Graham Hill Water Treatment Plant Concrete Tanks Replacement Project

CEQA Plus Federal Cross-Cutters
Initial Study/Mitigated Negative Declaration

May 2019

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Abbreviations and Acronyms

APE	Area of Potential Effect
AQMP	Air Quality Management Plan
BMP	Best Management Practice
CAAQS	California ambient air quality standards
CAL FIRE	California Department of Forestry and Fire Protection
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resources Board
CCAA	California Clean Air Act
CDFW	California Departmentof Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CH_4	Methane
CHRIS	California Historical Resources Information System
City	City of Santa Cruz
CO_2	carbon dioxide
CRHR	California Register of Historical Resources
dbh	diameter at breast height
ESA	Environmentally Sensitive Area
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FTA	Federal Transportation Authority
GHWTP	Graham Hill Water Treatment Plant
HCP	Habitat Conservation Plan
HMMP	Habitat Management and Monitoring Plan
IS	initial study
lbs/day	pounds per day
MBARD	Monterey Bay Air Resources District
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MG	million gallon
MHJB	Mount Hermon June beetle
MND	mitigated negative declaration
MT	metric ton
NAAQS	National Ambient Air Quality Standards
NCCAB	North Central Coast Air Basin
NHPA	National Historic Preservation Act
NO_x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NWIC	Northwest Information Center
PM_{10}	Particulate matter less than or equal to 10 microns
proposed project	Graham Hill Water Treatment Plant Concrete Tanks Replacement Project

RCNM	Roadway Construction Noise Model
SB	Senate Bill
SCADA	supervisory control and data acquisition system
SO_x	sulfurous gases
SWPPP	Stormwater Pollution Prevention Plan
USACE	United States Army Corps of Engineer
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and wildlife Service
UV	ultraviolet
VOC	volatile organic compounds
WDR	Waste Discharge Requirement
ZBWG	Zayante band-winged grasshopper

City of Santa Cruz
Environmental Checklist Form/Initial Study

I. Background

1. Project Title:

Graham Hill Water Treatment Plant Concrete Tanks Replacement Project

2. Lead Agency Name and Address:

City of Santa Cruz Water Department

212 Locust Street

Santa Cruz, California 95060

3. Contact Person and Phone Number:

Jessica Martinez-McKinney, Associate Planner, 831.420.5322

4. Project Location:

Graham Hill Water Treatment Plant

715 Graham Hill Road, Santa Cruz, California 95060

Assessor's Parcel Number 060-141-05

Refer to **Figures 1** and **2**.

5. Project Applicant's/Sponsor's Name and Address:

City of Santa Cruz Water Department

212 Locust Street, Santa Cruz, California 95060

6. General Plan Designation:

The proposed project area is designated as Community Facilities in the City of Santa Cruz General Plan. Adjacent land uses have been designated as Very Low Density Residential (0.1-1 Dwelling Unit/Acre) by City of Santa Cruz, and Rural Residential (2.5-20 acres per developable unit) and Mountain Residential (10-40 acres per developable unit) by the County of Santa Cruz.

7. Zoning:

The project area is zoned Public Facilities (PF) by the City of Santa Cruz Planning Department.

8. Description of the Project:

Project Background

The Graham Hill Water Treatment Plant (GHWTP) is a surface water treatment plant which provides the City of Santa Cruz (City) Water Department's service area and over 95,000 residents with their main source of potable water supply. The GHWTP site is within the City of

Santa Cruz jurisdiction but surrounded by developed properties within the unincorporated County of Santa Cruz.

The GHWTP was completed in 1961, expanded in 1968, and modernized in 1987. The modernization in 1987 was the last major upgrade at the GHWTP. The GHWTP, which has a hydraulic capacity of 24 million gallons of water per day, is a conventional water treatment plant, treating local surface waters from multiple sources: the San Lorenzo River, Majors Creek, Laguna Creek, Reggiardo Creek, Liddell Spring, and Loch Lomond Reservoir.

The conventional treatment process of the GHWTP consists of taste and odor control, pre-chlorination, coagulation, flocculation, sedimentation, dual granular media filtration, corrosion control and post-filtration chlorination. Filter backwash water and sedimentation basin sludge is recycled through a plate settler clarification system and returned to the beginning of the conventional treatment process. The GHWTP is in operation twenty-four hours a day, three hundred and sixty-five days a year, and is staffed by State certified Water Treatment Operators at all times. A central supervisory control and data acquisition system (SCADA) is used to monitor and control the treatment process and distribution system facilities.

In October 2015, City consultants Kennedy Jenks conducted a structural analysis of the concrete tanks and identified several deficiencies of the existing concrete tanks. They recommended major rehabilitation or replacement of the tanks over the next 10 to 15 years due to possible tank failure and loss of contents in a seismic event. It was determined that to meet the long term needs of the GHWTP, a feasible rehabilitation option was not possible due to the age and conditions of the tanks in relation to the future needs of the GHWTP to provide reliable and efficient service for the City. The purpose of the proposed project is to address the existing GHWTP deficiencies through the replacement of identified infrastructure. To reduce seismic risks during the interim period, the City has begun operating the facilities at lower water levels, as recommended by the Kennedy Jenks structural analysis.

The proposed improvements project is considered a "Project" under the California Environmental Quality Act (CEQA) because it is an activity directly undertaken by a public agency, and because it is supported through the assistance (funding) from one or more public agencies (CEQA Statute 21065). The City of Santa Cruz is the Lead Agency, responsible for compliance with CEQA and preparation of required environmental documentation. The Lead Agency, as defined by CEQA, is the public agency that has the primary responsibility for carrying out or approving a project. The City of Santa Cruz has prepared this Initial Study/Mitigated Negative Declaration (IS/MND) in accordance with the requirements of CEQA and the CEQA Guidelines.

The City is seeking federal funding for the proposed project through the Drinking Water State Revolving Fund program, which is a federal-state partnership to help ensure safe drinking water. Because the project may receive federal funding, it is subject to federal environmental "cross-cutting regulations" as well as CEQA. The federal "cross-cutting regulations" applicable to this project include the Clean Air Act, Endangered Species

Act, Migratory Bird Treaty Act, and National Historic Preservation Act. These are addressed in Section V, Explanation of Environmental Checklist Responses, under Air Quality, Biological Resources, and Cultural Resources, respectively.

Project Description

The proposed project would replace three existing concrete tanks that are past their anticipated service life, in accordance with the structural analysis and recommendations made by Kennedy Jenks (October 2015). **Figure 3** includes photos of the existing Sludge Storage Tank with staining from a horizontal leak showing the existing degradation of the tanks.

The three tanks proposed for replacement are the 1.0 million gallon (MG) Filtered Water Storage Tank, the 0.7 MG Wash Water Reclamation Tank (Reclaim Tank), and the 0.7 MG Sludge Storage Tank (**Figure 4**). The purpose of replacing the three tanks is not to increase the capacity or expand the services of the GHWTP, but is intended to upgrade and improve the reliability and flexibility of the system. These facilities and the associated appurtenances are a part of the existing GHWTP water treatment process, and would continue to provide the same services following project implementation.

The three replacement tanks would be constructed largely within the already disturbed areas of the GHWTP, in the lower pad area where the existing tanks are currently located. The existing lower pad would be expanded to accommodate the new tank configuration and construction sequencing, which would be phased to allow for the continued operation of the water treatment plant during construction. The proposed project elements are described below and summarized in **Table 1, Graham Hill Water Treatment Plant Concrete Tanks Project – Major Project Elements.**

Upgrades to the new concrete tanks would include a circular raceway chlorine contactor with an operational storage tank within the Filtered Water Storage Tank and mechanical equipment that would allow the plant operators to use four modes to operate their backwash water management system efficiently in the Reclaim and Sludge Storage Tanks. In addition, the new tanks would include a subdrain system to collect and intercept any leakage or groundwater around the tanks, routing this water through the storm drain collection system that would discharge directly into the San Lorenzo River.

In addition to the replacement of the three concrete tanks, two treatment plant pump stations would be upgraded. The Reclaim Pump Station would be relocated from the top of the existing Reclaim Tank to an at-grade location; the Wash Water Supply Pump Station would be relocated from its current location in the Operations Building basement to an at-grade location near the new Filtered Water Storage Tank.

Two new pump stations, appurtenant piping, and equipment would also be installed. A new Decant Port Effluent Pump Station would be constructed at-grade to pump decanted water from the new Reclaim Tank and new Sludge Storage Tank directly to the plant headworks. A Sludge Pump Station vault would be constructed to transfer solids between the Reclaim Tank and Sludge Storage Tank.

Replacement of the tanks also requires installation of ancillary pipelines, including:

- A 6" pipeline from the Sludge Pump Station to the new Sludge Storage Tank;
- A 30" drain pipe from the upper processes to the Reclaim and Sludge Storage Tanks;
- A 30" drain pipe from the new clearwell to the Reclaim and Sludge Storage Tanks;
- A 42" raw water pipeline behind the Filtered Water Tank; and,
- A 42" filtered water and 42" treated water pipeline behind the new Filtered Water Tank.

Implementation of the project would modify the electrical power supply, instrumentation, and controls, and would also include the installation of a new flow meter vault and meter to monitor the treated water flow rate leaving the GHWTP. A new Electrical Building would be constructed on the lower pad area to house associated electrical equipment.

The existing access foot bridge and staircase between the higher elevation (where the majority of the treatment and operations occur) and the lower pad area (where the tanks are located) would be replaced in-kind. The existing access road to the lower pad would be widened and repaved to accommodate construction vehicles and solids handling vehicles, as necessary, during plant operations per recommendations made by Kennedy Jenks (October 2015).

Up to five (5) retaining walls are included in the project to provide slope support along the site edges and access road. It is anticipated that the longest wall may be up to 450 feet long, and collectively the retaining walls would total approximately 850 feet in length. The maximum wall height is anticipated to be 32 feet. One additional retaining wall would also be required to support the construction of the electrical building. The height and length of the electrical building retaining wall would depend on its final location; in the currently proposed location, the retaining wall maximum length is 140 feet and the height is 20 feet.

Improvements to the existing stormwater drainage system for the GHWTP would also be implemented as part of the project to prevent runoff from flowing onto downhill slopes. The existing stormwater drainage pipe leaving the GHWTP site has a maximum capacity of 23 cubic feet per second (cfs). Through implementation of the project improvements, the 100-year design flow would be 21 cfs. As the existing storm drain pipe has sufficient capacity for the 100-year design storm event, an additional outlet was not added as part of the proposed improvements. However, the effectiveness and efficiency of the system would be improved to offset ongoing erosion caused by surface stormwater flow that is occurring onto neighboring properties during large storm events. Improvements include eliminating the existing storm drain conveyance that terminates in a "Tee" diffuser and installing drainage benches on cut slopes to capture the project area runoff and directly convey it into the existing storm drain pipeline that discharges into the San Lorenzo River.

The proposed project has been designed so that it could accommodate possible future ultraviolet (UV) disinfection and solids dewatering facilities that may be considered as part of a future project. To avoid having to re-excavate the area should these facilities be approved in the future, piping, conduit, and other buried infrastructure to facilitate potential connections would be installed.

Table 1. Graham Hill Water Treatment Plant Concrete Tanks Project – Major Project Elements
Defined Project
Pump Stations
• Reclaim Pump Station • Wash Water Supply Pump Station • Decant Port Effluent Pump Station • Sludge Pump Station (Vault)
Tanks
• One (1) Filtered Water Tank – includes inner wall & roof (1 MG) (adding a raceway for chlorine contact) • One (1) Reclaim Tank (0.75 MG) • One (1) Sludge Storage Tank (0.75 MG)
Site/Grading
• Up to 5 Retaining walls • Expand existing lower pad to create new pad • Expand and improve existing access road • 36" flow meter vault • 42" flow meter vault • Replace access foot bridge and staircase from upper pad to lower pad
Other Project Elements
• Electrical Building • Accommodation for possible future ultraviolet (UV) disinfection and solids dewatering facilities • Installation of ancillary pipelines, instrumentation, and controls

Project Construction

Sequencing. Construction of the replacement tanks would need to be phased to allow continued operation of the water treatment plant and delivery of treated drinking water to the service area. Specifically, the Reclaim Tank and the Filtered Water Storage Tanks must be online at all times. The lower pad where the existing Concrete Tanks are located does not have adequate space to accommodate construction of the new tanks while keeping the existing tanks online. Therefore, the lower pad needs to be extended to the area north of the existing tanks. To extend the lower pad north, the existing Sludge Storage Tank needs to be demolished. The proposed construction sequence may change during construction if the selected general contractor has innovative solutions that meet operational and environmental requirements.

Following demolition of the Sludge Storage Tank and expansion of the lower pad the new Electrical Building will be constructed to the south of the existing Filtered Water Tank. To construct the Electrical Building, the existing filtered water pipeline would be temporarily realigned because the location of the new Electrical Building is on top of this pipeline.

Following construction of the Electrical Building, the new Sludge Storage Tank would be constructed on the new lower pad area. Immediately following construction of the new Sludge Storage Tank, the new Reclaim Tank would be constructed where the existing Sludge Storage Tank is currently located. The new Reclaim Pump Station, Decant Pump Station, and Sludge Pump Station would also be constructed and placed in service

before the original Reclaim Tank is demolished. After the new Reclaim Tank, Reclaim Pump Station, Decant Pump Station, and Sludge Pump Station are operational, the existing Reclaim Tank and Reclaim Pump Station would be demolished, and the new 36-inch and 42-inch filtered water pipelines would be installed.

The new Filtered Water Tank would then be constructed where the existing Reclaim Tank is located. After the new Filtered Water Tank is operational, the existing Filtered Water Tank would be demolished.

When the Filtered Water Tank is operational, the new Wash Water Supply Pump Station would be constructed. After the new Wash Water Supply Pump Station is operational, the original Wash Water Supply Pump Station located in the Operations Building basement would be decommissioned; the pumps, valves and other components would be removed; and the pumps' connections would be sealed.

Startup and commissioning of the improvements would occur as individual facilities are completed. This would allow City use of the facilities prior to the completion of all aspects of the project to facilitate the continued operation of the plant.

Staging. Staging would occur onsite at the GHWTP within the existing lower asphalt pad area, parking areas, or previously disturbed areas that currently support operational infrastructure. Additional staging and parking would occur near the main headquarters throughout the existing paved or gravel areas of the plant.

In the event that all construction related equipment and materials cannot be contained onsite, an offsite staging area would be utilized throughout project implementation. The offsite staging area would be located on a site that has been previously disturbed. The site would be located within five (5) miles of the GHWTP, and would be approximately 100 x 200 feet in size. Any adjacent waterways and/or sensitive resources would be protected. Although the City has not determined a specific offsite staging area, one area being considered for use is APN 008-012-07, a vacant lot owned by the City on River Street. This lot is graveled and has been used by the City for materials storage in the past. This site is used regularly by the City for storage and staging purposes, and is fenced for security purposes. When in use, BMPs are implemented per the City's Stormwater management program to ensure that the adjacent San Lorenzo River and sensitive resources are protected from construction related impacts.

The offsite staging location would be used for materials/equipment storage and/or employee parking. The contractor may include security fencing and/or personnel to ensure the safety of the equipment and materials used for project construction activities. In the event that the offsite area was used for employee parking, a daily shuttle would transport employees between the offsite parking location and the GHWTP. If spoils were transported and/or stored at the offsite staging area, water quality best management practices (BMPs), as described below, would be implemented to ensure that all materials remained contained on the site, and there would be no runoff to adjacent land uses. If an

offsite staging area is used that deviates from these specifications, additional environmental evaluation and review may be required.

Schedule. It is assumed that construction activities would occur for approximately two and a half years, beginning in winter 2019 and ending in summer 2022. **Table 2** outlines the construction duration for each portion of the project; some of these actions would occur concurrently, and therefore, the total duration for all construction activities (116 weeks) is less than the cumulative number of weeks for each construction action. In addition, the total duration for construction activities (116) is less than the anticipated construction schedule to account for gaps in construction work that may occur during implementation of the project.

Table 2. Estimated Construction Duration for Project Implementation

Construction Action	Duration
Mobilize construction materials/equipment to the site, Site preparation	4 weeks
Site Work/Earthwork/Demolition	20 weeks
Removal and Replacement of Utilities	36 weeks
Concrete Work for Tank Replacement	48 weeks
Install replacement path railing and striping	6 weeks
Mechanical Work	48 weeks
Electrical Upgrades	68 weeks
Other Activities	48 weeks
Approximate Total Construction Time	**116 weeks**

Equipment and Materials. Construction equipment that is anticipated for use includes excavators, scrapers, loaders, backhoes, graders, compacters, pavers, water trucks, boomtrucks, cranes, concrete pumps, air compressors and trucks for transporting materials. Waste and debris from demolishing the existing tanks and structures would be transported incrementally from the GHWTP to the City of Santa Cruz Resource Recovery Facility at Dimeo Lane or another approved waste disposal facility.

Construction Best Management Practices (BMPs). The following construction BMPs would be implemented throughout project related construction activities to minimize impacts to the environment that may occur through the project.

Air Quality and Water Quality

The following construction BMPs will be implemented to minimize negative effects on air quality and water quality throughout construction activities.

1. Implementation of the project will result in the ground disturbance of more than one acre and, therefore, will be regulated under the Clean Water Act through the National Pollutant Discharge Elimination System (NPDES) stormwater program, which requires compliance with the Construction General Permit. This permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) which must describe the site, the facility, erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local

plans, control of construction sediment and erosion control measures, maintenance responsibilities, and non-stormwater management controls. The inspection of construction sites before and after storms is also required to evaluate stormwater discharge from the construction site, and to identify and implement additional erosion controls, where necessary. Compliance with the NPDES-required SWPPP will reduce the overall risk of soil erosion.

2. All construction and staging activities will be conducted in accordance with the City's Storm Water Ordinances (Chapters 16.19 Storm Water and Urban Runoff Pollution Control) and the City's *Construction Work Best Management Practices, Chapter 4 of the Best Management Practices Manual for the City's Storm Water Management Program* (revised June 2014). This includes the preparation and implementation of an Erosion Control Plan, which will specify detailed water quality protection and erosion/sediment control BMPs. The Erosion Control Plan will also include requirements for equipment and vehicle maintenance, materials storage, and other construction practices which could result in the inadvertent release of fuel, motor oil, and other hazardous fluids and materials. Measures to ensure proper disposal of construction and demolition waste, including asbestos, lead and other debris containing hazardous materials are also included. BMPs will be selected to represent the best available technology that is economically achievable, subject to review and approval by the City. The City will perform routine inspections of the construction area to verify the BMPs are being properly implemented and protection measures are being maintained. The City will notify the contractor immediately if there were a violation that will require immediate compliance.

3. Excavation and grading activities on or near slopes exceeding thirty (30) percent will occur outside of the winter rainy season at the discretion of the City based on weather conditions and forecasts. All grading, regardless of the time of year or weather conditions, will employ BMPs as described in the Erosion Control Plan and SWPPP.

4. To reduce the generation of fugitive dust throughout project implementation, the construction contractor will be required to prepare and implement dust control measures at the construction and staging areas, which will include: water all active construction areas as needed based on the type of construction activity, soil, and wind exposure; maintain at least 2-feet of freeboard, or cover dirt and loose materials, in haul trucks throughout transportation; cover inactive storage piles and stock piles of dirt; and sweep any roadways/paths if loose soil material remains at the end of the work day.

5. As necessary, the project will comply with MBARD Rule 424, National Emissions Standards for Hazardous Air Pollutants. Rule 424 defines the investigation and reporting requirements for asbestos which include surveys and advanced notification on structures being renovated or demolished. Air District notification will be required

at least ten days prior to renovation or demolition activities. If old underground piping or other asbestos containing construction materials are encountered during trenching activities, Rule 424 may also apply.

6. If portable construction equipment that is used for project implementation includes engines 50 horsepower (Hp) in size or greater, the City will comply with required permits issued by MBARD, in compliance with the California Air Resources Board regulations.
7. Given the close proximity of residences, the City will comply with the MBARD's recommendation to use cleaner construction equipment that conforms to the Environmental Protection Agency's Tier 3 or Tier 4 emission standards. Wherever feasible, construction equipment will use alternative fuels such as compressed natural gas, propane, electricity or biodiesel.

Biological Resources

In accordance with the Biotic Report (**Appendix A**) that was prepared for the project, the following construction BMPs will be included throughout implementation of the project.

1. **Education Materials and Training –** A binder with information containing any permits and environmental requirements for the project, including avoidance of special-status species and habitats, will be created and kept at the project area at all times. Prior to starting construction, all employees and contractors who will be present during project activities will receive training from a qualified individual on the contents of the binder, including species identification, avoidance and minimization measures, and stop work and reporting requirements.
2. **Heritage Tree Protection –** Preconstruction activities will include identifying, marking, and measuring the trees that will be removed or trimmed for project construction. Although the City of Santa Cruz Heritage Tree Ordinance is not applicable to the project, pursuant to California Government Code section 53091, any impacts to heritage trees (trees with a circumference of forty-four (44) inches, approximately fourteen (14) inches in diameter, measured at breast-height, approximately fifty-four (54) inches above existing grade) will be avoided to the greatest extent feasible, and pruning or removal will be performed by a state tree care license issued by the State of California in accordance with a consulting arborist report prepared for the project area. The City will also comply with mitigation requirements, in accordance with the project arborist report.
3. **Preconstruction Surveys –** Preconstruction surveys and protection measures, as needed, will be undertaken for a variety of species prior to the onset of construction activities. Although identified survey and protective buffer areas for each species will be observed to the greatest extent practicable, for areas in which this will extend onto private property, access and established buffers will be limited to the project area.

Nesting Birds

To protect nesting birds, no tree or vegetation trimming or removal, or noise generating activities above existing ambient noise levels, could occur from February 1 through August 31 unless the following Avian Nesting Surveys are completed by a qualified biologist.

Birds of Prey. A survey for nesting activities of birds of prey within the project area and a 500-foot radius within 14 days prior to starting project activities shall be undertaken. In the event that this area includes private property for which access is restricted, visual inspection of adjacent habitats will be undertaken. If any active nests are observed, these nests shall be designated as Environmentally Sensitive Areas (ESAs) and protected by a minimum 500-foot avoidance buffer, to the greatest extent possible, within the project area, until the breeding season has ended, or until a qualified biologist has determined that the young have fledged and are no longer reliant upon the nest site or parental care for survival.

Other Avian Species. A survey for nesting activities within the project area and, to the greatest extent possible, a 250-foot buffer, within 14 days prior to starting project activities shall be undertaken. In the event that this area includes private property for which access is restricted, visual inspection of adjacent habitats will be undertaken. If any nesting activity is found, the City shall designate nests and nest substrate (trees, shrubs, ground, or burrows) as an ESA and protect with a minimum 250-foot buffer until young have fledged and are no longer reliant on the nest site or parental care.

Bat Species

Preconstruction surveys of suitable roosting habitat features shall be conducted within the project area and a 250-foot buffer by a qualified biologist within 14 days prior to the start of project construction activity. In the event that this area includes private property for which access is restricted, visual inspection or echolocation monitoring of adjacent habitats will be undertaken. Surveys will be conducted during the appropriate time of day to maximize detectability to determine if bat species are roosting within or near the project area. Surveys may include observational methods or echolocation monitoring to determine whether bats are present. A survey report shall be completed that includes, but is not limited to, the survey methodology and biologist qualifications and, if bats are present, the colony size, roost location, and characteristics. If surveys confirm that bats daytime roost in areas impacted by the project, the permittee shall maintain a 300-foot buffer around bat roost sites during project activities, within the project area. If

present, bats shall not be disturbed without specific notice to and consultation with CDFW.

American Badger

Preconstruction surveys for American badger and sign of their burrows shall be conducted within 14 days of the start of construction. Any American badger detected within the project area during project activities shall be allowed to move out of the work area of its own volition. If American badger is denning on or immediately adjacent to the project work area, CDFW shall be consulted to determine whether the animal(s) may be evicted from the den. Eviction of badgers will not be approved by CDFW unless it is confirmed that no dependent young are present.

San Francisco Dusky-Footed Woodrat

Preconstruction surveys for San Francisco dusky-footed woodrat and nests shall be conducted within 30 days of the start of construction. All active woodrat nests shall be avoided and protected during project construction activities with a minimum 25-foot buffer. If nests cannot be avoided by this buffer, the City shall consult with CDFW regarding a reduced buffer or to dismantle the nests prior to land clearing activities. CDFW may approve the dismantling of nests during the nonbreeding season, between October 1 and December 31, to allow animals to escape harm and to reestablish territories for the next breeding season.

4. **Work Timing –** Many of the special-status animals with a potential to occur within the project area are active at dusk and during the night. To avoid impacts to these species, all noise-generating work activities shall be confined to daylight hours.

5. **Erosion Control –** To protect the small seep area adjacent to the project area at the bottom of the slope below the lower cement pad, erosion control measures, as identified if the project erosion control plan, shall be implemented and maintained along the southern edge of the project area. Erosion control shall be inspected and maintained until the project is complete.

6. **Temporary Fencing to Protect Resources Outside of the Construction Zone –** Prior to the onset of construction activities, the contractor will install temporary fencing between areas of disturbance and areas that will remain undisturbed throughout project implementation to prevent impacts beyond the construction area, specifically along the northern and western project boundaries. This will protect vegetation and trees, and associated wildlife species, including the Mount Hermon June beetle and common wildlife species present onsite.

7. **Implement the Low Effect HCP Conservation Strategy** – The following Minimization and Mitigation Measures are from the existing Low Effect Habitat Conservation Plan (HCP) for the Issuance of an Incidental Take Permit Under Section 10(a)(1)(B) of the Endangered Species Act for the Federally Endangered Mount Hermon June beetle,

Zayante band winged grasshopper and Ben Lomond spineflower (City of Santa Cruz 2013a) and are designed to protect Mount Hermon June beetle (MHJB), Zayante banded winged grasshopper, Ben Lomond spineflower and Zayante sandhills/Maritime Coast Range Ponderosa Pine Forest habitat. In accordance with the HCP, compliance monitoring by a qualified biologist will occur throughout all construction activities and O&M activities in suitable or occupied MHJB habitat. The qualified biologist will ensure that the following measures are implemented. The qualified biologist will also be responsible for effects monitoring, which will include the calculation of areas of habitat disturbance and the number, if any, of individual MHJB relocated. All information gathered by the biologist will be included in the HCP annual report prepared by the City for the USFWS.

Measure 7a: Locate Project Activities on and Adjacent to Current Development. To the extent practical, the covered activities of the HCP that occur on the portion of the project area characterized by Zayante sands will be located either within, or immediately adjacent to, the footprint of the existing GHWTP facilities (i.e., existing buildings, water tanks, service roads, pipelines, etc.).

Measure 7b: Delineate Boundaries of the Impact Area. Temporary fencing and signs will be erected before any vegetation clearing, excavation, or grading activities occur to clearly delineate the boundaries of the project's impact area between areas disturbed by construction activities and those that will remain in existing conditions, specifically in the northern and western perimeters of the project area. Warning signs will be posted on the temporary fencing to alert workers not to proceed beyond the fence. All protective fencing will remain in place until the construction activities have been completed. Signs will include the following language: "NOTICE: SENSITIVE HABITAT AREA. DO NOT ENTER."

Measure 7c: Cover Exposed Soils. Adult males of the MHJB actively search for breeding females during the evenings between about May 15 and August 15. During this period, both sexes burrow into duff and Zayante sandy soils during the daytime for refuge until the following night's flight. If construction or other ground disturbing activities occur during any portion of the MHJB flight season, all exposed Zayante soils within the impact area will be covered by tarps, plywood, erosion control fabric, or another suitable impervious material. Exposed soils should be covered between the hours of 7:00 p.m. and 7:00 a.m. daily by a qualified biologist. This will prevent adult males from burrowing into the exposed soils and subsequently being injured or killed by soil disturbance (digging, grading, covering, etc.).

Measure 7d: Dust Control. Appropriate dust control measures, such as periodically wetting down the work areas, will be used as necessary during excavation or any

soil disturbing activities in the impact area or any other covered activities that generate dust.

Measure 7e: New Outdoor Lighting. Adult MHJBs are active at dusk and may be distracted by incandescent, mercury vapor, sodium, and black light sources, which can disrupt normal behaviors and breeding activities. Thus, any new outdoor lighting installed as part of this project will use bulbs certified to not attract nocturnal insects.

Measure 7f: Landscaping Elements That Degrade MHJB Habitat. Because MHJB adults emerge from the soil to attract and search for mates, turf grass, dense ground covers (such as ivy), weed matting, aggregate, and mulch can degrade habitat conditions and will not be used in this project. Material for revegetation will use plants endemic to the Zayante Sandhills.

Cultural Resources

Prior to the onset of construction activities, a qualified archaeologist will provide an education program for the contractor and construction crew to provide an overview of cultural, historic and paleontological resources, and what resources may be discovered through ground disturbing activities. The program will include an overview of the steps that will be required in the event of an unexpected discovery of resources through the implementation of construction related activities at the GHWTP.

In the event that unexpected cultural, historic or paleontological resources are discovered by any person at the construction site, the City shall implement the following measures consistent with Section 24.12.430, Protection of Archaeological Resources, of the Santa Cruz Municipal Code[1]. Work will be stopped in the event that unexpected occurrences of cultural or historic resources occurs through implementation of construction activities. Although the project area has been previously disturbed through prior construction activities and cultural or historic resources are unlikely to be found at the GHWTP, if evidence of cultural resources are identified during ground disturbance associated with the proposed project, the construction crews will stop all work within 100 feet of the discovery until a qualified archaeologist who meets the Secretary of the Interior's Professional Qualifications Standards as promulgated in 36 CFR 61 and who has experience with precontact, historic period, and tribal resources assesses the previously unrecorded discovery and provides recommendations. Potential resources include subsurface historic features such as artifact-filled privies, wells, and refuse pits, and artifact deposits, along with concentrations of adobe, stone or concrete walls or foundations, and concentrations of ceramic, glass, or metal materials. Potential Native American archaeological materials include obsidian and chert flaked stone tools (such as projectile and dart points), midden (culturally derived darkened soil containing heat-affected rock, artifacts, animal bones, and/or shellfish remains), and/or groundstone implements (such as

1 http://www.codepublishing.com/CA/SantaCruz/html/SantaCruz24/SantaCruz2412.html#24.12.430

mortars and pestles).

If cultural resources are encountered, the archaeologist shall have the authority to temporarily halt or redirect ground-disturbing activities until the material is evaluated and appropriate course of action is determined by the archaeologist and City.

1. Discovery of Artifacts or Remains During Excavation or Development. If any person excavating or otherwise disturbing earth discovers any human remains of any age or any artifact or any other object which reasonably appears to be evidence of an archaeological/cultural resource, shall:
    a. Immediately cease all further excavation, disturbance, and work on the project area;
    b. Cause staking to be placed completely around the area of discovery by visible stakes not more than ten (10) feet apart forming a circle having a radius of not less than one hundred feet from the point of discovery; provided, that such staking need not take place on adjoining property unless the owner of the adjoining property authorizes such staking;
    c. Notify the Santa Cruz County sheriff-coroner of the discovery unless no human remains have been discovered, in which case the property owner shall notify only the planning director;
    d. Grant permission to all duly authorized representatives of the sheriff-coroner to enter onto the property and to take all actions consistent with this section.
2. Coroner's Action on Discovery of Remains. If human remains are discovered, the sheriff-coroner or representative shall promptly inspect the remains to determine the age and ethnic character of the remains and shall promptly. If the remains are found to be Native American in origin, the sheriff-coroner shall notify the Native American Heritage Commission. The Native American Heritage Commission will identify the Native American most likely descendant who will provide recommendations for the proper treatment of the remains and associated artifacts per California State Resources Code Section 5079.9.
3. Action on Discovery of Artifacts. If any artifacts are discovered, the City shall cause an on-site inspection of the property to be made by a qualified archaeologist. The purpose of the inspection shall be to determine whether the discovery is of an archaeological resource or cultural resource.
4. Discovery Not an Archaeological/Cultural Resource. Upon determining that the discovery is not of an archaeological/cultural resource, the qualified archaeologist shall notify the City of such determination and shall authorize the resumption of work.
5. Discovery an Archaeological/Cultural Resource. Upon determining that the discovery is of an archaeological/cultural resource, the archaeologist shall notify

the City that no further excavation or development may take place until a mitigation plan or other measures have been developed to preserve or protect the resource.

6. Mitigation Plan. The City shall prepare any required mitigation plan. The mitigation plan shall include conditions necessary or appropriate for the protection of the resource including, but not limited to, conditions on the resumption of work, redesign of the project, or other conditions deemed appropriate by the planning director. The mitigation plan will be reviewed by the NAHC to ensure proper protection of the resource. When the NAHC is satisfied that the mitigation plan is adequate, resumption of work will be authorized in conformance with the mitigation plan.

Noise

The following measures will be implemented to minimize noise impacts on adjacent land uses to the greatest extent possible.

1. Notify neighbors located adjacent to the GHWTP of the construction schedule to ensure awareness of the upcoming project activities and projected duration of construction activities.
2. A "Construction Coordinator" will be identified by the City. The contact information for the Construction Coordinator will be included on notices distributed to neighbors regarding planned construction activities, and posted outside of the GHWTP. The Construction Coordinator will be responsible for responding to any local concerns about construction noise. The Construction Coordinator shall notify the City within 48 hours of the report, determine the cause of the concern, and implement, as feasible, reasonable measures to resolve the concern, as deemed acceptable by the City. A reporting program will be implemented by the Construction Coordinator that documents complaints received, actions taken to resolve problems and effectiveness of the actions.
3. To the greatest extent practicable, noise control measures will be implemented throughout the construction area, including a feasible combination of parapet walls, enclosures/housing for noisy equipment, locating enclosure openings/ventings away from neighboring residences and/or the construction of noise barriers.
4. Where technology exists, quiet models of air compressors and other stationary noise sources will be required for use to the greatest extent practicable.
5. New at-grade motors will be fully enclosed and specifications will require the installation of quiet models. The pump stations will be designed to leave space for the installation of sound enclosures, as necessary, to limit noise generation. At a maximum, the proposed pumps will generate noise levels of 70 dBA at 3 feet per testing conducted by the pump motor manufacturer.

6. Construction of the proposed project will occur during daylight hours. In addition, noise generating project activities will be restricted to 8:00 a.m. through 5:00 p.m. Monday through Friday, unless prior approval by the Water Department Director is obtained, which is in accordance with the City and County noise ordinances.

Traffic and Transportation

The following plan will be developed to minimize traffic impacts that may result through project related construction vehicles and activities.

Traffic Control Plan. A traffic control plan will be prepared through the County encroachment permit process to minimize project effects on local traffic around the project area, including Graham Hill Road and the roadways around the offsite staging area, if offsite staging is required. The County approved traffic control plan will ensure that roadways and pedestrian/bicycle paths remain open throughout project construction to the greatest extent feasible, and that any lane and path closures will be safely and effectively managed, with detours clearly identified. Emergency access will be retained on all roadways during construction.

Prior to the start of construction activities, signage will be installed on Graham Hill Road near the GHWTP, and will include the dates for construction, contact information for the Construction Coordinator to answer project specific questions, and detour information to minimize the effects of temporary pedestrian/bicycle path closures, as necessary. Additionally, the local safety personnel (e.g., police and fire department) will be informed of any detours or lane closures to maintain effective emergency service access throughout the duration of the project.

City designated truck routes will be used by construction equipment to import and export material from the project area to the City of Santa Cruz Resource Recovery Facility on Dimeo Lane, or another approved waste disposal facility.

9. **Other Public Agencies Whose Approval is Required:**

- California Air Resources Board – Permits or registration if portable construction equipment with engines exceeding 50 Hp is used (to be determined)
- Central Coast Regional Water Quality Control Board – NPDES Permit

  City of Santa Cruz – Project Approval and Adoption of the Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program
- County of Santa Cruz Public Works Department – Encroachment Permit
- Monterey Bay Air Resources District – Compliance with Rule 424, National Emissions Standards for Hazardous Air Pollutants (to be determined)

II. Environmental Setting and Surrounding Land Uses

The GHWTP is located in a suburban/rural area within the City of Santa Cruz (**Figure 1**). The GHWTP is accessed from Graham Hill Road, and there is a security gate that requires a code or access to be provided by operations staff within the plant to enter the site. The plant is completely fenced, and public access is not permitted.

The plant is largely surrounded by low-density residences on Graham Hill Road, Mosswood Court and Quail Crossing Roads. Within the GHWTP, the undeveloped portions of the property are defined by steep grasslands and well-established trees and vegetation. There are no adjacent waterways to the project area.

The project area includes just over 1 acre of the GHWTP site, as construction activities and staging would occur throughout much of the site, with the exception of the upper grassy, unpaved area of the plant located adjacent to residences on Mosswood Court (**Figure 2**). In the event that offsite staging would occur, the project area would also include the offsite staging area where additional worker parking would be provided, and materials and equipment would be stored. This area would be located on a previously disturbed property within a 5-mile radius of the GHWTP, as described above in the Project Construction – Staging section.

III. Environmental Checklist

Environmental Factors Potentially Affected by the Project:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Unless Mitigation is Incorporated" as indicated by the checklist on the following pages. All potentially significant impacts could be reduced to a less than significant level with mitigation.

	Aesthetics		Agricultural & Forest Resources		Air Quality
X	Biological Resources		Cultural Resources		Energy
X	Geology/Soils		Greenhouse Gas Emissions		Hazards & Hazardous Materials
	Hydrology/Water Quality		Land Use/Planning		Mineral Resources
X	Noise		Population/Housing		Public Services
	Recreation		Transportation		Tribal Cultural Resources
	Utilities/Service Systems		Wildfire		Mandatory Findings of Significance

Discussion of Environmental Checklist

The environmental checklist with the questions and answers for each environmental factor has been presented in this section. The discussion which explains the responses is presented in Section V, Explanation of Environmental Checklist Responses.

List of Required Mitigation Measures

A summary of the required mitigation measures identified in this initial study is provided below:

- **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation)
- **Mitigation Measure BIO-2**: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation)
- **Mitigation Measure GEO-1**: Stop Work in the Event of Unexpected Paleontological Resources or Unique Geological Features during Construction
- **Mitigation Measure NOI-1:** Preparation and Implementation of a Noise Control Plan for Construction Activities

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
1. AESTHETICS. Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?			X	
b) Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?				X
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?			X	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
2. AGRICULTURE AND FOREST RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement Methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? (V.1b-Figure 4.15-1 in DEIR)				X
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland				X

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
zoned Timberland Production (as defined by Government Code section 51104(g))?				
d) Result in the loss of forest land or conversion of forest land to non-forest use?				X
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?				X
3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?			X	
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?			X	
c) Expose sensitive receptors to substantial pollutant concentrations?			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?			X	
4. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?		X		
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
removal, filling, hydrological interruption, or other means?				
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?		X		
5. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5?			X	
b) Cause a substantial adverse change in the significance of an			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
archaeological resource pursuant to Section 15064.5?				
c) Disturb any human remains, including those interred outside of dedicated cemeteries?			X	
6. ENERGY. Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?			X	
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?			X	
7. GEOLOGY AND SOILS. Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. (V.Ic) ii. Strong seismic ground shaking? iii. Seismic-related ground failure, including liquefaction? iv. Landslides? (V.Ib-DEIR Figure 4.10-3)				
b. Result in substantial soil erosion or the loss of topsoil?			X	
c. 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?			X	
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
e. 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?				X
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		X		
8. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	
9. HAZARDS & HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	
b) Create a significant hazard to the public or the environment through reasonably foreseeable			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
upset and accident conditions involving the release of hazardous materials into the environment?				
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ miles of an existing or proposed school?			X	
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				X
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?				X
f) Impair implementation of or physically interfere			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
with an adopted emergency response plan or emergency evacuation plan?				
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?			X	
10. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?			X	
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			X	
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
i. result in substantial erosion or siltation on- or off-site; ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite; iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv. impede or redirect flood flows?				
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?				X
e) Conflict with or obstruct implementation of a water quality control plan or sustainable			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
groundwater management plan?				
11. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?				X
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?				X
12. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? (V.1a)				X
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				X

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
13. NOISE: Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		
b) Generation of excessive groundborne vibration or groundborne noise levels?			X	
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				X

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
14. POPULATION AND HOUSING. Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				X
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				X
15. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities or need for new or physical altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a) Fire protection?				X
b) Police protection?				X
c) Schools?				X
d) Parks?				X
e) Other public facilities?				X

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
16. RECREATION. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				X
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				X
17. TRANSPORTATION. Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?			X	
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?			X	
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or				X

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
incompatible uses (e.g., farm equipment)?				
d) Substantially Result in inadequate emergency access?			X	
18. TRIBAL CULTURAL RESOURCES				
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or			X	
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe				
19. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?			X	
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			X	
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				X

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?			X	
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?			X	
20. WILDFIRE. -- If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?			X	
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?			X	
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that			X	

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?				
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?			X	
21. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?		X		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a		X		

ENVIRONMENTAL IMPACTS Issues (and Supporting Information Sources):	Potentially Significant Issues	Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?				
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			X	

IV. Determination

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	
I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent (City of Santa Cruz), including the mitigation measures identified herein. A MITIGATED NEGATIVE DECLARATION will be prepared.	X
I find that the proposed project MAY have a significant effect on the environment and an ENVIRONMENTAL IMPACT REPORT is required.	
I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.	
I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	

Heidi R Luckenbach

Heidi Luckenbach, Deputy Director/Engineering Manager
City of Santa Cruz Water Department

May 28 2019
Date

V. Explanation of Environmental Checklist Responses

1. AESTHETICS.

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

a. *Have a substantial adverse effect on a scenic vista;*

b. *Substantially damage scenic resources, including visually prominent trees, rock outcrops, or historic buildings along a state scenic highway;*

c. *In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality; or*

d. *Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.*

a) Adverse Effect on Vista – Less than Significant. The City of Santa Cruz General Plan 2030 identifies substantial natural and open space areas as scenic resources that build the character of the City. These include coastlines and beaches, the San Lorenzo River and other waterways, parks and open space, and views of the Santa Cruz Mountains, downtown area, and the Pacific Ocean (City of Santa Cruz 2012a). Other amenities including the City of Santa Cruz Pogonip Open Space, the University of California Santa Cruz Campus, other pronounced hills and greenbelt locations, and historic and cultural sites and structures also provide scenic amenities to the City (City of Santa Cruz 2012a).

Implementation of the project would occur within the GHWTP property, an area that is largely shielded from public view because of the surrounding topography and mature vegetation. The project area may be intermittently viewed from surrounding hillsides, including Coolidge Drive on the campus of the University of California at Santa Cruz campus. The project would result in the replacement and construction of infrastructure throughout the GHWTP (**Figure 4**). Project construction of these features, including the expansion of the access roadway, may require the removal or limbing of up to 52 trees onsite and existing vegetation along the hillside that supports MHJB (**Figure 5**).

Impact Analysis. The GHWTP is located in the northern portion of the City of Santa Cruz, outside of the urban downtown. There are no views from the proposed project location of the Monterey Bay or Pacific Ocean, San Lorenzo River or downtown Santa Cruz, nor any other scenic views identified by the City of Santa Cruz. Limited views of the project area may be seen from areas within the Santa

Cruz Mountains, depending on the topography and vegetation of the vantage point. Pogonip Open Space, which has been identified as a scenic resource by the City of Santa Cruz General Plan 2030, is located approximately 1 mile west of the site, and is not visible from the project area.

Design features that would be added to the GHWTP would be partially visible from public vantage points, including adjacent hillsides and Coolidge Drive within the University of Santa Cruz campus. Although infrastructure improvements would modify views of the project area from these adjacent vantage points, the overall land use would remain the same within the GHWTP following project implementation, and views to the project area would remain largely unchanged. Implementation of the project would not block or hinder views from adjacent land uses, or result in changes to views to areas identified as scenic vistas by the City. Therefore, impacts to scenic vistas as a result of project implementation would be **less than significant.** No mitigation would be required.

b) Damage Scenic Resources within State Scenic Highway – No Impact. The entrance to the GHWTP is via a driveway on Graham Hill Road, set back from the roadway and behind a secured gate. The project area is located approximately 0.25 miles east of Highway 9 and approximately 0.75 miles west of Highway 17, and is not visible from either roadway. Neither Highway 9 nor Highway 17 is Officially Designated as a State Scenic Highway; although, both are considered Eligible State Scenic Highways (Caltrans 2019). The project area is also not located along a City designated scenic road, as Graham Hill Road is not considered a scenic road (City of Santa Cruz 2012a). Therefore, the project would not result in damages to scenic resources within a state designated scenic highway or local scenic roadway, and there would be **no impact.**

c) Degrade Visual Character or Quality of the Area – Less than Significant. As described under (a), the project area is not largely visible from adjacent scenic vistas or resources, and does not include elements that would substantially change the scenery from the existing sensitive viewpoints to the site or surrounding area from public lands. Limited views of the project area from adjacent hillsides, and in particular Coolidge Drive on the University of California Santa Cruz campus, are possible. However, the topography and mature vegetation within the Santa Cruz Mountains largely shield views of the site from these areas.

Land uses surrounding the project area are low density residential development, interspersed among rolling vegetated grasslands and open space that support mature trees and vegetation. The project area is completely enclosed and surrounded by fencing, and is visible from only private residential yards adjacent to the north, south and east of the project area.

Impact Analysis. Improvements to the GHWTP would result in changes to the plant that visually would result in the plant looking largely the same as existing conditions within a larger footprint, as the added features would be similar to those present today. However, the potential for removal or limbing of up to 52 trees throughout the project area would alter views from adjacent land uses within the surrounding Santa Cruz Mountains, and would diminish the existing screening that is provided by the mature vegetation. Although there would be changes to the overall visual character and quality of the project area, these changes would be temporary in nature. Vegetation would be replanted following project implementation, and the overall land use changes within the GHWTP would be minor and largely unchanged following project implementation, as the project area would continue to support a large water treatment facility that is surrounded by open space and mature vegetation.

Implementation of the project would also remain consistent with the project zoning for Public Facilities (PF), as the upgraded facilities would be consistent with the existing GHWTP. The project would also not conflict with applicable regulations governing the scenic quality of the project area, as there are limited views of the project area from public viewsheds within the Santa Cruz Mountains, and the overall nature of the area within and surrounding the GHWTP would remain largely unchanged. Therefore, this impact would be **less than significant**. No mitigation would be required.

d) <u>New Source of Substantial Light or Glare – Less than Significant</u>. The GHWTP includes existing light sources (e.g., exterior standards and fixtures), which are illuminated at night for security purposes, from each building and throughout the lower pad that supports the tanks. There are also lights at the top of the stairs extending from the main headquarters building to the lower tanks area, at the first landing going to the reclaim tank, and on the catwalks leading to the reclaim and sludge tanks. Following the construction of the new tanks and associated infrastructure, exterior safety lighting would be installed around each tank, along the pathways between plant structures, on the exterior of buildings and along the access road, similar to existing conditions. The light that would be added to the access road would also include a switch, and would not be illuminated in response to motion, thereby limiting the timing that the light would be activated.

There would be limited, if any, nighttime construction throughout the implementation of the project that would result in an increase in light or glare from the project area. In compliance with the Low Effect HCP that has been developed for the MHJB that is present at the plant, all exterior lights would continue to be turned off during flight season (mid-June through July) unless changed to certified bulbs, and any new outdoor lighting installed as part of the project will use bulbs certified to not attract nocturnal insects.

Impact Analysis. The replacement tanks and facilities at the GHWTP would be equipped with similar lighting to existing conditions, and any additional lighting included through project implementation would be low-level safety lighting. The lighting along the existing catwalk and stairway would remain unchanged. Although the project may introduce new sources of lighting for safety on the exterior of the buildings, around the tanks, and along the access road, these lights would be of similar luminescence level as those lights currently present throughout the GHWTP, and would be directed downward, providing the minimal lighting level necessary for safety and operational purposes. Therefore, implementation of the project would result in similar light levels within the GHWTP, and would not result in the addition of light or glare that would adversely affect day or nighttime views to the project area or from adjacent land uses. Therefore, the impact from replacement and additional light sources would be less than significant.

The new infrastructure that would be constructed within the GHWTP as a result of project implementation would be similar in color and tint, and would complement the existing structures and buildings located within the GHWTP. Because the project would use similar colors and materials that do not generate substantial glare, project implementation would not provide a significant increase in glare from within the project area that would be viewed from adjacent land uses, or within the GHWTP.

Throughout construction, there would be additional short-term glare from the sun reflecting off the glass and metal on construction equipment within the project area. This would be similar to any glare from employee and maintenance vehicles and equipment currently used and parked near the project area. The additional glare would be temporary, limited to daytime hours, and similar to cars and trucks that are currently associated with the existing land uses that border the project area. Further, construction and implementation would be contained within the GHWTP that is not visible from Graham Hill Road or any adjacent roadways and limited public vantage points. Therefore, the project would not create a new source of substantial glare that would adversely affect views of the area, and the impact associated with glare would be less than significant.

The impact from new sources of light and glare would be **less than significant.** No mitigation would be required.

2. AGRICULTURE AND FOREST RESOURCES.

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

a. *Convert prime farmland, unique farmland or farmland of state importance to non-agricultural uses;*

b. *Conflict with existing zoning for agricultural use or a Williamson Act contract;*

c. *Conflict with existing zoning for, or cause rezoning of, forest land;*

d. *Result in the loss of forest land or conversion of forest land to non-forest use; or*

e. *Involve other changes to the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use.*

a) <u>Convert Farmland – No Impact</u>. The project area does not contain any lands that have been designated as Prime Farmland, Unique Farmland or Farmland, as shown on the maps prepared by the Farmland Mapping and Monitoring Program of the California Resources Agency (California Resources Agency 2014). The entire project area has been mapped as Urban and Built-Up Land, which is defined as land that is occupied by structures with a building density of at least 1 unit to 1.5 acres. There would be no reduction in farmland or agricultural resources, or conversion of existing agricultural land uses to non-agricultural uses. Therefore, there would be **no impact**.

b) <u>Conflict with Zoning for Agricultural Use or Williamson Act Contract – No Impact</u>. There are no lands within or adjacent to the project area that are under a Williamson Act contract (California Department of Conservation 2016). The project area is located in a developed area that does not support agricultural land uses and is not located adjacent to agricultural land uses. The project area is zoned by the City of Santa Cruz as Public Facilities (PF), which is not considered to be an agricultural zone. Therefore, there would be **no impact**.

c) <u>Conflict with Zoning for Forest Land or Timberland – No Impact</u>. The project area is not located on or near lands that have been zoned as forest lands, timberlands or Timberland Production (City of Santa Cruz 2012a). The project area is zoned by the City of Santa Cruz as Public Facilities (PF), which is not considered to be an agricultural zone (City of Santa Cruz 2012a). Implementation of the project would result in the removal of up to fifty two (52) trees onsite, including thirty four (34) heritage oak, pine and redwood trees. The potential impact of tree removal is addressed in Section 4, Biological Resources. Because the project would not conflict with existing zoning for or cause rezoning of forest land or timberland,

and would not result in the removal of forest lands (City of Santa Cruz 2018a), there would be **no impact**.

d) Convert Forest Land – No Impact. As described above, no forest land occurs within the project area, or within the immediate vicinity of the project area (City of Santa Cruz 2012a). The potential impact of removing up to fifty two (52) trees onsite is addressed in Section 4, Biological Resources. Because the project would not result in the loss of forest land or conversion of forest land to non-forest use, there would be **no impact**.

e) Convert Farmland or Forest Land – No Impact. As described above, there is no farmland or forest land within or adjacent to the project area. The project includes replacing concrete storage tanks, pumps, and water treatment equipment and facilities that are past their service lives and would not involve other changes in the existing environment which, due to their location or nature, could result in the conversion of farmland to non-agricultural use or conversion of forest land to non-forest use. Furthermore, as described in Section 4, Biological Resources, any trees to be removed for project construction that qualify as heritage trees would be replaced at a ratio of 1:1 to 3:1 depending on the size of the tree, resulting in largely the same conditions as appear today. Therefore, there would be **no impact**.

3. AIR QUALITY.

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

b. Conflict with or obstruct implementation of the applicable air quality plan;

c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;

d. Expose sensitive receptors to substantial pollutant concentrations; or

e. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The information in this section is based on the *Graham Hill Water Treatment Plant Concrete Tank Replacement Project - Air Quality and Greenhouse Gas Conformity Analysis* prepared by Harris (**Appendix B**).

a) Conflict with Air Quality Plan – Less Than Significant. The Monterey Bay Air Resources District (MBARD) Air Quality Management Plan (AQMP) is the applicable air quality plan for the project area. MBARD was required under the California Clean Air Act (CCAA) to develop an attainment plan to address

ozone violations by July 1991. The CCAA requires MBARD to periodically prepare and submit a report to the California Air Resources Board (CARB) that assesses its progress toward attainment of the California Ambient Air Quality Standards (CAAQS). The most recent update (2012-2015) is the seventh update to the 1991 AQMP. It shows that the region continues to make progress toward meeting the state ozone standard.

Impact Analysis. Project construction would result in short-term emissions generated by construction activities and equipment. Following construction, operation of the GHWTP would be the same as existing conditions and would not result in an increase in criteria pollutant emissions. The proposed new pump stations would not generate new vehicle trips to the facility, and the pumps would be powered by electricity, thereby not resulting in a new source of criteria pollutants.

As described in the MBARD CEQA Air Quality Guidelines (MBUAPCD 2008), construction projects using typical construction equipment such as dump trucks, scrapers, bulldozers, compactors and front-end loaders that temporarily emit precursors of ozone [i.e., volatile organic compounds (VOC) or oxides of nitrogen (NO_x)], are accommodated in the emission inventories of the AQMP. Projects that propose use of typical construction equipment and practices would not have a significant impact on the attainment and maintenance of ozone ambient air quality standards and would therefore not conflict with the AQMP. Construction of the project would not require any non-typical construction equipment or practices. As such, emissions from project construction would be accommodated in the AQMP inventories. Additionally, as described below in Section b, the proposed project would not exceed the 82 lbs/day threshold for PM10 emissions during construction.

The proposed project would not increase the capacity for water treatment at the GHWTP that would result in increased operational emissions or increased vehicle or equipment use. Following construction, operation of the tanks and supporting facilities would remain the same as existing conditions and would not result in an increase in criteria pollutant emissions.

Therefore, the project would not result in any change to ambient conditions that would conflict with or obstruct implementation of the AQMP, and the impact relative to the applicable air quality plan would be **less than significant**. No mitigation would be required.

b) <u>Considerable or Net Increase in Criteria Pollutants – Less Than Significant.</u> The federal Clean Air Act of 1970 required the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) for six criteria pollutants with states retaining the option to adopt more stringent standards or to include other specific pollutants. The USEPA has classified air

basins (or portions thereof) as being in "attainment," "nonattainment," or "unclassified" for each criteria air pollutant, based on whether or not the NAAQS have been achieved. If an area is designated unclassified, it is because inadequate air quality data was available as a basis for a nonattainment or attainment designation. The project is located in the North Central Coast Air Basin (NCCAB). The USEPA classifies the NCCAB as in attainment or unclassified for all pollutants with respect to federal air quality standards. The NCCAB is not in nonattainment status for any pollutant.

The state of California, under the CCAA, has established standards for criteria pollutants that are generally stricter than federal standards. The CARB establishes air quality standards in the state and measures progress in reducing pollutant emissions. The NCCAB is currently in nonattainment status for respirable particulate matter (PM_{10}), and transitional nonattainment status for ozone. An area is designated transitional nonattainment if, during a single calendar year, the state standard is not exceeded more than three times at any monitoring location within the applicable district.

Impact Analysis. Construction of the proposed project would result in temporary increases in air pollutant emissions. The MBARD identifies a quantitative threshold for PM_{10} emissions of 82 pounds per day (lbs/day) for direct and cumulative impacts. The MBARD identifies general earthmoving screening values to determine consistency with this threshold. Projects that propose grading of up to 8.2 acres total, with minimal earthmoving or grading of 2.2 acres per day or less, are considered not to exceed the threshold of 82 lbs/day.

Project criteria pollutant emissions are estimated in the *Graham Hill Water Treatment Plant Tank Replacement Project - Air Quality and Greenhouse Gas Conformity Analysis* prepared by Harris (**Appendix B**). Calculated maximum daily construction emissions are provided in **Table 3**, and calculated annual emissions from construction are provided in **Table 4.**

Table 3. Estimated Construction Daily Maximum Air Pollutant Emissions (lbs/day)

Phase	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
a. Demolition and Site Preparation	3	30	20	<1	3	1
b. Structure Construction	2	26	14	<1	11	3
c. Coating	17	2	2	<1	<1	<1

Source: See **Appendix B**.

Notes:

Emission quantities are rounded to the nearest whole number. Exact values are provided in **Appendix B**.

PM_{10} – Particulate Matter less than 10 microns

$PM_{2.5}$ – Particulate matter less than 2.5 microns

NO_X – Oxides of Nitrogen

SO_X – Oxides of Sulfur

CO – Carbon Monoxide

VOC – Volatile organic compounds

Table 4. Estimated Construction Annual Pollutant Emissions (tons/year)						
Phase	**VOC**	**NO_x**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
a. Demolition and Site Preparation	<1	2	1	<1	<1	<1
b. Structure Construction	1	4	3	<1	<1	<1
c. Coating	<1	<1	<1	<1	<1	<1

Source: See **Appendix B**.

Notes:

Emission quantities are rounded to the nearest whole number. Exact values are provided in **Appendix B**.

PM_{10} – Particulate Matter less than 10 microns

$PM_{2.5}$ – Particulate matter less than 2.5 microns

NO_X – Oxides of Nitrogen

SO_X – Oxides of Sulfur

CO – Carbon Monoxide

VOC – Volatile organic compounds

As shown in **Table 3**, the project is estimated to generate a maximum of 11 lbs/day of PM10 which would not exceed the MBARD threshold. The MBARD does not identify quantitative thresholds for other criteria pollutants during construction. Construction projects using typical construction equipment, such as dump trucks, scrapers, bulldozers, compactors and front-end loaders that temporarily emit precursors of ozone, are accommodated in the emission inventories of State- and federally-required air plans and would not have a significant impact on the attainment and maintenance of ozone AAQS. However, a project that would use non-typical equipment would have the potential to result in a significant impact related to emissions of VOCs or NOx. The proposed project would employ typical construction equipment, and would not require any non-typical construction equipment or techniques that have not been accounted for in the NCCAB emissions inventories.

Following construction, operation of the GHWTP would remain the same as existing conditions, and the project would not result in an increase in criteria pollutant emissions from plant operations or increased vehicle and equipment use. The additional two pumps would be powered by electricity, as discussed above, and therefore would not result in a new source of criteria pollutants. Construction and operational impacts related to emissions of criteria pollutants would be **less than significant**. No mitigation would be required.

c) <u>Expose Sensitive Receptors to Pollution – Less Than Significant.</u> MBARD defines sensitive receptors for CEQA purposes as any residence including private homes, condominiums, apartments, and living quarters; education resources 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 also include long term care hospitals, hospices, prisons, and dormitories or similar live-in housing. There are residences located around all sides of the project area, within a low-density residential

neighborhood. The nearest residential property lines are located approximately 50 feet from the project area (**Figure 2**).

Impact Analysis. Project construction would result in construction related emissions, including diesel particulate matter which is classified as a toxic air contaminant, adjacent to residences, thus exposing sensitive receptors to short-term criteria pollutant emissions. However, the MBARD screening criteria assumes that projects that would involve less than 8.2 acres of grading would result in less than significant PM10 emissions. The project would involve a total grading area of 1.315 acres, less than 20 percent of the screening criteria. Additionally, maximum daily PM10 emissions are calculated not to exceed 11 pounds per day, less than 15 percent of the 82 pounds per day threshold. Based on the MBARD screening criteria, the PM 10 emissions would be minimal and not expose sensitive receptors to substantial pollutant concentrations. Following construction, the project would not generate a net increase in long-term criteria pollutants, as the operation of the GHWTP would remain largely the same as existing conditions. Therefore, impacts to sensitive receptors would be **less than significant**. No mitigation would be required.

d) Result in Emissions or Odors – Less Than Significant. As described above, there are residences located north, south and east of the project area, within a low-density residential neighborhood, and the nearest residential property lines are located approximately 50 feet from the project area. Rolling grasslands and mature vegetation surround the project area. Residents within the adjacent neighborhood would be considered sensitive receptors for odors that may be produced throughout implementation of the project.

Impact Analysis. Project construction activities could expose residents adjacent to the project area to odors from construction equipment and actions. Based on the planned construction methodology, only a few pieces of construction equipment would be in operation simultaneously. Emissions of sulfurous gases (SO_x), the main source of odors from construction equipment, would be extremely limited[2] and short-term. Following construction, operation would remain largely the same as existing conditions, and would not include any source of new long-term odors. Conditions would likely be improved compared to existing conditions as deteriorating equipment would be replaced. Therefore, impacts related to odors on adjacent residents would be **less than significant**. No mitigation would be required.

Federal Cross-Cutting Regulation: Clean Air Act

With regard to conformity to Federal standards, the Code of Federal Regulations (CFR) provides guidance to document Clean Air Act Conformity Determination

2 Monterey Bay Air Resources District (formerly Monterey Bay Unified Air Pollution Control District). CEQA Air Quality Guidelines. 2008.

requirements. 40 CFR Part 93.153(b)(2) defines de minimis levels, that is, the minimum thresholds for which a conformity determination must be performed for criteria pollutants for which an air basin is in nonattainment or maintenance. The NCCAB is in attainment or designated as "unclassified" for all pollutants under federal standards. As such, a comparison to federal de minimis thresholds to determine CAA consistency is not required. As shown in **Table 4** and previously discussed, annual emissions from construction of the proposed project would be minimal and would not exceed emissions inventories for the basin. Therefore, the project would not have the potential to significantly impact the ability of the NCCAB to maintain attainment status. This impact is **less than significant**. No mitigation would be required.

4. BIOLOGICAL RESOURCES.

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

a. *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;*

b. *Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;*

c. *Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;*

d. *Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;*

e. *Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or*

f. *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.*

Harris & Associates prepared the *Graham Hill Water Treatment Plant Tank Replacement Project – Biotic Report,* in February 2019 (Biotic Report), which provides the environmental and regulatory setting and a discussion of the effects of

the proposed project on the biological resources that occur within the project area (**Appendix A**). Descriptions of the habitats and species, including special status species that occur in the project area, are included in the environmental setting of the Biotic Report. Avoidance and minimization measures identified in the Biotic Report are designed to protect sensitive biological resources from impacts from the proposed project, and are included in the Project Description and construction BMPs. Potential impacts that would occur as a result of project implementation (after the implementation of construction BMPs) are discussed below by checklist topic, and include, where appropriate, mitigation measures to reduce these impacts.

a) <u>Adverse Effect 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 - Less than Significant with Mitigation.</u>

The following discussion includes a description of the special status species that could be affected by the proposed project, followed by a discussion of potential impacts. Additional information regarding all special status species considered in light of the proposed project is provided in **Appendix A**.

Wildlife

Mount Hermon June Beetle (*Polyphylla barbata*) (federally endangered). The MHJB is restricted to habitats within Zayante sandy soils, including: maritime Coast Range Ponderosa pine forest, northern maritime chaparral, and sand parkland (see discussion in Maritime Coast Range Ponderosa Pine Forest, above) (USFWS 1997; HCP). In addition, adults have been found in disturbed sandy areas where remnants of these habitats still occur. Ponderosa pine grows at all known MHJB locations and is a useful indicator of suitable habitat for the MHJB.

MHJB are known to occur at the water treatment facility in Maritime Coast Range Ponderosa Pine Forest habitat. Surveys in 2004 and 2008 detected MHJB outside the project area, immediately south of the water tank adjacent to the paved access road. However, 2017 monitoring efforts at the facility did not detect any MHJB (City of Santa Cruz 2018b)).

Zayante Band-Winged Grasshopper (*Trimerotropis infantilis*) (federally endangered). The preferred habitat of the ZBWG is barren or sparsely vegetated, sunlit sand, which are features of the open sand parkland plant community. Although ZBWG have never been found on the property, and likely do not occur within the project area, this species is included in the HCP due to the extremely limited amount of habitat for this species in the County. Inclusion in this section ensures consistency with the HCP, and adequate avoidance, minimization, and mitigation for ZBWG.

Ben Lomond Spineflower (*Chorizanthe pungens* var. *hartwegiana*) (federally endangered). Ben Lomond spineflower (BLS) occurs in Zayante sandhills habitat, and, like the ZBWG, has never been observed on the property, and likely does not occur within the project area. BLS is included in the HCP due to the extremely limited amount of habitat for this species in the County. Inclusion in this section ensures consistency with the HCP, and adequate avoidance, minimization, and mitigation for Ben Lomond spineflower.

Nesting Birds (protected). Nesting Birds are protected by the Migratory Bird Treaty Act, California Fish and Game Code, and California Environmental Quality Act. Nesting birds may occur on the property in trees, shrubs, and on the ground during nesting season (February 1-September 1) (CDFW 2018).

Hoary Bat (*Lasiurus cinereus*) (uncommon). All native bats are protected under the California Fish and Game Code. Hoary bats generally roost in dense foliage of medium to large trees within open habitats or habitat mosaics with access to trees for cover and open areas or habitat edges for feeding and nearby water sources. This species may roost in the larger trees and forage within the project area.

American Badger (*Taxidea taxus*) (CDFW Species of Special Concern). American badgers are reported to occur in Santa Cruz County in remote areas with grasslands and loose soil. Given the small size of the grasslands within the project area, the development on the property, including fencing, and lack of loose soils, it is unlikely that American badgers occur on the property.

San Francisco Dusky-Footed Woodrat *(Neotoma fuscipes annectens)* (CDFW Species of Special Concern). The San Francisco dusky-footed woodrat is found throughout the San Francisco Bay area in scrub, grassland, and woodland communities. This species may be present in trees or vegetation throughout the GHWTP property.

Vegetation

The following sensitive habitat, which (regionally) supports Mount Herman June beetle, Zayante band-winged grasshopper, and Ben Lomond spineflower, is found at the project area.

Maritime Coast Range Ponderosa Pine Forest

Maritime Coast Range Ponderosa Pine Forest is listed by CDFW as a rare and unique ecosystem found in Santa Cruz County, California. This habitat is restricted to pockets of Zayante soils, which developed from the Santa Margarita formation (sandstone and limestone formed by Miocene marine terraces) and are geologically distinct from the volcanic origins of the Santa Cruz Mountains (USFWS 1997). Zayante soils are endemic to Santa Cruz County and occur in three locations. The largest Zayante soil deposit is in the vicinity of the communities of Ben Lomond, Felton, Mount Hermon, Olympia, and Scotts Valley.

A second, smaller area is located in Bonny Doon (USFWS 1997). The third, and smallest, cluster is found near the community of Corralitos (and is not similar to the other two locations in terms of vegetation) (USFWS 1997).

Zayante soils are deep, coarse-textured, poorly developed, and well drained, creating a warmer and drier microclimate that supports three unique habitats that occur singularly or as a mosaic: northern maritime chaparral, ponderosa pine forest, and sand parkland. These habitats, as mosaics, are referred to as: "Maritime Coast Range Ponderosa Pine Forest", "Zayante sand hills habitat", "ponderosa sand parkland", "ponderosa pine sandhills", and/or "silver-leafed manzanita mixed chaparral" (HCP).

Maritime Coast Range Ponderosa Pine Forest in Santa Cruz County is a disjunct (geographically separate from the main distribution of the population) remnant occurrence of Ponderosa pine, which typically occurs at higher elevations in the Sierra Mountains (within California). The Ponderosa pine trees in this habitat are widely-spaced in low-density, open, park-like stands with an herbaceous understory of grasses and forb, and often co-occurs with other special-status, endemic species, including: Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*) (federally endangered), Santa Cruz wallflower (*Erysimum teretifolium*) (federally endangered), Santa Cruz cypress (*Cupressus abramsiana*) (federally endangered), Silverleaf Manzanita (*Arctostaphylos silvicola*) (CNPS 1B), and Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*) (CNPS 1B) (USFWS 1997) (HCP). Although Ponderosa pine do occur in the project area, the other special-status plants do not.

Two federally-endangered insects are associated with Maritime Coast Range Ponderosa Pine Forest, including the Mount Hermon June beetle (MHJB) (*Polyphylla barbata*) and Zayante band-winged grasshopper (ZBWG) (*Trimerotropis infantilis*). These two insect species and the Ben Lomond spineflower are protected via the City's low-effect Habitat Conservation Plan (HCP) (discussion of the Federal Endangered Species Act is provided in the Biotic Report in **Appendix A**). The HCP provides both protection for these species and their habitat, Maritime Coast Range Ponderosa Pine Forest, as well as a mechanism for incidental take for activities related to construction, maintenance, and operations, as specified in the HCP.

The HCP covers all 5.7 acres of Maritime Coast Range Ponderosa Pine Forest on the south side of the property. In this location, Ponderosa pines co-occur with coast live oaks and coyote bush (*Baccharis pilularis*). Of the 5.7 acres of habitat, 0.88 acres are occupied by the federally endangered Mount Hermon June Beetle. No other listed species associated with Maritime Coast Range Ponderosa Pine Forest currently occur on the property.

Impact Analysis. Most of the proposed work would occur in areas that are already disturbed, including the existing developed area of the facility and the landslide area, which is located directly to the north of the existing tanks and contains deposits of uncompacted soil fill from the original tank construction. Not many biological resources occur in these areas, but impacts to resources within developed areas, the landslide area, and the more natural adjacent habitats could affect nesting migratory birds and roosting bats. When these species utilize the vegetation in and adjacent to construction areas, they may be affected by construction noise or the trimming or removal of vegetation, especially trees.

The following activities within the HCP area would cause impacts to the special status habitat and species that occur there.

- trenching and pipe placement (temporary impacts), and
- the potential removal or limbing of up to six (6) Ponderosa pine trees with the following diameter at breast height (dbh; 54-inches above grade): 38, 23, 21, 24, 14, and 20-inches (permanent impacts) (**Figure 5**).

In anticipation of potential "take" of protected species from ongoing operations and future construction like the proposed project, the City of Santa Cruz submitted a Low-Effect HCP to the USFWS. The HCP was approved in 2013, and the 10(a)1(B) permit is valid until 2043. The HCP's covered activities provide incidental "take" coverage for construction activities needed to accommodate changes in regulatory requirements, growing demands for water, or the updating and replacement of aging facilities. Refer to the discussion of the Federal Endangered Species Act and HCP in the Biotic Report (**Appendix A**).

The proposed activities are authorized under the existing HCP up to a maximum impact area of 5.7 acres of habitat that could potentially be used by the MHJB. The covered activities, including vegetation clearing and grading, could permanently impact life stages of the MHJB and temporarily remove their habitat. Per HCP requirements, impacts will be mitigated at a ratio of 1:1. This level of mitigation is commensurate with the level of impacts to MHJB habitat at the water treatment facility property because the habitat quality at the Bonny Doon property is of high quality and connects to adjacent properties that also support high quality sandhills habitat. This mitigation ration reflects the higher conservation value of the habitat at the Bonny Doon site over that of the Water Department property, which is degraded from previous development, isolated from other similar habitats, and small in size.

The implementation of the HCP, including advanced mitigation via the establishment and enhancement of the Bonny Doon Ecological Preserve, ensures that impacts from covered activities at the GHWTP will not jeopardize the continued existence of the covered species. In addition, maximum impacts at the water treatment facility would result in 5.7 acres of habitat mitigation at

the Bonny Doon mitigation site, which is far smaller than the available mitigation area. Thus, the remaining approximately 11.3 acres would be available to mitigate for other City activities impacting MHJB, and could be credited to the Water Department through a future HCP or Section 7 consultation. In order to comply with the HCP, a list of impact acreages, for both temporary and permanent impacts will be reported to the USFWS. This report will provide a mechanism to record impacts against the amount of available mitigation at the Bonny Doon mitigation site, and will be submitted to the USFWS as part of the City's ongoing annual HCP reporting requirements. Refer to the HCP, which is included as an attachment to the Biotic Report (**Appendix A**).

Construction BMPs for nesting birds, roosting bats, American Badger, San Francisco dusky-footed woodrat and Maritime Coast Range Ponderosa Pine Forest and Mount Hermon June beetle are identified in the Project Description (Section 9) and the Biotic Report (**Appendix A**), and included in the project design to avoid and minimize impacts to these species. These include:

- Construction Education Materials and Training,
- Compliance with the City of Santa Cruz Heritage Tree Ordinance,
- Preconstruction Surveys and Protection Measures,
- No nighttime construction throughout the implementation of the project that would result in an increase in light or glare from the project area. In compliance with the Low Effect Habitat Conservation Plan that has been developed for the MHJB that is present at the plant, all exterior lights would continue to be turned off during flight season (mid-June through July), or USFWS-approved, beetle-friendly lighting would be installed.
- Erosion Control Measures,
- Temporary Fencing to Protect Resources Outside of the Construction Zone, and,
- Implement Habitat Conservation Plan BMPs and Avoidance and Minimization Measures.
    - Measure 7a: Locate Project Activities on and Adjacent to Current Development,
    - Measure 7b: Delineate Boundaries of the Impact Area,
    - Measure 7c: Cover Exposed Soils,
    - Measure 7d: Dust Control,
    - Measure 7e: New Outdoor Lighting, and
    - Measure 7f: Landscaping Elements That Degrade MHJB Habitat.

With the implementation of these avoidance and minimization measures, the effects of the proposed projects on nesting birds and roosting bats would be less than significant, and therefore are not further discussed.

As discussed above, the work proposed in the area protected by the HCP includes road widening, trenching and pipe placement, potential tree removal or limbing of up to six (6) Ponderosa pine trees, and construction of a building to house electrical equipment. The proposed project would result in the loss of rare Maritime Coast Range Ponderosa Pine Forest habitat that supports the federally endangered MHJB. The permanent impact resulting from the potential removal or limbing of up to six (6) Ponderosa pine trees (important in the life cycle of MHJB) and the temporary impact of 0.08 acres for pipeline construction are considered "take" under the Federal Endangered Species Act (for a discussion of FESA, see the Biotic Report, **Appendix A**).

Mitigation for incidental take of species covered under the HCP resulting from the implementation of the project is included in the incidental take permit. These measures are described below. With the implementation of these measures (listed below as **Mitigation Measures BIO-1** and **BIO-2**), the impact to Maritime Coast Range Ponderosa Pine Forest habitat and MHJB would be **less than significant with mitigation**.

> **Mitigation Measure BIO-1: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation).** The City operates under an active low effect HCP for several federally listed species that include Mount Hermon June beetle, Zayante band-winged grasshopper, and Ben Lomond spineflower. The tank replacement project is a covered activity under the HCP.
>
> To mitigate for incidental take, the HCP includes the creation and management of an off-site mitigation area: 17.0 acres at the City of Santa Cruz's Laguna Creek watershed property (APN 080-241-18) in Bonny Doon (Preserve) (HCP) (McGraw 2017). Although this parcel measures a total of 171.4 acres, only the southwestern portion of the parcel, which is characterized by Zayante soils and sandhills habitat, is part of the mitigation area. This property is adjacent to the Bonny Doon Preserve, which is managed by the California Department of Fish & Wildlife (CDFW). The Preserve is located within the southwestern corner of Section 18 of T10S R2W of the Davenport 7.5' USGS topographic quadrangle.
>
> The purpose of the Preserve is to protect and manage habitat for the federally endangered Mount Hermon June beetle, Zayante band-winged grasshopper, Ben Lomond spineflower, and other co-occurring species (McGraw 2017). The City manages and monitors habitat in the Preserve, and will continue to do so for the duration of their 30-year incidental take

permit (from 2013 to 2043), to achieve goals and objectives for the Sandhills ecosystem, communities, and endangered species, as outlined in the Habitat Management and Monitoring Plan (HMMP) for the Laguna Sandhills Preserve (McGraw 2014). Strategies prescribed in the HMMP for ecosystem and community goals include managing to reduce exotic plants, trespass, and fire.

Although the City is already complying with the HCP, and impacts are already mitigated via implementation of the HCP, the identification of the habitat creation and management mitigation measure is included here to clearly link the impacts of this project to the mechanism that has already provided mitigation for them.

Mitigation Measure BIO-2: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation). Temporarily impacted areas at the GHWTP will be cleared of vegetation or graded to assist in construction of the proposed project, but will not be permanently covered by new structures or other hardscape after the project is completed. This includes the area adjacent to the road widening and the trenching for the pipeline through the HCP area. After project completion, these temporarily impacted areas with Zayante soils will be revegetated with plants native to the Zayante Sandhills, including: sticky monkeyflower (*Mimulus aurantiacus*), deer weed (*Lotus scoparius*), silver bush lupine (*Lupinus albifrons* var. *albifrons*), Ponderosa pine and coast live oak. These native plants will provide suitable habitat conditions for MHJBs that might eventually colonize the temporarily impacted portion of the impact area. Revegetated areas will not include any landscape elements that degrade habitat for the MHJB, including mulch, bark, weed matting, rock, aggregate, or turf grass.

b) <u>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 U.S. Fish and Wildlife Service – Less than Significant with Mitigation.</u> As discussed above for (a), Maritime Coast Range Ponderosa Pine Forest is a CDFW-listed rare and unique ecosystem. Because of the rarity of this habitat, effects on Maritime Coast Range Ponderosa Pine Forest from the proposed project would be significant without mitigation, which is included in the HCP and incidental take permit. Therefore, with implementation of these measures (listed as **Mitigation Measures BIO-1** and **BIO-2**, described above), the impact would be **less than significant with mitigation**.

- **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation)

- **Mitigation Measure BIO-2**: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation)

c) **Adverse Effect on State or Federally Protected Wetlands (including, but not limited to, Marsh, Vernal Pool, Coastal, etc.) through Direct Removal, Filling, Hydrological Interruption, or other Means – Less than Significant.** Within the mixed evergreen forest, on the slope southwest of the project area, there is an opening in the canopy that supports a very small (0.02 acre), unverified wetland area. The source of water in this area may be the result of a natural seep or runoff from the facility. The wet area is dominated by non-native plants, including calla lilies (*Zantedeschia aethiopica*) and poison hemlock (*Conium maculatum*). This area is not within the project area, but is adjacent to the project area, just west of the lower paved pad that currently supports the tanks.

Impact Analysis. The proposed project would include the implementation of erosion control BMPs, as included in the project SWPPP, to prevent impacts to the seep area (refer to the **Project Description, Air Quality and Water Quality Construction BMPs**). Erosion control measures would be installed and maintained along the southern edge of the project area throughout project implementation. Erosion control would be inspected and maintained until the project is complete per SWPPP requirements. With implementation of these construction BMPs, the potential impact of the proposed project on the seep area would be **less than significant**. No mitigation would be required.

d) **Interfere with Wildlife Movement – Less Than Significant**. Migratory species that may use the habitats at the GHWTP include migratory birds and bats. Native resident species that may move through the facility include medium-sized mammals like coyote, gray fox, deer, mountain lion, bobcat and raccoon, which may move from the San Lorenzo River corridor to other protected areas such as Henry Cowell Redwoods State Park, City of Santa Cruz Pogonip Open Space, the upper campus of the University of Santa Cruz and De Laveaga City Park.

Impact Analysis. Because the construction of the proposed project would not change the ability of these species to move in or out of the facility, and because the habitats adjacent to the project area would remain largely under existing conditions, this impact would be **less than significant.** No mitigation would be required.

e) **Conflict with Local Policies or Ordinances – Less Than Significant.** While the GHWTP is within City jurisdiction, City ordinances related to biological resources do not apply to the project pursuant to state law. California Government Code section 53091(d) and (e) provides that facilities for the production, generation, storage, treatment, or transmission of water supplies are exempt from local zoning and

building ordinances. Despite the exemption the project will follow all City ordinances related to biological resources that are relevant to the project.

Heritage Tree Ordinance

Preconstruction activities would include identifying, marking, and measuring the trees that would be removed or trimmed for project construction. Although the City of Santa Cruz Heritage Tree Ordinance is not applicable to the project, pursuant to California Government Code section 53091, any impacts to heritage trees (trees with a circumference of forty-four (44) inches, approximately fourteen (14) inches in diameter, measured at breast-height, approximately fifty-four (54) inches above existing grade) will be avoided to the extent reasonable and pruning or removal will be performed by a state tree care license issued by the state of California as described in a consulting arborist report. The current project design may limb or remove up to 52 oak, pine and redwood trees (**Figure 5**). Of the 52 trees, 34 would be considered heritage trees. The City would also comply with all mitigation (replanting) requirements outlined in the arborist report.

Sensitive Habitat Ordinance

The Sensitive Habitat Ordinance (conservation regulations) identifies and protects the natural environmental resources of the City of Santa Cruz in areas having significant and critical environmental characteristics. The conservation regulations have been developed in general accordance with the policies and principles of the General Plan, as specified in the Environmental Quality and Safety Elements of the General Plan, and the Local Coastal Program, and any adopted area or specific plans. The Sensitive Habitat Ordinance (conservation regulations) intend to accomplish the following:

1. Minimize cut, fill, earthmoving, grading operations, and other such man-made effects on the natural terrain;
2. Minimize water runoff and soil erosion caused by human modifications to the natural terrain;
3. Minimize fire hazard and risks associated with landslides and unstable slopes by regulating development in areas of steep canyons and arroyos and known landslide deposits;
4. Preserve riparian areas and other natural habitat by controlling development near the edge of ponds, streams, or rivers;
5. Encourage developments which use the desirable, existing features of land such as natural vegetation, climatic characteristics, viewsheds, possible geologic and archaeological features, and other features which preserve a land's identity;

6. Maintain and improve, to the extent feasible, existing water quality by regulating the quantity and quality of runoff entering local watercourses;
7. Maintain and improve, to the extent feasible, existing air quality by achieving or exceeding state air quality guidelines;
8. Serve as part of the Local Coastal Implementation Plan of the Local Coastal Program.

Habitat for the MHJB (Maritime Coast Range Ponderosa Pine Forest) receives consideration under the Sensitive Habitat Ordinance of the City of Santa Cruz and project implementation would comply with ordinance requirements.

Impact Analysis. The project would not conflict with local policies and ordinances protecting biological resources, including the Heritage Tree Ordinance and Sensitive Habitat Ordinance. The City would comply with requirements set forth in both of these ordinances.

Implementation of the project is expected to remove or limb up to 52 trees, including 34 heritage trees that are oak, pine and redwood trees, ranging in dbh from 14-inches to 38-inches (**Figure 5**). Compliance with the Heritage Tree Ordinance would include consultation with the City of Santa Cruz Parks and Recreation Services director to determine the mitigation to offset the impacts of tree removal. Compliance with the Heritage Tree Ordinance would range from replacement plants at a 1:1 to 3:1 ratio. Planting of replacement trees within the HCP area would follow the recommendations for revegetation in the HCP.

With compliance with the Heritage Tree Ordinance and Sensitive Habitat Ordinance, the impact would be **less than significant**. No mitigation would be required.

f) **Conflict with Adopted Habitat Conservation Plan – Less than Significant with Mitigation**. As discussed under (a) and in **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation), the City operates under an active low-effect HCP for several federally listed species that include Mount Hermon June beetle, Zayante band-winged grasshopper and Ben Lomond spineflower. The proposed project, including tank replacement, trenching and pipe replacement, construction of an electrical building, facilities upgrades, and access road widening, are all covered activities under the HCP.

As discussed under (a), the *Loss of Maritime Coast Range Ponderosa Pine Forest, Habitat for the Federally-Endangered Mount Hermon June beetle* presents impacts to Maritime Coast Range Ponderosa Pine Forest habitat and the federally endangered MHJB resulting from implementation of the proposed project. The permanent impact resulting from the potential removal or limbing of up to six (6) Ponderosa pine trees (important in the life cycle of MHJB) and

the temporary impact of 0.08 acres for pipeline construction are considered "take" under the Federal Endangered Species Act. Refer to the Biotic Report (**Appendix A**) for additional information on the Federal Endangered Species Act.

Implementation of **Mitigation Measures BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation) and **BIO-2**: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation), would mitigate impacts to Maritime Coast Range Ponderosa Pine Forest and Mount Hermon June beetle and therefore project implementation does not conflict with the HCP. Therefore, this impact would **less than significant with mitigation**. No additional mitigation would be required.

Federal Cross-Cutting Regulations: Endangered Species Act and Migratory Bird Treaty Act

The Federal Endangered Species Act (FESA) and Migratory Bird Treaty Act (MTBA) require an analysis of the project effects on federally-listed habitats, plant and animal species and their associated habitats, and migratory birds, respectively. The Maritime Coast Range Ponderosa Pine Forest that occurs at the Graham Hill Water Treatment Facility is a rare habitat that supports the federally listed Mount Hermon June beetle. The City operates under an active low-effect HCP for these special status resources. The proposed project, including the tank replacement, road widening, construction of the electrical building, trenching and pipe placement, and tree trimming and removal, are covered activities under the HCP, and pre-implementation mitigation at Bonny Doon Ecological Preserve provides mitigation for the impacts from the proposed project. Refer to the discussion of the HCP under **Maritime Coast Range Ponderosa Pine Forest** habitat description and **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation).

Migratory birds, which are protected under the MBTA, may utilize trees on the facility property. Construction BMPs outlined in the Project Description, including preconstruction surveys and protection, if needed, have been included to reduce all impacts on nesting migratory birds to a less than significant level.

Harris & Associates prepared the *Graham Hill Water Treatment Plant Tank Replacement Project – Biotic Report*, which provides the environmental and regulatory setting and a discussion of the effects of the proposed project on the biological resources that occur on site (**Appendix A**). This report includes a review of relevant reports and information from the USFWS, a review of existing aerial photos of the project area, and a species list from the CNDDB and other resource databases. Using the results of these reports, biologists conducted a

biological survey of the proposed project area in March 2018 and January 2019 to assess the site conditions, direct/indirect impacts to any federally-listed species, sensitive habitats, or migratory birds within the project area that may result from the proposed project activities.

Based on this evaluation and the inclusion of construction BMPs in the Project Description, no impacts to migratory birds or critical habitat are anticipated. The project would result in impacts to Maritime Coast Range Ponderosa Pine Forest and Mount Hermon June beetle, which are mitigated via the implementation of the HCP. Refer to the discussion of the HCP under **Maritime Coast Range Ponderosa Pine Forest** habitat description and **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation).

With implementation of **Mitigation Measures BIO-1** and **BIO-2**, the impacts on these resources would be **less than significant with mitigation**. No additional mitigation would be required.

- **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation)
- **Mitigation Measure BIO-2**: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation)

5. CULTURAL RESOURCES.

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

a. *Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5;*

b. *Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5; or*

c. *Disturb any human remains, including those interred outside of dedicated cemeteries.*

The information in this discussion is based on the *Historical Resources Evaluation for the Concrete Tanks Replacement Project (Carey & Co 2019) and the Archaeological Investigations at the City of Santa Cruz Concrete Tank Replacement Project, Graham Hill Water Treatment Plant (Albion July 2019)*.

a) <u>Change in Significance of Historical Resource – Less than Significant</u>. To identify previously recorded cultural resources within a 0.25-mile radius of the project area, a qualified archaeologist conducted a field visit in March 2018, and background research that included a search of the California Historical Resources Information System (CHRIS) at the Northwest Information Center

(NWIC) at Sonoma State University in February of 2018. The CHRIS records search also included a review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the California Points of Historical Interest list, the California Historical Landmarks list, the Archaeological Determinations of Eligibility list, and the California State Historic Resources Inventory list.

In addition to the CHRIS records search, the archaeologist also reviewed the listings of the City of Santa Cruz Historic Building Survey, the City of Santa Cruz Historic Context Statement (Lehmann 2000), and the City of Santa Cruz 2030 General Plan and associated documentation, specifically the Cultural Resources Background Report (LSA Associates 2006). These documents provided prehistoric and historic context for the current project area. There were no historical resources located within, or within 0.25 miles of the project area.

Impact Analysis. The project includes replacing concrete storage tanks, pumps, and water treatment equipment and facilities that are past their service lives. Because the tanks and associated infrastructure are over 50 years old, they were reviewed to determine if the resources would be considered federal or state historic resources, replacement of which could result in a significant impact on historic resources.

Through investigation undertaken by Carey & Associates, it was determined that these are not unique features because the tanks lack integrity, and they do not hold historic significance. Therefore, they would not be considered historic resources either federally or through the state, and would not be eligible for listing in either the NRHP or CRHR. Therefore, implementation of the project would not impact any historic resources, and potential effects to historic resources are not evaluated further. However, through ground disturbing activities, there is always a chance that previously undiscovered historic resources could be revealed which could be determined significant. With implementation of cultural resources BMPs, as discussed in the Project Description, all work would be stopped in the event that unexpected cultural or historical resources were discovered during ground disturbing activities. Therefore, this impact would be **less than significant.** No mitigation would be required.

b, c) Change in the Significance of Archaeological Resources, Disturb Human Remains – Less than Significant. Albion's Phase I archaeological investigations for the City of Santa Cruz Concrete Tank Replacement Project (Albion 2019) comprised background historical research, an NWIC records search of known cultural resources within half-mile of the Project APE, Native American consultation, a field reconnaissance survey of the APE, and limited subsurface testing. The records search, consultation, and field reconnaissance revealed no known or newly identified cultural resources within the APE. However, the records

search revealed four previously recorded cultural resources within a half-mile radius of the APE. A 2009 study of a substantially overlapping APE also found no new or previously documented cultural resources and recommended a finding that no historic properties would be affected.

Historic maps and photos indicate that, while the property was part of a Mexican Period rancho and passed through a series of owners from the early American Period to the present, there is no indication the project APE was used for anything other than agricultural fields prior to construction of the treatment plant in 1959.

Impact Analysis. Based on the records search and field surveys that were undertaken for the project, there is no reason to anticipate the presence of buried historic period archaeological deposits or human remains in the project area. Results of shovel testing support this conclusion, with the top 60 cm lacking identifiably historic artifacts and no substantial volume of cultural material of any kind, with considerable evidence for modern disturbance. The fact that the areas of subsurface impacts for the project are on or immediately adjacent to an artificially excavated terrace dating to the mid-2oth century in an area of otherwise steep topography, further confirms the lack of potential for historic period archaeological resources.

The same holds true for precontact Native American cultural resources. As mentioned above, the APE, including the entire area slated for subsurface excavating and grading, is on or immediately adjacent to a modern artificial terrace that would have been a steep slope on the edge of the San Lorenzo River Valley in the ancient past. Consequently, it would not have been suitable for human habitation and any overlying archaeological deposits on the edge of the valley would have been removed during excavation for the terrace prior to construction of the existing tanks. Thus, while there is one known precontact archaeological site within a half-mile of the APE set back from the valley edge, the topography and modern impacts to the two locations are not the same, and the potential for buried precontact resources in the APE is very low. However, through ground disturbing activities, there is always a chance that previously undiscovered resources could be revealed which could be determined significant. With implementation of cultural resources BMPs discussed in the Project Description, all work would be stopped in the event of unexpected occurrence of cultural resources or human remains, and appropriate measures would be taken to preserve these resources. Therefore, this impact would be **less than significant.** No mitigation would be required.

Federal Cross-Cutting Regulation: National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires an analysis of the effects on "historic properties". Required documentation includes a cultural resources report on historic properties conducted in accordance with

the Secretary of the Interior's Standards, including: 1) a clearly defined Area of Potential Effect (APE), specifying the length, width, and depth of excavation with a map clearly illustrating the project APE; 2) a records search, less than one year old, extending to a half-mile beyond the project APE; 3) written description of field methods; 4) identification and evaluation of historic properties within the project's APE; and 5) documentation of consultation with the Native American Heritage Commission and local Native American tribes.

Additionally, the report must be prepared by a qualified archeologist that meets the Secretary of the Interior's Professional Qualifications Standards, and must include one of the following four findings: No historic properties affected, No effect to historic properties, No adverse effect to historic properties, or Adverse effect to historic properties. The required information is included in the *Historical Resources Evaluation for the Concrete Tanks Replacement Project (Carey & Co 2018) and the Archaeological Investigations at the City of Santa Cruz Concrete Tank Replacement Project, Graham Hill Water Treatment Plant* (Albion 2019). The report includes the finding that the project would have "No adverse effect to historic properties" as there are no historic resources that have been identified on the site.

6. ENERGY.

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

a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation; or

b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

a) <u>Result in Wasteful or Inefficient Energy – Less than Significant.</u> Implementation of the project would occur in phases to maintain uninterrupted operation of the water treatment plant. Two of the degraded concrete tanks would remain operational until the new tank had been constructed, tested and deemed fully operational before being demolished. Maintaining the degraded tanks for operation while testing the new concrete treatment tanks would require a temporary increase in energy consumption as additional pump use beyond existing conditions would occur. The final build-out of the project would also result in the addition of two pumps beyond the existing conditions.

Construction activities associated with the project would utilize fossil fuels throughout project implementation.

Impact Analysis. The increased energy consumption as a result of the project construction and new water treatment testing would not result in wasteful, inefficient, or unnecessary consumption of energy resources. Equipment operators would limit idling time to five (5)-minutes, as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations) (BAAQMD 2017), which would minimize inefficient fossil fuel use. It is expected that construction workers would park onsite, and construction equipment would remain within the GHWTP, to the greatest extent feasible, to minimize the consumption of fuel energy that would otherwise be utilized during travel. In the event that offsite staging was required, construction workers would be transported to the site via a private shuttle to minimize the use of fossil fuels and energy utilized for travel. Upon completion, the project would replace degraded water treatment tanks that are past their service lives, improving the efficiency of the GHWTP facility, with tanks that would provide the same service and capacity to the facility.

Following project implementation, operation of the GHWTP would remain the same as existing conditions, with the exception of the two new pump stations. Estimated energy use from these pumps is provided in **Attachment B.** The pumps are anticipated to result in a new increase in electricity demand of 27.93 megawatt hours (MW/h) per year which would be considered minimal. Furthermore, the GHWTP would continue to be serviced by the Monterey Bay Community Power (MBCP), which supplies carbon-free power.

Because construction and operation of the project would not result in wasteful or inefficient energy use, this impact would be **less than significant**. No mitigation would be required.

b) Conflict with State or Local Renewable Energy or Energy Efficiency Plans – Less than Significant. The City of Santa Cruz established the Green Building Program in 2013 that includes building ordinances and standards, and construction requirements for construction projects within the City. The City of Santa Cruz General Plan (adopted June 2012) also includes Goal NRC4.1.9 in Chapter 10 of the General Plan that states that the City's goal to promote efficiency upgrades and renewable energy projects. The General Plan emphasizes that water services be maintained in good condition to ensure their availability when needed.

Impact Analysis. Implementation of the project would conform with the City of Santa Cruz programs and goals that have been established through the improvement of the efficiency of the GHWTP by replacing outdated features throughout the project area with new features, while maintaining the current capacity or level of service, as stated above for (a). The proposed project would improve the reliability and efficiency of the GHWTP and, therefore, would not conflict with or obstruct state or local renewable energy or energy efficiency

plans. Therefore, this impact would be **less than significant**. No mitigation would be required.

7. GEOLOGY AND SOILS.

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

a. *Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, referring to Division of Mines and Geology Special Publication 42, strong seismic ground shaking, seismic-related ground failure, including liquefaction, or landslides;*

b. *Result in substantial soil erosion or the loss of topsoil;*

c. *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;*

d. *Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;*

e. *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; or*

f. *Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.*

The information in this section is based on the *Preliminary Geotechnical Report for the Graham Hill Water Treatment Plant Tank Improvements Project*, hereinafter referred to as the *Geotechnical Report*, that was prepared by Group Delta in March of 2018 (Group Delta Consultants, Inc. 2018) (**Appendix C**).

a, c) <u>Expose People/Structures to Seismic-Related Risk – Less than Significant.</u> The project area is located in a region of high seismic activity and earthquake potential. Within proximity (approximately 15 miles) of the City of Santa Cruz, there are at least six (6) major faults and fault systems, including: the San Andreas, San Gregorio, Zayante, Ben Lomond and Butano Faults, the Monterey Bay Fault Zone, and other faults and branches of these major faults (City of Santa Cruz 2017a). The active or potentially active faults near the project area are the San Andreas (10 miles to the northeast), San Gregorio (10 miles to the southwest),

Zayante-Vergeles (7 miles to the northeast), Monterey Bay-Tularcitos (12 miles to the southwest), and numerous fault branches from these major faults. The San Andreas Fault is the largest and most active of the faults in the site vicinity; however, each fault is considered capable of generating moderate to severe ground shaking (Group Delta Consultants, Inc. 2018).

The Alquist-Priolo Earthquake Fault Zoning (AP) Act provides regulatory zones to prevent the construction of buildings used for human occupancy on the surface trace of active faults. There are no active faults within or in close proximity to the project area (California Department of Conservation 2019).

It is reasonable to assume that there will be at least one moderate to severe earthquake from one of the local faults during the next 50 years. The United States Geological Survey's Working Group on California Earthquake Probabilities (WGCEP) estimates that each region of California will experience a magnitude 6.7 or larger earthquake in the next 30 years, and there is a 63 percent chance of at least one magnitude 6.7 or greater earthquake occurring in the nearby San Francisco Bay Area region between 2007 and 2036.

An earthquake or seismic event can cause intense shaking of sediments and ground failure, such as liquefaction and landslides. Liquefaction is the transformation of loose, water-saturated sand or silt into a liquid state. A landslide is a general term that describes a wide variety of mass downslope movements of soil and rock.

The project area is located in an area not mapped as having the potential for liquefaction during seismic events, according to the liquefaction map provided in the City's 2030 General Plan, which is based on the depth of groundwater, soil characteristics, and probable earthquake intensities and durations. Further investigations undertaken by Group Delta confirmed that site conditions within the project area are at low risk for liquefaction in the event of seismic events (Group Delta Consultants, Inc. 2018)

Although the project area is not located within a landslide hazard area (County of Santa Cruz 2019), studies performed by Pacific Crest Engineering (PCE) in 2006 revealed two localized shallow landslides which they described as the New Slide and Old Slide areas. The Old Slide occurred downslope of the Filtered Water Tanks and lower tank pad access roadway well before April 2006. As noted in the PCE report, the area was re-vegetated and appears stable with the exception of an erosion area at the property line. The slide occurred within surficial and shallow subsurface – fill compromising the outer fill wedge below the road. This was apparently due to the water tank overflowing at some point in time which caused local saturation of the fill. In addition to drainage improvements, repairs also included construction of a soldier pile wall across the

gully below the older slide area and backfilling the gully behind the wall for further stabilization (Pacific Crest Engineering 2006).

The New Slide was located northwest of the Water Treatment tanks and occurred on or around April 5, 2006. The slide occurred entirely within shallow fill at the edge of a level bench created by cutting and filling on the hillside. Mud and debris flowed downslope of the slide area. The slide apparently occurred as a result of intense saturation due to drainage which was inadvertently directed into the slide area. We understand repairs to portion of the 2006 landslide included minor grading, as well as surface and subsurface drainage improvements.

The proposed project improves the slope stability of the project area. The loads from the new tanks would be transferred to bedrock and not to fill or the underlying soils. In addition, significant surface and subsurface drainage systems would be installed which would further improve overall site stability. Analysis for the project also did not identify a plausible slope stability mechanism that could result in landslides that would impact the proposed improvements or neighboring properties (Group Delta 2018). The slope stability conclusions were further validated by the performance of the slope over the past 60 years since it was constructed. While there has been some surficial erosion and sloughing, there are no indications of shallow or deep slope instability such as crest settlement or cracking (Group Delta 2018).

Impact Analysis. There are no active faults located within or adjacent to the project area. Therefore, it is not expected that the project area would be subject to the risk of fault rupture. The project area is also not in an area having high potential for liquefaction, as described above. The new construction is not expected to have any adverse impacts on static or seismic slope stability. The loads from the new tanks would be transferred to bedrock and not to fill and/or underlying soils. Where new fill is required below the new sludge tank, it will be supported by a retaining wall deriving its lateral support in bedrock below the fill. In addition, the potential for water infiltration in the future is low because the new tanks would include a subdrain system to collect and intercept any leakage or groundwater around the tanks. Additionally, surface infiltration on the pad would be addressed through project design by an impervious asphalt surface and a stormdrain collection system that discharges directly to the San Lorenzo River. These improvements and design features would prevent runoff (both surface and subsurface) from flowing onto the downhill slopes.

Previous fill material would also be removed prior to the construction of the tanks in this area, and the cement pad foundation and retaining walls would further control slide material from adjacent slopes (Group Delta 2018). The data and analyses conducted for the project support the conclusion that no additional stabilization measures beyond those designed in the project are required (Group

Delta 2018). Furthermore, the project would be constructed in accordance with the current California Building Code (CBC), which includes design criteria for different types of structures and methods for obtaining ground motion inputs. Therefore, impacts related to geotechnical hazards, including fault rupture, liquefaction and landslides, as a result of project implementation would be **less than significant**. No mitigation would be required.

b) **Soil Erosion or the Loss of Topsoil – Less than Significant.** Soil erosion is the loss of topsoil by water and wind; soil erosion potential is related to the texture, organic matter content, soil structure, and permeability of soil materials. The primary soil types at the project location are Zayante-Rock outcrop complex (approximately 66 percent of the site), which spans the entire western edge of the project area, and Watsonville loam (approximately 34 percent of the site), which is found in the northeast section of the site, outside of the area for proposed construction activities. Zayante-Rock outcrop complex soils are soils that have rapid permeability and runoff, have a high erosion hazard, and are generally well-drained (United States Department of Agriculture 1980). Watsonville loam soils exhibit slow to medium runoff, have very slow permeability, slight to moderate erosion hazard, and are poorly drained (United States Department of Agriculture 1980).

Soils with erosion factors (K factors) greater than 0.4 are considered highly erodible. According to the United States Department of Agriculture's Soil Survey Geographic Database, the Zayante-Rock outcrop complex soil within the project area has a K factor of 0.02, which is not highly erodible; the Watsonville loam soil has a K factor of 0.43, which is considered to be erodible.

Impact Analysis. The project area contains Watsonville loam soils that are considered highly erodible. Although located outside of the proposed area for construction, it is possible that these soils would be impacted as a result of project construction activities and ground disturbing activities. To offset potential impacts that may occur as a result of the erosion of all soils throughout the project area, the project design has included recommendations from the *Geotechnical Investigation*, including the construction of five (5) retaining walls throughout the project area to control the movement of soils. The retaining walls would be constructed for slope support along the site edges and access road.

Throughout construction, the implementation of erosion control BMPs, as required through the project SWPPP, would be implemented to minimize potential erosion or loss of topsoil. As described within the Project Description under Air Quality and Water Quality Protection Measures, this would also include the preparation and implementation of a City approved Erosion Control Plan, which would specify detailed water quality protection and erosion/sediment control BMPs.

Once the replacement tanks and water treatment facilities are constructed, the treatment plant would be exposed to inclement weather that may result in accelerated soil erosion. However, the proposed tanks and water treatment facilities were designed to accommodate the erodible Watsonville loam soils, and include geotechnical recommendations from the *Geotechnical Report* (Group Delta Consultants Inc. 2018). The new tanks and retaining walls would include a subdrain system to collect and intercept any leakage or groundwater around the tanks. Finally, surface infiltration on the pad would be addressed through project design by an impervious asphalt surface and a stormdrain collection system that discharges directly to the San Lorenzo River. Further, any disturbed soil would be replanted with native vegetation following project completion. Therefore, project impacts related to erosion and the loss of topsoil would be **less than significant.** No mitigation would be required.

d) **Expansive Soils – Less than Significant.** Expansive soils shrink or swell depending upon water content and can cause damage to structures. Soils with a high clay content are more susceptible to swelling than sand or gravel soils. Although, as discussed above, the northeastern corner of the project area consists of Watsonville loam soils, which have a high shrink swell potential, the new concrete water tanks would be constructed west of the pre-existing, degraded storage tanks. As such, the area in which ground disturbance is proposed, along the western edge of the project area, would be constructed on Zayante-Rock outcrop complex. Therefore, the soils that are proposed to be disturbed through project implementation within this area are not considered expansive (United States Department of Agriculture 1980).

Impact Analysis. Zayante-Rock outcrop complex is the soil that underlays the area that has been identified for ground disturbance through implementation of the project. These soils have rapid permeability, are excessively drained, and are unlikely to pond or support flooding. They have low shrink swell potential and are not expansive by nature. The Watsonville loam soils, present within the northeastern corner of the GHWTP site, would not support permanent structures. Implementation of the project would not result in the addition of permanent structures on expansive soil, as defined in Table 18-1-B of the CBC, and would not create substantial risks to life or property. Therefore, this impact would be **less than significant**, and no mitigation would be required.

e) **Septic Tanks – No Impact**. There are no septic tanks, leach fields, or alternative waste water disposal systems existing or proposed as part of or affected by the project. Therefore, there would be **no impact**.

f) **Destroy a Paleontological Resource or Geologic Feature – Less than Significant with Mitigation.** The City of Santa Cruz 2030 General Plan and associated documentation, specifically the Cultural Resources Background Report (LSA Associates 2006), has identified areas within the City of Santa Cruz that are

sensitive for paleontological resources. These documents provided prehistoric and historic context for the current project area. The project area is underlain with Late Pleistocene Alluvium (Pleistocene: 100,000 – 10,000 years ago), Purisima Formation (Late Miocene to Pliocene: 7 – 2 million years ago) and Santa Margarita Sandstone (Late Miocene: 12 – 9 million years ago). These geological units are all considered sensitive for paleontological resources, although no known paleontological resources have been discovered on the site.

Impact Analysis. Although known paleontological resources would not be impacted through project implementation, ground disturbing activities could reveal previously undiscovered paleontological or geological resources of significance. Although it is unlikely resources would be discovered, because the project area has been previously disturbed and evaluated for the potential to support these resources, there is a possibility that unanticipated and accidental discovery of paleontological resources or unique geologic features during ground disturbing project related activities could occur. With implementation of **Mitigation Measure GEO-1**: Stop Work in the Event of Unexpected Paleontological Resources or Unique Geological Features during Construction, the impacts to unknown resources would be **less than significant level with mitigation.**

> **Mitigation Measure GEO-1: Stop Work in the Event of Unexpected Paleontological Resources or Unique Geological Features during Construction**: As discussed in the Project Description, an education program for cultural and paleontological resources would be undertaken for the construction crew prior to the onset of construction activities. If paleontological resources or unique geologic features are discovered during soil-disturbing activities by construction crews, all work will stop immediately and the City will notify a qualified paleontologist. A paleontologist would inspect the discovery and determine whether further investigation is required. If the discovery can be avoided, no further mitigation would be required. If the resource cannot be avoided, the qualified paleontologist would evaluate the resource and determine whether it meets the definition of "unique". If the resource is determined to not be unique, work may continue in the area. If the resource is determined to be unique, work would remain halted, and a preservation or recovery plan will be prepared. Preservation in place is the preferred protective measure. If preservation in place is not possible, resources and/or fossils would be recovered, prepared, identified, catalogued and analyzed according to current professional standards under the direction of the qualified paleontologist. Work may commence at the time of completion of the treatment. A final summary report would be completed and submitted to the City. The report would include a discussion of the methods used, stratigraphy exposed, fossils collected, and the significance of the

recovered fossils. The report will also include an itemized inventory of all the collected and catalogued fossil specimens.

8. GREENHOUSE GAS EMISSIONS.

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

a. *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or*

b. *Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.*

The information in this discussion is based on the *Graham Hill Water Treatment Plant Concrete Tanks Replacement Project Conformity Analysis* that has been included in **Appendix B**.

a) <u>Generate GHG Emissions – Less Than Significant.</u> Global warming is the observed increase in the average temperature of the Earth's surface and atmosphere caused by increased greenhouse gas (GHG) emissions, which can contribute to changes in global climate patterns resulting in global climate change. GHG emissions are the result of both natural and anthropogenic activities, and the primary sources of these emissions is caused by the consumption of fossil fuels for power generation and transportation, forest fires, decomposition of organic waste, and industrial processes. Principal GHG's that enter the atmosphere as a result of human activities are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O).

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

The California Air Resources Board (CARB) is the lead agency for implementing AB 32. In accordance with requirements of AB 32, a scoping plan was adopted by CARB in December 2008 and updated in 2017. This most recent scoping plan lays out the framework for achieving the 2030 reductions as established in SB 32, described below. The proposed 2017 scoping plan update identifies GHG reductions by emissions sector to achieve a statewide emissions level that is 40 percent below 1990 levels by 2030. CARB recommends that projects incorporate design features and GHG reduction measures, to the degree feasible, to minimize

operational GHG emissions, and that achieving no net additional increase in on-going annual GHG emissions, resulting in no contribution to GHG impacts, is an appropriate overall objective for new development.

In October 2012, the City of Santa Cruz adopted a Climate Action Plan (CAP) that outlines the actions the City will take over the next ten years to reduce GHG emissions by 30 percent (City of Santa Cruz 2012b). The CAP identifies five categories for CAP actions and identifies reduction strategies to achieve municipal and community goals. Each category chapter briefly outlines the issues and current programs, and then outlines programs and actions necessary to fully achieve the reductions for that sector. The categories are: energy efficiency, transportation and land use planning, water use and waste reduction, locally generated renewable energy, and public partnerships, education and outreach.

Impact Analysis. Project GHG emissions are estimated in the *Graham Hill Water Treatment Plant Tank Replacement Project - Air Quality and Greenhouse Gas Conformity Analysis* prepared by Harris (**Appendix B**). Refer to **Appendix B** for model input and output. Calculated annual GHG emissions from construction are provided in **Table 5**.

Table 5. Estimated Total Construction GHG Emissions

Phase	Metric Tons CO2e
Demolition and Site Preparation	291
Structure Construction	874
Coating	7
Total GHG Emissions	**1,172**

Note: Emission quantities are rounded to the nearest whole number. Exact values are provided in **Appendix B.**

As shown in **Table 5**, the proposed project would result in a total one-time contribution of approximately 1,172 metric tons (MT) CO2e over the multiple year construction period.

Following construction, operation of the tanks and supporting structures would be the same as existing conditions, with the exception of two new pump stations. The pumps are anticipated to result in a new increase in energy demand of 27.93 MW/h per year (**Attachment B**). This electricity demand would result in a minimal net increase in GHG emissions of 8.16 MTons CO2e per year. However, the GHWTP would continue to be serviced by MBCP, which supplies carbon-free power. Therefore the new pumps would not result in a net increase in GHG emissions, and no impacts would occur during operation.

Because the project would not have any on-going GHG emissions, it would not impact the ability of the state or City to meet GHG reduction goals. Therefore, this impact would be **less than significant.** No mitigation would be required.

b) <u>Conflict with Applicable Plan – Less than Significant.</u> The applicable plans for the proposed project are CARB's statewide emissions reduction targets and the City CAP, as described above under (a).

Impact Analysis. As described under (a), the project would not result in any ongoing annual GHG emissions that would impact the state or City's ability to meet emissions reduction targets. The City of Santa Cruz CAP does not include any GHG reduction strategies related to construction. Therefore, the project would support the goals and strategies of the applicable plans, and there would be no conflict with the applicable plans. This impact would be **less than significant**. No mitigation would be required.

9. HAZARDS and HAZARDOUS MATERIALS.

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

a. *Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;*

b. *Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;*

c. *Emit hazardous emissions or handle hazardous materials or waste within ¼ miles of an existing or proposed school;*

d. *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, create a significant hazard to the public or the environment;*

e. *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area;*

f. *Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or*

g. *Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.*

a-c) <u>Create a Hazard to the Public or Environment, or Handle Hazardous Materials near a School – Less than Significant.</u> A hazard to the public or environment could occur through the routine transport, use, or disposal of hazardous materials. It could also occur if there is a reasonably foreseeable upset, or accidental conditions, that would involve the release of hazardous materials into the environment, or if hazardous emissions are emitted or hazardous materials are

handled within 0.25 mile of a school. Little Green Beings, a private day care and preschool program, is the only school located within 0.25 miles of the project area. The school is located at 630 Graham Hill Road.

Remediation Testing & Design prepared a report for the City of Santa Cruz Health Department in November of 2007 detailing the remediation of arsenic related soils that were present in fill material that was disposed of along the western slide area of the GHWTP where tank construction activities would occur. Over 2,000 tons of material was removed at that time, in addition to another 600 cubic yards of clean overburden soils. It was determined through this report that further testing was not required for soils throughout the GHWTP, and that remediation efforts were complete.

Impact Analysis. Once project construction is complete, the water treatment plant would be maintained and operated by water treatment plant personnel similar to existing conditions, which involves the transport of bulk chemicals to support operations of the plant. It is not anticipated that any addition to required chemicals would occur beyond existing conditions as a result of project implementation, and current BMPs would continue to maintain the safety of these transport procedures.

Throughout project implementation, construction workers, the public, and environment could be exposed to additional hazardous materials, beyond existing conditions, through the following activities.

- Construction vehicles and equipment use fuel, oil, engine fluids and other hazardous substances that would be transported and used throughout the project area, and could be inadvertently released through leaks, spills or accidents.
- Waste from the demolition of the existing concrete water tanks and associated operational equipment would be comprised of concrete, gunite, and steel, which do not constitute hazardous materials. However, there may also be lead or other hazardous materials associated with demolition activities.

As described in the Project Description, the project includes several measures to control the release of hazardous materials, in accordance with local and state regulations. As described under construction BMPs for Air Quality and Water Quality, compliance with the project SWPPP and the City *Construction Work Best Management Practices, Chapter 4 of the Best Management Practices Manual for the City's Storm Water Management Program* (revised June 2014), would result in measures implemented to minimize accidental spills, proper handling of hazardous materials, erosion, runoff and dust control measures. This would also include requirements for equipment and vehicle maintenance, materials storage, and other construction practices which could result in the inadvertent release of fuel, motor oil, and other hazardous materials. This includes proper

disposal of demolition waste (including lead and other debris containing hazardous materials), such as keeping demolition waste covered and ensuring adequate space within the trucks as loads of the demolished materials are transported to the Santa Cruz Resource Recovery Facility and Recycling Center, which has a facility designated for hazardous materials disposal, to ensure that materials are contained and hazardous materials are not being emitted. The project would also comply, as necessary, with MBARD Rule 424, National Emissions Standards for Hazardous Air Pollutants. Rule 424, that defines the investigation and reporting requirements if asbestos is discovered during renovation, demolition or trenching activities. Air District notification would be required at least ten days prior to renovation or demolition activities.

With implementation of the SWPPP requirements, demolition plan, local air regulations and associated BMPs, this impact would be **less than significant**. No mitigation would be required.

d) **Project Located on List of Hazardous Materials Sites – No Impact**. A government records search conducted in February 2019 revealed that no portion of the project area is listed on the Cortese List, a compilation of information from various sources listing potential and confirmed hazardous waste and hazardous materials sites in California (State Water Resources Control Board 2015). There are various sites south of the project area that are either open or have been previously reported, remediated, and closed. There is one site located approximately 0.2 miles southwest of the project area that is listed as a Waste Discharge Requirement (WDR) site. WDR sites operate under Waste Discharge Requirements issued by the State Water Resources Control Board or Regional Water Quality Control Board and are not considered to host hazardous materials (State of California Water Resources Control Board 2015). As a result, there would not be a risk of public exposure to hazardous material sites in the project area. Therefore, there would be **no impact**.

e) **Project Located near Airport – No Impact.** The project area is not located within two miles of a public or private airport, in the vicinity of a private air strip, or in an area for which an airport land use plan has been developed or adopted. There would be **no impact**.

f) **Impair or Interfere with Emergency Response/Evacuation Plan – Less than Significant.** The proposed project is located within the jurisdiction of the City of Santa Cruz, but is surrounded by unincorporated Santa Cruz County properties. Therefore, the project would comply with both the City of Santa Cruz Emergency Operations Plan or the City of Santa Cruz Hazard Mitigation Plan (City of Santa Cruz 2013b, 2017a) and the County of Santa Cruz Operational Area Emergency Management Plan (Santa Cruz County, 2015).

Impact Analysis. The project would not involve the development of structures or facilities that could potentially impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. During construction, as described in the Project Description under Traffic Control Plan, roadways and emergency access would be retained, and local safety personnel (e.g., police and fire department) would be contacted regarding any lane closures or detours through the County encroachment permit process. Furthermore, all construction vehicles and equipment would be contained on site in a manner that allows for continuous access throughout the GHWTP site. Therefore, construction would not impede implementation of the applicable Santa Cruz Emergency Operations Plan, draft City of Santa Cruz Hazard Mitigation Plan (City of Santa Cruz 2013b, 2017a) for County Operational Area Emergency Management Plan (Santa Cruz County, 2015). This impact would be **less than significant**. No mitigation would be required.

g) **Expose People or Structures to Wildland Fires – Less than significant.** The project area is located in a moderately developed, urbanized area that is bound by residential and commercial uses to the north, east, and south. However, the land west of the project area, zoned as Parks (PK) by the City of Santa Cruz, supports a variety of land uses including densely vegetated open space interspersed within low-density residential properties and the San Lorenzo River. The project area and the surrounding lands are located in a Local Responsibility Area (LRA) for which fire protection is provided by City of Santa Cruz Fire Department. The project area is designated as an LRA Moderate Fire Hazard Severity Zone for wildland fires (CAL FIRE 2007). Following project completion, the GHWTP would support largely the same structures and facilities, and would provide the same level of service as existing conditions. The project would not result in the addition of project features that would put the GHWTP or surrounding areas at greater risk of wildland fires, and would not require additional services for fire protection. Therefore, the project would not expose people or structures to significant risk of loss, injury, or death involving wildland fires. The impact would be **less than significant**.

10. HYDROLOGY AND WATER QUALITY.

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

a. *Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality;*

b. *Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin;*

c. *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site, substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite, create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff, or impede or redirect flood flows;*

d. *In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; or*

e. *Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.*

a, c) <u>Violate any Water Quality Standards or Degrade Water Quality; Alter Existing Drainage Patterns – Less than Significant.</u> Throughout construction activities, stormwater runoff could contain soil and other pollutants such as fuels, oils, grease, lubricants, solvents and other materials associated with construction equipment and activities. The testing stages of the project would also include filling the filtered water tank with chlorinated water for disinfection and leak testing, and after completion, discharging the dechlorinated water into the San Lorenzo River. The reclaim and sludge tanks would also be filled with potable water for testing that would be recycled and used within the GHWTP to the greatest extent practical, or discharged into the San Lorenzo River.

Through the development of the project SWPPP and grading plan, a drainage plan would be required for the GHWTP in relation to the proposed project modifications, including the additional infrastructure and impermeable surfaces that would occur following project implementation. The drainage plan would ensure that drainage from the construction area, and resulting infrastructure following project implementation, would not result in additional erosion and/or

degradation of the site or neighboring properties as a result of the additional features added to the GHWTP.

Impact Analysis. Implementation of the project would result in an increase in impermeable surfaces that would impact the existing drainage patterns. Currently, during high winter flows, stormwater runoff results in overflow onto properties downslope of the GHWTP where the system terminates in a "Tee" diffuser. Implementation of the project would improve the existing drainage of the site by capturing stormwater from impervious surfaces and conveying the water into the storm drain system, which is routed to the San Lorenzo River. Studies have been undertaken through the project to verify that when conveyed effectively from the site, the existing storm drain will support flows under 100-year flood conditions (Group Delta 2018). Implementation of the project would eliminate the existing storm drainage culvert with the "Tee" discharge, improving conditions on neighboring properties through the installation of drainage improvements (surface and subsurface) to prevent runoff from flowing onto downhill slopes. The access road would also be designed to direct water to the storm drain system. Finally, along the lower tank pad area, the project would include concrete curbs along the outboard side of the pad to prevent runoff from sheet flowing onto downhill slopes.

During construction, stormwater and runoff could contain soil and other pollutants such as fuels, oils, grease, lubricants, solvents and other materials associated with construction equipment and activities. Furthermore, waters that would be discharged into the San Lorenzo River could be contaminated with chlorine.

As described in the Project Description construction BMPS for Water Quality and Air Quality, all construction activities would be conducted in accordance with the project SWPPP. The project would also take into consideration the City's Storm Water Ordinances (Chapters 16.19 Storm Water and Urban Runoff Pollution Control and 18.45 Excavation and Grading Regulations) and the City's *Construction Work Best Management Practices, Chapter 4 of the Best Management Practices Manual for the City's Storm Water Management Program*. This includes preparation and implementation of a City-approved Erosion Control Plan, which would specify detailed water quality protection and erosion/sediment control BMPs. It also includes requirements for equipment and vehicle maintenance, materials storage, and other construction practices which could result in the inadvertent release of fuel, motor oil, and other hazardous fluids and materials.

With implementation of the project drainage plan, SWPPP requirements and water quality protection measures, the project would not degrade water quality, and no water quality standards or waste discharge requirements would be violated. Furthermore, drainage from the site would be improved to account for changes in the project area resulting from the increased impervious surfaces

and infrastructure introduced to the GHWTP through project implementation. Therefore, this impact would be **less than significant**. No mitigation would be required.

b) <u>Decrease Groundwater Supplies or Interfere with Groundwater Recharge – Less than Significant</u>. Groundwater provides five (5) percent of drinking water in Santa Cruz, with the remainder provided by surface water supplies that are treated at the GHWTP. Implementation of the project would result in an increase in the efficiency of the GHWTP, but would not expand the capacity of the system for treating drinking water. The GHWTP would continue to draw water from the Tait wells, which is groundwater under the influence of surface water. There would be no increase in the amount of water drawn from the Tait wells as a result of project implementation.

Groundwater recharge primarily occurs from stormwater runoff percolating or moving downward from surface water to groundwater. Impervious surfaces diminish the ability of water to penetrate the ground and recharge the local groundwater basins, as flows increase in velocity and the area for recharge is diminished. Implementation of the project would result in an increase in impermeable surfaces, as the treatment facilities would be expanded west of the existing lower asphalt pad and the access road was widened.

Impact Analysis. Implementation of the project would result in a net increase in impermeable surfaces with the expansion of the lower pad area and access road. Although there would be an increase in the impermeable surfaces surrounding and supporting the tanks, this would be necessary to maintain the stability of the project area as the impermeable surfaces that would be constructed provide the foundation for the proposed tanks and infrastructure. Although impermeable surfaces reduce the level of water that may percolate through the ground and restore groundwater basins, for the GHWTP project area, the efficient conveyance of water from the site through the stormdrain system is beneficial in supporting the stability of the site (Group Delta 2018).

As discussed above, the proposed project would not use any additional groundwater beyond existing conditions, and would not impact groundwater in any way that would require any additional water supply throughout the project area above existing conditions. Therefore, the impact would be **less than significant.** No mitigation would be required.

d) <u>Flood Zone or Inundation by Tsunami, Seiche, or Mudflow – No Impact</u>. According to the Federal Emergency Management Agency (FEMA) Flood Map, the project area is located within an Area of Minimal Flood Hazard, designated as Zone X (https:/msc.fema.gov/portal, flood map 06087C0218E, effective May 16, 2012). The San Lorenzo River, which is approximately 650 feet west of the project area, has historically been the principal source of flooding in the City of Santa Cruz.

Based on the review of the California Geologic Survey Tsunami Inundation Map for Emergency Planning, Santa Cruz Quadrangle (July 1, 2009), the project area is not mapped within a Tsunami Inundation Line or Area and is not susceptible to tsunami inundation.

A seiche affects enclosed bodies of water after an earthquake-caused wave has been generated, and is an oscillating standing wave. The Monterey Bay, which is located approximately 2.5 miles south of the project area, is considered to be an area that may support a seiche; however, the project area is not considered to be at risk as it is not within the immediate vicinity of the bay.

Impact Analysis. Following project implementation, there would be no project features that would result in the increase of the project area, or surrounding areas, to be impacted by water inundation by flood hazards, tsunami, seiche zones, or mudflow. The project area is located outside of the 100-year flood zone for the San Lorenzo River and is not in an area that would be expected to be impacted by water related disasters, as described above. Therefore, there would be **no impact**. No mitigation would be required.

e) Conflict with Water Control Plan or Groundwater Management – Less than Significant. The Graham Hill Water Treatment Plant is a surface water treatment plant, utilizing the San Lorenzo River, Majors Creek, Laguna Creek, Reggiardo Creek, and Loch Lomond Reservoir for water supply. The Urban Water Management Plan (City of Santa Cruz 2016) is the guiding plan for the City of Santa Cruz to manage urban water supplies for consumers. The plan includes a description of the water service area, water sources, conservation measures, improvement needs and an assessment for future demands. Implementation of the project would result in an increase in the efficiency of the plant to treat surface flows to provide drinking water for the City of Santa Cruz. Following project implementation, the GHWTP would operate at the same capacity and would predominately retain the same features as existing conditions. The GHWTP would continue to draw water from the Tait wells, which is groundwater under the influence of surface water. There would be no increase in the amount of water drawn from the Tait wells as a result of project implementation.

Impact Analysis. Implementation of the project would result in the improved efficiency of the GHWTP; however, the capacity and function of the plant would remain the same. The operations of the plant would continue to treat surface waters and would not impact groundwater quality or availability in any way. The GHWTP would continue to draw water from the Tait wells, which is groundwater under the influence of surface water. There would be no increase in the amount of water drawn from the Tait wells as a result of project implementation.

Therefore, the project would support the overall goals of the Urban Water Management Plan to improve the efficiency of the current water treatment

processes, and this impact would be **less than significant.** No mitigation would be required.

11. LAND USE AND PLANNING.

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

a. *Physically divide an established community; or*

b. *Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.*

a) Physically Divide an Established Community – No Impact. The GHWTP is located in a suburban/rural residential area, adjacent to a residential community and open space that supports large areas of rolling grasslands with mature vegetation and trees, and the San Lorenzo River approximately 650 feet west of the project area. All project construction activities and proposed improvements would be located within the GHTWP site, with the exception of construction-related vehicles traveling along Graham Hill Road. There would be no project features that would be introduced into the community that would alter adjacent land uses, or provide a barrier for movement between them. Therefore, the project would not physically divide an established community, and there would be **no impact.**

b) Conflict with Applicable Land Use Plans – No Impact. The City of Santa Cruz land use designation for the project area is Community Facilities, and zoning is Public Facilities (PF). Implementation of the project would continue to support the GHWTP facilities and provide ongoing treatment of surface water for the City of Santa Cruz water supply.

The project, which includes replacing degraded concrete water treatment tanks and associated infrastructure, is consistent with applicable plans and policies in relevant planning documents, including the City's General Plan 2030 (2012a), the City of Santa Cruz Local Hazard Mitigation Plan Five Year Update 2017-2022 (2017a), and the City of Santa Cruz 2015 Urban Water Management Plan (2016). The GHWTP is currently degraded, and the tanks and facilities proposed for replacement are beyond the years that they were intended for service.

A variety of goals in the City's General Plan 2030 (2012a) support the replacement and upkeep of water supply facilities, including goals CC3.4-CC3.4.4, which state objectives to maintain the integrity of the water system through the modernization of water treatment plants and for the optimization and improvements of the water system. The City of Santa Cruz Local Hazard Mitigation Plan (2017a) emphasizes the importance of upgrading sewer, water,

and other infrastructure to withstand seismic shaking, and notes that a water shortage can be caused due to infrastructure capacity and operating constraints. Additionally, the City's 2015 Urban Water Management Plan (2016) underlines the importance that the GHWTP operates properly at all times to maintain water service.

Impact Analysis. The proposed project would continue to support and improve water treatment processes, which are the existing land uses onsite; would improve the efficiency of the City's water service; and would be consistent with applicable plans regarding water supply, treatment and infrastructure, as discussed above. The proposed project would remain in compliance with existing City of Santa Cruz General Plan land use designation and zoning, and would not comply with planning regulations and policies to continue to improve water reliability for the City. Therefore, there would be **no impact**.

12. MINERAL RESOURCES.

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

a. *Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*

b. *Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?*

a, b) Loss of Mineral Resources – No Impact. The City of Santa Cruz is primarily developed. There are no mines, areas of known mineral resources or designated areas for mineral resource preservation within the City or the General Plan 2030 Planning Area (City of Santa Cruz 2012a). The City zoning for the project area is Public Facilities (PF), a zone that does not support mineral resource overlays.

Impact Analysis. Implementation of the project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, nor result in the loss of availability of a locally-important mineral resource recovery site delineation on a local general plan, specific plan, or other land use plan, as there are no known mineral resources that have been identified within the City of Santa Cruz. There would be **no impact.**

13. NOISE.

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

a. *Result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;*

b. *Result in the generation of excessive groundborne vibration or groundborne noise levels; or*

c. *For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.*

a) Increase in Substantial Temporary or Permanent Noise – Less than Significant with Mitigation. The existing conditions within the project area include operational noise at the GHWTP (pumps, motors, aerators, generators), maintenance noise (leaf blowers), vehicular noise along Graham Hill Road and residential nuisance noise (e.g., lawn mowers, vehicles, people talking, barking dogs).

Impact Analysis. Construction activities would temporarily increase noise levels throughout the project area and adjacent residential land uses. Construction equipment that is anticipated for use includes loaders and backhoes, excavators, pavers, compactors, graders, cranes, and concrete pumps. However, due to the limited size of the construction area in each phase of construction, only a few pieces of equipment would operate simultaneously at any given time. Noise levels from the anticipated construction fleet were determined based on typical equipment noise levels determined by the FHWA Roadway Construction Noise Model (RCNM). The two noisiest pieces of construction equipment (grader and compactor) anticipated for the project were assumed to operate simultaneously in the same location, and would have the potential to generate noise levels up to 83.5 dBA at 50 feet from the construction site (the distance of the nearest sensitive receptor).

While the City noise ordinance is not applicable to water infrastructure projects of this type, the project would comply with the ordinance in order to minimize impacts to adjacent land uses throughout the construction of the project. Section 9.36.010 of the City's noise ordinance prohibits offensive noise between the hours of 10:00 p.m. and 8:00 a.m. within 100 feet of a building used for sleeping purposes, or which would disturb people within hearing distance of the noise. Section 9.36.010(c) exempts construction noise from the ordinance between 7:00 a.m. and 8:00 a.m. if permitted by the City to alleviate traffic

impacts, or is required due to project completion time constraints. The residences surrounding the project area are located in the County of Santa Cruz. Chapter 8.30 (Noise) of the Santa Cruz County Code establishes noise regulations in Santa Cruz County. Section 8.30.010 of the County's Code states that "offensive noise" shall not be permitted between the hours of 10:00 p.m. and 8:00 a.m. Section 8.30.010 of the County Code states that daytime noise that exceeds 75 db at the property line of the property from which the sound is broadcast should be considered offensive. The ordinance also states that the necessity of the noise should be taken into consideration in determining whether a noise is in violation of the code (8.30.010(C)(5)).

As described in the Project Description, construction of the project would be restricted to daylight hours, 8:00 a.m. to 5:00 p.m., which would be consistent with the City and County noise ordinances, unless prior approval by the Water Department Director is obtained. Construction noise would be temporary and intermittent, and noise levels would fluctuate throughout the day, and would vary day to day. Construction noise would potentially be considered a nuisance to the surrounding residences in the County. As discussed in the Project Description, a number of noise measures would be implemented throughout project construction activities to minimize impacts on adjacent land uses, including the addition of the Construction Contact, ongoing communication with neighbors regarding upcoming construction activities and measures to utilize the best technology and placement of equipment to minimize noise impacts, to the greatest extent practical, generated through the project. Although the construction noise would be temporary in nature, the proposed upgrades would be implemented over the course of two and a half years, resulting in a disturbance in ambient noise for neighboring residences. Therefore, this impact would be **significant.** Through implementation of **Mitigation Measure NOI-1:** Preparation and Implementation of a Noise Control Plan for Construction Activities, this impact would be reduced to a **less than significant level with mitigation.**

The project would replace deteriorating existing GHWTP facilities with similar facilities. The anticipated operational noise level from the replacement structures, including additional pump stations, and electrical and other new equipment, would be similar to the existing noise level and is not considered a significant source of additional operational noise. All new pump stations would be fully enclosed and specifications would require the installation of quiet models. Furthermore, the pump stations would be designed to leave space for the installation of sound enclosures If they are found to be necessary. Thus, the project would not result in a substantial permanent increase in ambient noise levels or expose people to noise levels in excess of standards established in the City's General Plan and Noise Ordinance (Chapter 9.36). Therefore, the impact from operational noise would be **less than significant.** No mitigation would be required.

Mitigation Measure NOI-1: Preparation and Implementation of a Noise Control Plan for Construction Activities. The City will require, through the project construction contract specifications, that the construction contractor submit to the City for review and approval a Noise Control Plan prepared by a qualified noise consultant at least 28 days prior to the onset of construction activities. A qualified noise and vibration consultant is defined as a Board Certified Institute of Noise Control Engineering member or other qualified consultant or engineer approved by the City. The Noise Control Plan shall present noise control measures and Noise Performance Standards to ensure compliance with the standards established by the City noise ordinance and Santa Cruz County noise regulations. The City shall be responsible for ensuring that the construction contractor design and implements noise control measures correctly and that the construction activities comply with the project Noise Performance Standards.

b) Groundborne Vibration or Noise Levels – Less than Significant. Land uses that are considered vibration-sensitive[3] (in which groundborne vibration could potentially interfere with operations or equipment) include hospitals and research operations. The land use surrounding the project is residential, which is not considered a vibration sensitive land use.

The main concern associated with groundborne vibration is individual residential annoyance. The Federal Transportation Authority (FTA) has published vibration impact criteria to determine whether vibration would potentially result in an annoyance to residents. Construction vibration is subject to the FTA's infrequent event criteria because operation of vibration-generating equipment is anticipated to be intermittent throughout the day in the vicinity of an individual receptor. Residences fall into FTA Land Use Category 2, which is a receptor where people normally sleep. The FTA identifies 80 VdB as the generation level from infrequent events that would potentially disturb residents.

Impact Analysis. The project, which includes replacement of existing water treatment facilities, including the additional pump stations, and electrical and other new equipment, would not result in a substantial increase in any new permanent groundborne vibration or noise. However, construction activities would result in a limited amount of groundborne vibration and noise. **Table 6** presents typical vibration levels that would be expected at a distance of 25 feet and 45 feet from standard construction equipment, similar to what would be required for the project. Although a large bulldozer is not anticipated to be required for construction, it is included below to present a worst-case conservative estimate for construction equipment. Vibration levels, even for the worst-case

3 Federal Transit Administration (FTA), Office of Planning and Environment. 2018. Transit Noise & Vibration Impact Assessment. September 2018.

conservative estimate, would be below 80 VdB beyond 45 feet from the construction area.

Table 6. Vibration Source Levels for Construction Equipment		
Construction Equipment	**Approximate VdB at 25 feet**	**Approximate VdB at 45 feet(1)**
Large Bulldozer	87	79
Loaded Trucks	86	78

Source: FTA 2018.

Notes:

(1) Based on the formula VdB = VdB(25 feet) – 30log(d/25) provided by the FTA (2018).

The nearest residential property lines are located approximately 50 feet from the project area. Vibration levels beyond 45 feet from the construction area would be below the 80 VdB threshold for infrequent events that would potentially disturb residents. Therefore, the project would not result in exposure of person to or generation of excessive groundborne vibration or groundborne noise levels, and this impact would be **less than significant**. No mitigation would be required.

c) Project Located near Airport – No Impact. The project area is not located within an area for which an airport land use plan has been developed, nor within two miles or the general vicinity of a public airport or private airstrip. There would be **no impact**.

14. POPULATION AND HOUSING.

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

a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure; or

b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

a) Induce Population Growth – No Impact. The project includes the replacement of concrete water treatment tanks and associated equipment and facilities at the GHWTP, which currently has the hydraulic capacity of processing up to 24 million gallons of water per day. Replacement of these tanks would cause no expansion in the capacity for the facility. Therefore, the project would not supply additional potable water, and would not induce substantial population growth in the area, either directly or indirectly, as water the water supplied by the GHWTP would remain the same. There would be **no impact**.

b) <u>Displace Housing or People – No Impact.</u> The project would not displace existing housing nor people, necessitating the construction of replacement housing elsewhere. There would be **no impact**.

15. PUBLIC SERVICES.

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

- *Result in substantial adverse physical impacts associated with provision of new or physically altered facilities, the construction of which could cause significant impacts, in order to maintain acceptable service for a) fire protection, b) police* protection*, c) schools, d) parks, or e) other public facilities.*

a, b) <u>Increased Demand for Fire and Police Protection – No Impact.</u> The project area includes the existing water treatment plant and associated facilities, an access road on the property site, and nearby parking lot for construction staging. Public services in the project area include fire protection from the Santa Cruz Fire Department and police protection from the City of Santa Cruz Police Department and Santa Cruz County Sheriff's Department. The project would replace degraded water treatment equipment and structures, would not increase the capacity of the water services provides, and would not result in population growth or the need for additional public services, including fire and police protection. The project would not result in any uses that would generate the need for additional fire or police services, which would result in adverse effects on response times and service ratios. There would be **no impact.**

c-e) <u>Increased Demand for Schools, Parks and Other Public Services – No Impact</u>. Implementation of the project would result in the continued provision of potable water for the City's service area by the GHWTP and would not result in an increase in the water supplied. Therefore, implementation of the project would not result in an increase in the general population within the City that would require additional schools, parks or other public services. There would be **no impact**.

16. RECREATION.

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

a. *Increase the use of existing parks or recreational facilities such that substantial physical deterioration would occur or be accelerated; or*

b. *Include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment.*

a, b) <u>Increase Use of or Require Expansion of Recreational Facilities – No Impact.</u> Implementation of the project would result in the continued provision of potable water for the City's service area by the GHWTP and would not result in an increase in the water supplied. Therefore, implementation of the project would not result in an increase in the general population within the City that would result in increased use and degradation, or the need for expanded recreational opportunities or facilities within the City. There would be **no impact**.

17. TRANSPORTATION.

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

a. *Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities;*

b. *Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b);*

c. *Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment; or*

d. *Result in inadequate emergency access.*

a) <u>Conflict with Applicable Plans and Policies – Less than Significant</u>. Graham Hill Road provides access to the project area, with a driveway leading west into the GHWTP from the roadway. The road is two lanes wide adjacent to the site, and there are bicycle lanes along both shoulders of the roadway. There are no local bus routes or pedestrian trails and/or walkways located along Graham Hill Road adjacent to the site.

Applicable plans and policies for transportation within the City include the City's General Plan 2030 (2012a) and the Active Transportation Plan (2017b), which both encourage mobility within the City of Santa Cruz. The project area is surrounded by Santa Cruz County, through which transportation is planned under the Santa Cruz County Regional Transportation Commission's 2040 Regional Transportation Plan. Implementation of the project would not result in any changes along Graham Hill Road, or any public roadways, that would conflict with policies within this plan to continue to provide safe and effective travel routes throughout the County. However, throughout project implementation, construction vehicles would be present in higher frequency along Graham Hill Road for the thirty (30) month construction period.

Impact Analysis. Project construction would result in an increase of construction-related vehicles using Graham Hill Road and surrounding roadways. As

described in the Project Description construction BMPs, a Traffic Control Plan would be prepared and implemented through the County encroachment permit process. Throughout project construction, both lanes of Graham Hill Road would remain open, and the bike lanes along both shoulders would not be restricted. Project staging and construction related parking would occur onsite at the GHWTP, to the greatest extent feasible. In the event that offsite staging would be required to support the project, workers would be shuttled to the project area to minimize impacts on local roadways. As such, construction of the project is not anticipated to create a significant traffic increase along Graham Hill Road.

Following project completion, the GHWTP would continue operation, and traffic generated by employees would be the same as existing conditions. The project area would retain the same land use, supporting the GHWTP, and site access and workforce at the plant would remain the same. Therefore, the project would not conflict with the existing transportation infrastructure, or a program plan, ordinance or policy addressing the local circulation system, including transit, roadway, bicycle and pedestrian facilities, and this impact would be **less than significant**. No mitigation would be required.

b) **Conflict with CEQA Guidelines section 15064.3, subdivision (b)(1) or (b)(2) – Less than Significant**. As discussed for (a), implementation of the proposed project would not change operational activities that currently occur at the GHWTP, and the number of employees and vehicle use would not increase. Land use would remain the same, and no changes to the existing circulation system are proposed or would occur as a result of project implementation. There would be minor increase in construction-related vehicles using the roadway; however, implementation of the project traffic control plan that would be developed through the County encroachment permit process would ensure that access was retained in an efficient manner along County roadways. Therefore, there would be no long-term change to vehicle miles travelled and no conflict with CEQA Guidelines section 15064.3, subdivision (b)(1) or (b)(2). This impact would be **less than significant**.

c) **Increase Hazards due to Design Feature – No Impact.** The project does not include any design features that would substantially increase transportation related hazards, such as sharp curves, dangerous intersections, or incompatible land uses. The project includes an access road repair that would widen the interior roadway to the lower portion of the GHWTP, improving accessibility for construction vehicles, emergency vehicles and operational support vehicles. Therefore, there would be **no impact.**

d) **Inadequate Emergency Access – Less than Significant**. Implementation of the project would not result in any changes to Graham Hill Road, or access to the GHWTP or adjacent land uses. The project includes the expansion of the access

road that would widen the interior roadway to the lower portion of the GHWTP. This would improve access for large vehicles, including emergency service vehicles and operational support vehicles.

Impact Analysis. Throughout project implementation, Graham Hill Road would remain open; however, an increase in slow-moving construction vehicles may be present on the road that could delay or obstruct the movement of emergency vehicles within the general vicinity of the project area. As described in the Project Description, the project includes the implementation of a Traffic Control Plan that would be developed through the County encroachment permit process, which would include notifying emergency service providers of construction activities and retaining emergency access at all times within and surrounding the project area. Therefore, this impact would be **less than significant**. No mitigation would be required.

18. TRIBAL CULTURAL RESOURCES.

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

- *Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is: (a) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k); or (b) 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.*

a, b) <u>Adverse Change in Significance of Tribal Cultural Resources – Less than Significant.</u> In accordance with Assembly Bill 52 (AB 52), CEQA was amended to mandate consultation with California Native American tribes during the CEQA process to determine whether a proposed project would have impacts on Tribal Cultural Resources, because California tribes are experts in their Tribal Cultural Resources and heritage. Therefore, in compliance with AB 52, the City of Santa Cruz initiated consultation with tribes, and consultation is concluded when the City of Santa Cruz and the tribes agree on appropriate mitigation measures to mitigate and/or avoid any significant impacts.

In March 2018, Albion mailed project initiation letters on behalf of the City, including a project map and description, to the following Native American contact listed for the City of Santa Cruz's geographic area of jurisdiction by the NAHC.

- Irene Zwierlein, Amah Mutsun Tribal Band of Mission San Juan Bautista
- Patrick Orozco, Costanoan Ohlone Rumsen-Mutsen Tribe
- Rosemarv Cambra, Muwekma Ohlone Indian Tribe of the SF Bay Area
- Ann Marie Savers, Indian Canyon Mutsun Band of Costanoan

Responses from the Tribes included Irene Zwierlein of the Ohlone-Costanoan Tribe recommends an archaeologist be present for all ground disturbing activities associated with the project. Ann Marie Sayers of the Indian Canyon Mutsun Band of the Costanoan Tribe has no specific comments.

Surveys performed by qualified archaeologists (Albion 2019) determined that the overall sensitivity of the project area to support cultural and/or tribal cultural resources was low, and the potential discovery of unknown resources through ground disturbing activities would also be low. Through implementation of the cultural resources BMPs identified in the Project Description, appropriate training would be undertaken by construction crews to identify resources if they were discovered throughout project implementation, and appropriate measures would be undertaken to preserve and/or protect these resources. Therefore, a qualified archaeologist would not be present for monitoring throughout project implementation, but appropriate measures would be undertaken to preserve and/or protect any discovered cultural and tribal cultural resources.

Impact Analysis. There are no resources that have been listed in the California Register of Historic Resources, or in a local register of historic resources as defined in Public Resources Code, Section 5020.1(k). Also refer to Section 5, Cultural Resources. AB 52 established that a substantial adverse change to a Tribal Cultural Resource would have a significant impact on the environment. Based on archival and field-based research of the GHWTP, it is not anticipated that tribal resources would be impacted through project implementation. However, there always remains the potential for ground-disturbing activities to expose and/or impact unknown tribal cultural resources. Through the implementation of cultural resources BMPs that have been included in the Project Description, the potential discovery of tribal cultural resources would be accounted for through the preservation and/or protection of any resources inadvertently discovered through project implementation. Therefore, this impact would be **less than significant** on tribal historic resources. No mitigation would be required.

19. UTILITIES AND SERVICE SYSTEMS.

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

a. *Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects;*

b. *Not have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years;*

c. *Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments;*

d. *Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals; or*

e. *Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste*.

a, b) <u>Relocation or Construction of Services or Insufficient Water Supplies – Less than Significant.</u> The GHWTP provides the City's service area with 95% of its potable water and can process up to 24 million gallons of water per day. Once the project is complete, there would be no change in the water supply level of service or capacity of the plant; although, the operational efficiency and reliability of the system would be improved.

Impact Analysis. The City's 2015 Urban Water Management Plan (2016) emphasizes the importance that the GHWTP operates properly at all times to maintain water service. The proposed project would not substantially increase the service capacity, would not require the construction or relocation of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, which could cause significant environmental effects. The project would improve the efficiency of the City's water service and would ensure the City continues to have reliable access to water resources, which is considered beneficial to the City of Santa Cruz. Therefore, the impact would be **less than significant**. No mitigation would be required.

c) <u>Adequate Wastewater Capacity – No Impact.</u> Implementation of the project would not result in a change in the land use at the GHWTP, and services provided by the plant would remain unchanged. There would be no increase in the amount of wastewater produced by the plant and, therefore, no impact on the capacity of the City of Santa Cruz to treat wastewater. There would be **no impact.**

d) Generation of Solid Waste in Excess of Standards or Capacity – Less than Significant. The project area is served by the City of Santa Cruz Resource Recovery Facility, located 3 miles north of the City limits at 605 Dimeo Lane. This facility includes a sanitary landfill, recycling center, and green waste drop-off facility. The landfill complies with all conditions set by the California Integrated Waste Management Board, the California Regional Water Quality Control Board, and the Monterey Bay Air Pollution Control District, and the facility has the capacity to receive waste until approximately 2052 (City of Santa Cruz 2012a).

Impact Analysis. Project construction would generate demolition waste from removal of the existing concrete water tanks. Expected materials include concrete, metal, and construction related debris. As described in Section 9, Hazards and Hazardous Materials, waste from demolition of the concrete water tanks and associated operational equipment would be comprised of concrete, gunite, and steel, and may include hazardous materials, including lead. The Resource Recovery Facility has the ability and capacity to accept demolition and other construction-related solid waste generated by the project, included standard construction related hazardous materials, including lead. Therefore, solid waste generated by project implementation would be supported by the City facility or other approved facility. Once constructed, the project is not expected to generate solid waste beyond existing conditions. Therefore, this impact would be **less than significant.** No mitigation would be required.

e) Solid Waste Regulations – Less than Significant. As described above and in Section 9, Hazards and Hazardous Materials, project construction would generate demolition waste from removal of the tanks and associated operational equipment, which may include lead and other hazardous materials.

Impact Analysis. As described in the Project Description construction BMPs, the project would comply with the project SWPPP and City's *Construction Work Best Management Practices, Chapter 4 of the Best Management Practices Manual for the City's Storm Water Management Program* (revised June 2014). This includes proper disposal of demolition waste, such as keeping demolition waste covered, and ensuring adequate space within the trucks as loads of the demolished materials are transported to Santa Cruz Resource Recovery Facility or other approved facility, including hazardous materials. Therefore, this impact would be **less than significant.** No mitigation would be required.

20. WILDFIRE.

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

a. Substantially impair an adopted emergency response plan or emergency evacuation plan;

b. *Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire;*

c. *Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or*

d. *Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.*

a) <u>Impair an Emergency Plan or Evacuation Plan – Less than Significant</u>. The project would be contained within the GHWTP, and would not interfere with roadway traffic on Graham Hill Road once construction is complete. As described in Section 17, Transportation, there would be a minor amount of increased construction-related traffic that would be accounted for within the project Traffic Control Plan that would be developed through the County encroachment permit process.

Improvements to the access road within the GHWTP would improve access to the lower portion of the plant, improving access for emergency vehicles. Project implementation would not interfere with the City of Santa Cruz Emergency Operations Plan (2013b) or Santa Cruz County Operational Area Emergency Management Plan which directs City and County officials during major emergencies, such as a wildfire. As a result, the impact would be **less than significant**. No mitigation would be required.

b) <u>Expose Occupants to Wildfire Pollutants or Uncontrolled Spread of Wildfire – Less than Significant</u>. The project includes the replacement of degraded water treatment concrete tanks, related equipment, and the expansion of the access road leading to the lower level of the GHWTP. The project area is located in an area zoned for Public Facilities (PF), and is surrounded by residential and urban land uses, interspersed with mature vegetation and open space. The project area and surrounding lands are located in a Local Responsibility Area (LRA) designated as a LRA Moderate Fire Hazard Severity Zone for wildland fires (CAL FIRE 2007).

Impact Analysis. The project does not include the construction of housing or any other structures for residency. Following project completion, the water treatment plant would support similar structures, including the additional of an electrical building. Therefore, wildfire risks would remain largely the same, and would not expose people to further risks associated with pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Therefore, the impact would be **less than significant**. No mitigation would be required.

c) <u>Require Infrastructure that may Exacerbate Fire Risk – Less than Significant</u>. As described above, the project includes the replacement of degraded concrete water tanks and associated equipment to maintain the potable water supply in City of Santa Cruz, including the additional of an electrical building. The project is located in an area designated for moderate fire hazard risk (CAL FIRE 2007).

Impact Analysis. The project would be constructed in accordance with the current CBC, including all fire protection codes. The project does not include the addition of new roads; however, the access road within the GHWTP would be expanded to support construction traffic, resulting in conditions more suitable for emergency vehicle access. There would be no installation of fuel breaks, emergency water sources, power lines, or other new utilities as a result of project implementation. Therefore, the project would not result in the addition of risks, and this impact would be **less than significant**. No mitigation would be required.

d) <u>Expose People or Structures to Significant Downslope Flooding or Landslide Risks as a Result of Post-Fire Slope Instability, or Drainage Changes – Less than Significant</u>. The GHWTP includes steep sloping areas that support natural downhill drainage throughout the project area. Through project implementation, construction of up to five (5) retaining walls for slope support along site edges and along the access road would occur to minimize potential landslide and erosion risks associated with project implementation. Although an increase in impermeable surfaces would occur through project implementation, a drainage plan would be prepared for the project in accordance with the requirements of the grading permit and SWPPP that would be obtained for the project. Therefore, no significant changes in drainage patterns are anticipated as a result of the project, and the project area would be similar in nature to existing conditions following project implementation.

Impact Analysis. Implementation of the project would not considerably expose people or structures to risks including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes, as the site would be improved with the addition of five (5) retaining walls and implementation of a drainage plan to stabilize an area that is currently at risk for landslides. This impact would be **less than significant**. No mitigation would be required.

21. MANDATORY FINDINGS OF SIGNIFICANCE.

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

a. Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-

sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory;

b. *Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of the past projects, the effects of other current projects, and the effects of probable future projects.); or*

c. *Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly.*

a) <u>Potential to Degrade the Quality of the Environment and Adversely Affect Biological or Cultural Resources – Less Than Significant with Mitigation</u>. The discussions presented in the Biological Resources and Geology/Soils discussions above address the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory.

The following mitigation has been included to reduce potential effects on these resources to a level below significance.

- **Mitigation Measure BIO-1**: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation)
- **Mitigation Measure BIO-2**: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation)
- **Mitigation Measure GEO-1:** Stop Work in the Event of Unexpected Paleontological Resources or Unique Geological Features during Construction

As a result of this evaluation, there is no substantial evidence that, after mitigation, significant effects associated with this project would result. Therefore, the project impacts would be **less than significant with mitigation**.

b) <u>Cumulative Considerable Impacts – Less Than Significant with Mitigation</u>. Currently, the GHWTP is beginning a projected 10-year process to upgrade the overall facility that will change and modernize the water treatment process at the plant for the City of Santa Cruz. Currently there are two projects in the early planning phases of development: in-kind replacement of the flocculators and tube settlers. These projects also include repairing concrete walls and upgrades to the sedimentation basins. These projects are exempt from CEQA. The

proposed project also includes accommodations to facilitate the inclusion of a future UV disinfection and solids dewatering facility. In addition to project specific impacts, this evaluation considered the potential incremental effects of the project that could contribute to a significant cumulative impact. The significant cumulative impacts to which the project would contribute are air quality, greenhouse gas/climate change, noise and traffic.

Both air quality and greenhouse gas analyses presented in the Air Quality and Greenhouse Gas discussions above are cumulative in nature in that the analysis of individual impacts is undertaken in the context of the air quality basin and global climate change arena, respectively. The short-term construction emissions would be minimized through construction BMPs described in the Project Description, and the project would not exceed MBARD emissions thresholds for criteria pollutants. Therefore, the project would not result in a considerable contribution to significant cumulative impacts for air quality and greenhouse gas.

Noise minimizing BMPs would be implemented through the project to minimize impacts to neighboring land uses, including the provision of a Construction Coordinator to provide project information to interested parties, and to provide an ongoing evaluation of which noise reducing features provide the greatest decrease in noise levels leaving the project area. It is anticipated that the City will continue to work with neighboring land uses to implement project specific noise related BMPs to minimize impacts. Through the course of the implementation of various projects, this impact may be significant, as the accumulation of projects may result in a substantial increase in construction related noise. For the purposes of the proposed project, implementation of the noise related BMPs and **Mitigation Measure NOI-1:** Preparation and Implementation of a Noise Control Plan for Construction Activities would result in construction related noise that would have a **less than significant** impact on neighboring land uses. Through implementation of each of the proposed projects, the City will continue to monitor projected construction related noise levels to ensure that thresholds for noise are maintained, or additional mitigation measures will be added to these projects to minimize, to the greatest level practicable, noise impacts to neighboring land uses.

As presented in the Transportation discussion above, none of the roads providing access to the project area are expected to be significantly affected by project implementation. Short term impacts that would occur during construction would be minimized through the traffic control plan, as described in the Project Description.

Therefore, the project would not result in a considerable contribution to significant cumulative impacts, and the impact would be **less than significant with mitigation** through the inclusion of **Mitigation Measure NOI-1:** Preparation

and Implementation of a Noise Control Plan for Construction Activities to minimize construction related noise impacts.

c) **Adverse Effects on Human Beings – Less Than Significant.** The potential for adverse direct or indirect effects to human beings was considered in the evaluation of environmental impacts above. Based on this evaluation, project construction activities would not expose hazardous materials associated with demolition and removal of the existing tanks and treatment facilities, as the existing infrastructure that would include provisions to appropriately handle and remove all hazardous materials that may be associated with construction debris. Through implementation of the construction BMPs for Air Quality and Water Quality identified in the Project Description, the project would not cause substantial adverse effects on human beings related to the control of dust and nuisance odors from the project area. The project would increase the efficiency of the water treatment plant and improve the reliability of the City's water source, which would have a beneficial effect on human beings. Therefore, the impact would be **less than significant**. No mitigation would be required.

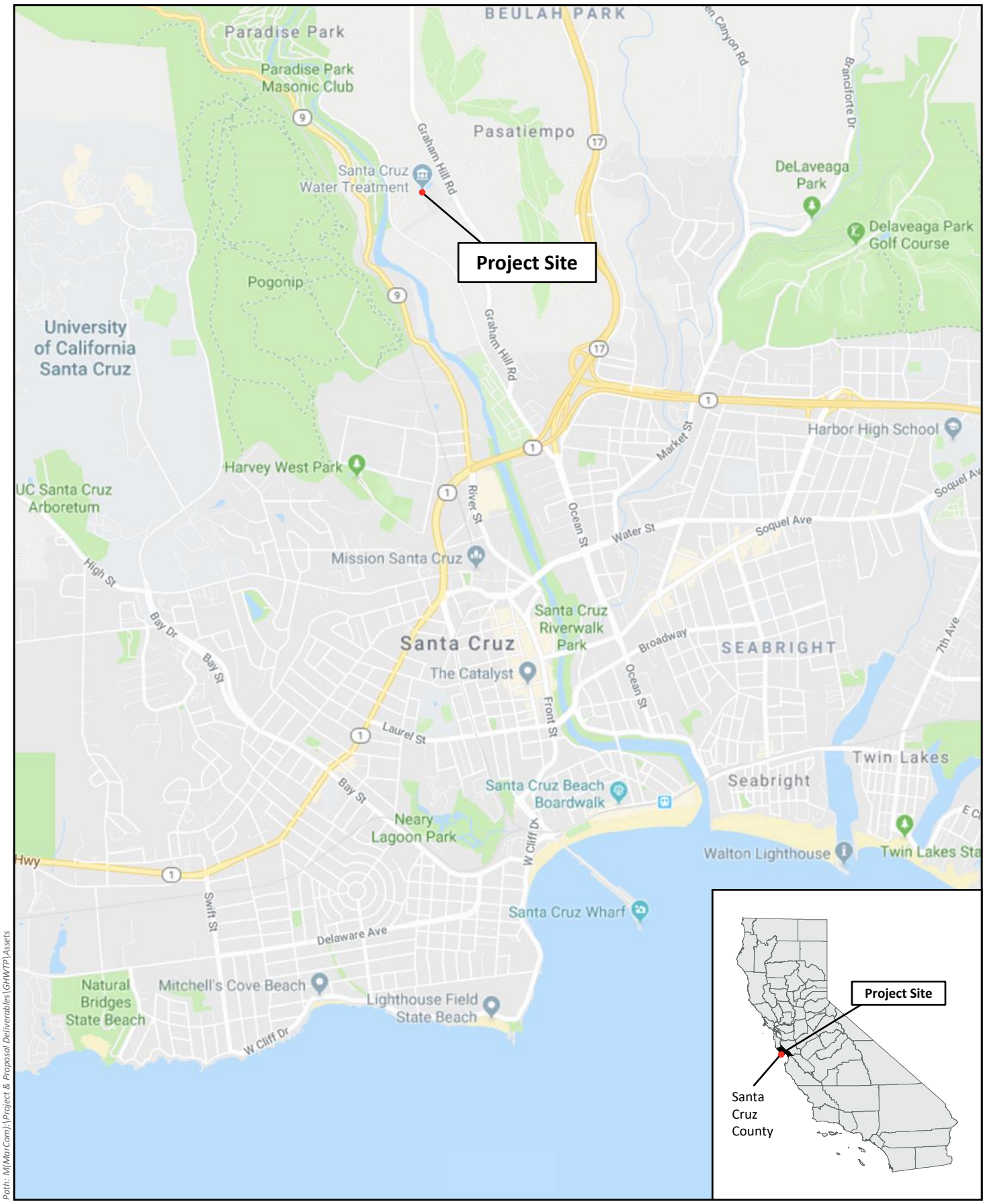

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Figure 1

Regional Location for the
GHWTP Concrete Tanks Replacement Project

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Source: Google Maps 2019

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Figure 2
GHWTP Property Boundary and Concrete Tanks
Replacement Project Area of Disturbance

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Existing Sludge Storage Tank with Horizontal Staining Line from Leaks

Close Up Photo of the Sludge Storage Tank with Horizontal Staining Line

Source: City of Santa Cruz 2019

Harris & Associates

No Scale

Figure 3
Photos of the Existing Sludge Storage Tank

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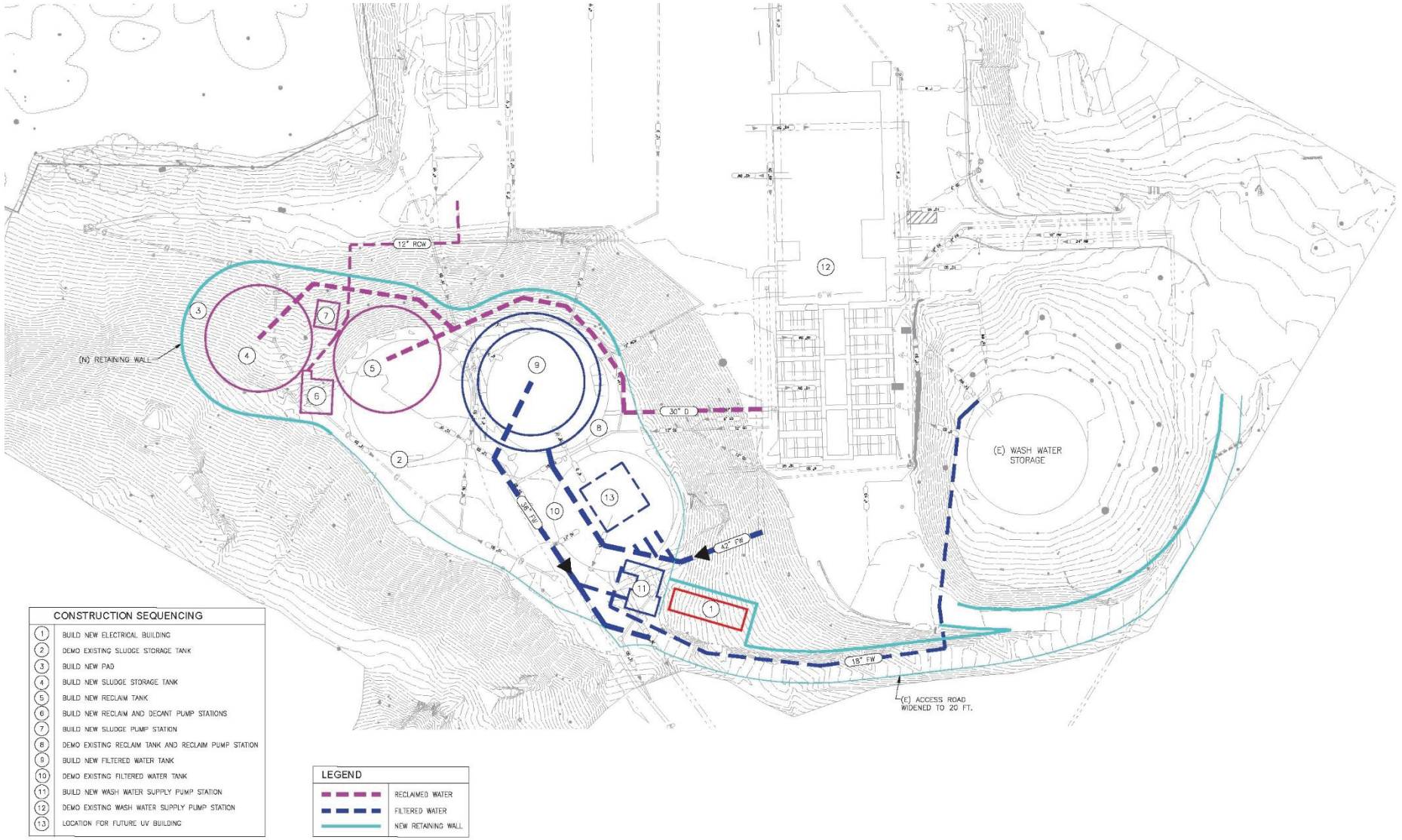

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Figure 4

GHWTP Concrete Tanks Replacement Project Components

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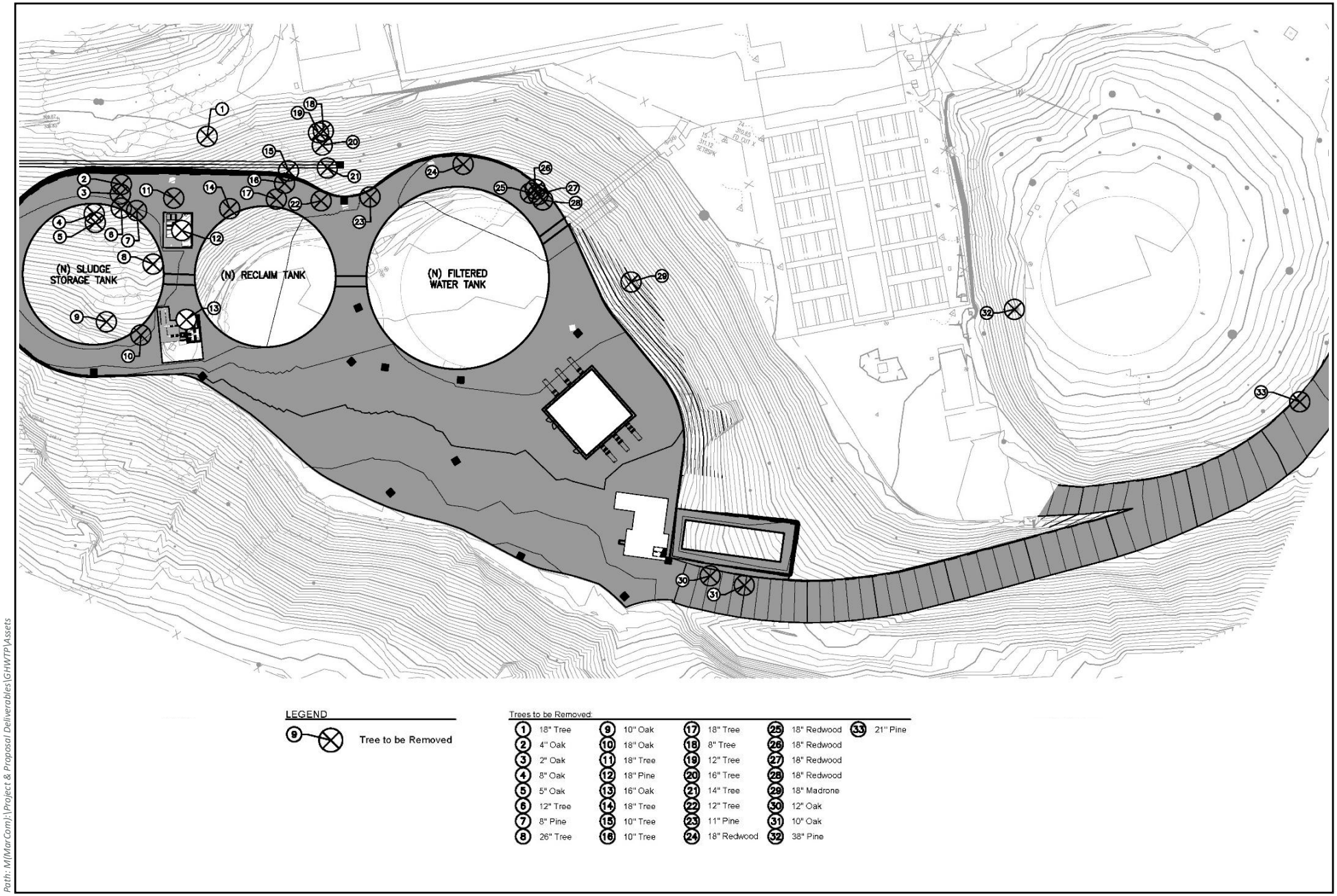

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Source: West Yost Associates 2019

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Figure 5
GHWTP Concrete Tanks Replacement Project Tree Removal Plan

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VII. List of Preparers

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Appendix A. Biotic Report

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Harris & Associates

Technical Memorandum

Date: February 13, 2019

To: Jessica Martinez-McKinney, Associate Planner, City of Santa Cruz Water Department

From: Wendy Young, Project Manager

cc: Shannon Bane, Wildlife Biologist

Subject: Graham Hill Water Treatment Plant Tank Replacement Project – Biotic Report (Revised)

1. Introduction

This technical memorandum presents the results of Harris & Associates' analysis of potential impacts to biological resources from construction of the proposed Graham Hill Water Treatment Plant (GHWTP) tank replacement project (project).

The City of Santa Cruz (City) plans to replace three concrete tanks and two associated pump stations at the GHWTP, located at 715 Graham Hill Road, Santa Cruz. The tanks being replaced are 1) filtered water storage, 2) reclaimed water storage, and 3) sludge storage. The Reclaim Pump Station and Wash Water Supply Pump Station were also designated for replacement. In addition, a new at-grade Decant Port Effluent Pump Station and Sludge Pump Station vault will be constructed. These facilities and associated appurtenances are a part of the existing GHWTP water treatment process. The project is not increasing the system's capacity for collection and treatment, but will replace the existing degraded system.

The construction elements of the project – including demolition of existing tanks, construction of replacement tanks, road expansion, trenching and pipe placement, construction of an electrical building and respective ancillary facilities – would be located on disturbed areas within the existing Graham Hill Treatment Plant site (property) (**Figure 1**). The tree removal plan is included as **Figure 2**. Throughout this document, "property" refers to the entire parcel, and "project area" refers to the area of construction.

The City is seeking financial assistance to construct the project through the Drinking Water State Revolving Fund (DWSRF). Therefore, this memorandum has been prepared in accordance with the State Water Resources Control Board requirements for the DWSRF program and relevant state and federal regulations.

2. Regulatory Setting

The DWSRF Loan Program is partially funded by the U.S. Environmental Protection Agency (US EPA) and subject to both state and federal environmental regulations, including the National Environmental Policy Act, Federal and state Endangered Species Acts, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Clean Water Act, California Fish and Game Code, California Environmental Quality Act, California Native Plant Protection Act, and City of Santa Cruz local ordinances (e.g., Heritage Tree Ordinance, Sensitive Habitat Ordinance). Descriptions of these regulations, and the applicability of the regulations to the project, are provided below.

Federal Regulations

National Environmental Policy Act

The National Environmental Policy Act (NEPA) was enacted by Congress in 1969 to ensure that federal agencies consider the environmental impacts of their actions and decisions. NEPA requires the federal government to use all practicable means and measures to protect environmental values and makes environmental protection a part of the mandate of every federal agency and department. NEPA requires analysis and a detailed statement of the environmental impact of any proposed federal action that significantly affects the quality of the human environment.

Because the project is partially funded with federal funds, project activities are subject to compliance with NEPA regulations.

Federal Endangered Species Act

The Endangered Species Act of 1973 (FESA), as amended (16 U.S.C. 1531 et seq.), provides for the protection and conservation of fish, wildlife, and plants that have been federally listed as threatened or endangered. Activities otherwise prohibited by section 9 of the Act and subject to the civil and criminal enforcement provisions of section 11 of the Act may be authorized for Federal entities pursuant to the requirements of section 7 of the Act and for other persons pursuant to section 10 of the Act.

Section 7

Section 7 of the ESA provides a means for authorizing take of threatened and endangered species resulting from actions that are conducted, permitted, or funded by a federal agency. Under Section 7, the federal agency conducting, funding, or permitting an action (the lead agency) must consult with USFWS or NOAA to ensure that the proposed action will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a proposed project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment (BA) evaluating the nature and severity of the expected effect. In response, USFWS or NOAA issues a biological opinion (BO) with a determination of one of the following findings.

The proposed action may either:

- jeopardize the continued existence of one or more listed species (jeopardy finding);

- result in the destruction or adverse modification of critical habitat (adverse modification finding);
- not jeopardize the continued existence of any listed species (no jeopardy finding); or
- not result in adverse modification of critical habitat (no adverse modification finding).

The BO issued by USFWS or NOAA may require avoidance and minimization measures and/or mitigation measures. If a proposed action under review would not jeopardize a listed species, USFWS or NOAA would issue an incidental take statement to authorize the proposed activity. The USFWS and NOAA Fisheries would complete an internal project review process pursuant to Section 7 of the Endangered Species Act. The outcome of the Section 7 process is a Biological Opinion.

Because the project is partially funded with federal funds, if project actions not covered under the existing incidental take permit and Habitat Conservation Plan (HCP) (see discussion below) may affect species protected under FESA, Section 7 would apply to the project.

Section 10

Section 10(a)(2)(A) of the Act states that no permit may be issued authorizing any taking referred to in Section 10(a)(1)(B) unless the applicant submits to the Secretary (the Secretary of the Interior) a HCP that specifies:

1. The impact which will likely result from such taking;
2. What steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps;
3. What alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and
4. Such other measures that the Secretary may require as being necessary or appropriate for purposes of the plan.

All HCPs must meet the following criteria in order to receive a permit:

1. The taking will be incidental;
2. The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
3. The applicant will ensure that adequate funding for the plan will be provided;
4. The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
5. The measures, if any required under subparagraph (A)(iv) will be met.

The project area is covered under an existing “Low-Effect” HCP (**Appendix A**). A low-effect HCP is one “involving: (1) minor or negligible effects on federally-listed, proposed or candidate species and their habitats … and (2) minor or negligible effects on other environmental values or resources. ‘Low-effect’ incidental take permits are those permits that, despite their authorization of some small level of incidental take, individually or cumulatively have a minor or negligible effect on species covered …” (USFWS 1996).

A low-effect HCP is defined as having:

- minor or negligible effects on federally listed, proposed, or candidate species and their habitats that are covered under the HCP; and
- minor or negligible effects on other environmental resources.

The City's low-effect HCP covers incidental take for Mount Hermon June Beetle, Zayante band-winged grasshopper, and Ben Lomond spineflower; Mount Hermon June Beetle is known to occur on the property, and the other two listed species could potentially occur on the property due to the presence of appropriate soils and habitat. The low-effect HCP covers the entire 12.71 acres of the GHWTP property, and includes 5.7 acres of suitable habitat, and 0.88 acres of occupied habitat for these species.

The purpose of the low-effect HCP is to expedite the handling of HCPs for activities with inherently low impacts, such as those anticipated for this project. Therefore, the project must comply with the terms set forth in the HCP, including those for incidental "take" from project activities that include the inclusion of avoidance and minimization measures throughout project implementation, and compliance with identified mitigation measures.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union, and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. It establishes seasons and bag limits for hunted species and protects migratory birds, their occupied nests, and their eggs (16 USC 703, 50 CFR 21, 50 CFR 10). Most actions that result in taking, or in permanent or temporary possession of a protected species, constitute violations of the MBTA. Examples of permitted actions that do not violate the MBTA include the possession of a hunting license to pursue specific game birds; legitimate research activities; display in zoological gardens; bird-banding; and other similar activities. The USFWS is responsible for overseeing compliance with the MBTA.

The project will require the trimming and removal of trees for the construction of the access road and replacement tanks, which provide habitat for and may house nests for migratory birds. Compliance with the MTBA will include preconstruction surveys and protection for species found within the project area at the time of construction.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles including their parts, nests or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb". For purposes of the "Bald Eagle Management Guidelines and Conservation Measures" the term "disturb" means to "agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior". In addition to immediate impacts, this definition also covers impacts that result from human-induced alteration initiated around a previously used

nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering behavior and causes injury, death or nest abandonment.

Although unlikely to occur in the project area, preconstruction surveys for these species and/or their nests will avoid any impacts to them.

Clean Water Act

The federal Clean Water Act (CWA) is the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. As such, it empowers the United States Environmental Protection Agency (EPA) to set national water quality standards and effluent limitations and establishes permit review mechanisms to enforce them, operating on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit.

Most of the CWA's provisions are at least indirectly relevant to the management and protection of biological resources because of the link between water quality and ecosystem health. The portions of the CWA that are most directly relevant to biological resources management are contained in CWA Section 404, which regulates the discharge of dredged and fill materials into "waters of the United States," including all areas within the ordinary high water mark of a stream, including non-perennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned; and seasonal and perennial wetlands. Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3). If compliance with CWA Section 404 is required, a water quality certification, or waiver of certification, would also need to be issued by the State Regional Water Quality Control Board pursuant to CWA Section 401.

Waters of the United States anywhere on the property are under the jurisdiction of the USACE. An unverified wetland (which supports poison hemlock and calla lilies, vegetation typical of wetlands) is discussed further below within the Habitats section. This area is present on the property, downslope of the tanks, but is not within the project area and will not be impacted by project construction activities.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act governs marine fisheries management in federal waters of the United States. The Act conserves and manages fishery resources found off of the coasts of the U.S., and the anadromous species and Continental Shelf fishery resources of the U.S. Public Law 104-297, the Sustainable Fisheries Act of 1996, amended the Act to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal fishery management plans. The Act also established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal management plan.

Within the project area, and greater GHWTP property, there are no waterways that have been identified for the purposes of the Act as EFH. The project would not result in any water quality

impacts that would impact any EFH waterways, and there would be no impacts on any protected fish species or habitats.

State Regulations

California Environmental Quality Act

The California Environmental Quality Act (CEQA) is a state law that requires state and local agencies to document and consider the environmental implications of their actions and to refrain from approving projects with significant environmental effects if there are feasible alternatives or mitigation measures that can substantially lessen or avoid those effects. CEQA requires the full disclosure of the environmental effects of agency actions, such as approval of a general plan update or the projects covered by that plan, on resources such as air quality, water quality, cultural resources, and biological resources.

The State Resources Agency promulgated guidelines for implementing CEQA known as the State CEQA Guidelines. Section 15380(b) of the State CEQA Guidelines provides that a species not listed on the federal or state lists of protected species may be considered rare if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definitions in the FESA and the California Endangered Species Act (CESA) and the section of the California Fish and Game Code dealing with rare or endangered plants and animals. This section was included in the guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on a species that has not yet been listed by either the USFWS or CDFW or species that are locally or regionally rare.

In addition, all potentially rare or sensitive species, or habitats capable of supporting rare species, are considered for environmental review per the CEQA Section 15380(b). This includes plants listed in the California Native Plant Society (CNPS California Rare Plant Ranks (CRPR) and natural communities of special concern listed in the California Natural Diversity Database (CNDDB).

Project activities are subject to compliance with CEQA regulations. A Categorical Exemption has been prepared by the City for the project. Impacts to any protected plants, wildlife, and habitats that occur within the project area must be identified, and avoided, minimized, and mitigated as necessary. The State of California does not recognize insects as endangered or threatened species pursuant to the State's Fish & Game Code. However, the MHJB does receive consideration under the California Environmental Quality Act (CEQA) since it satisfies the definition of a rare species under this statute.

California Native Plant Protection Act

The California Native Plant Protection Act (CNPPA) of 1977 prohibits importation of rare and endangered plants into California; unauthorized take of rare and endangered plants; and sale of rare and endangered plants (the "threatened" category replaced "rare" when the CESA was enacted in 1984). CESA defers to the CNPPA, which ensures that state-listed plant species are protected when state agencies are involved in projects subject to CEQA. Removal of plants for performance of a public service by a public agency or a publicly- or privately-owned public utility is exempt from CNPPA. Impacts to any rare or endangered plants that occur within the project area must be avoided and minimized, and mitigated as necessary.

California Endangered Species Act

The California Endangered Species Act (CESA) (Fish and Game Section 2050 et seq.), which is administered by the California Department of Fish and Wildlife (CDFW), protects wildlife and plants listed as threatened and endangered by the California Fish and Game Commission. CESA prohibits all persons from taking species that are state-listed as threatened or endangered except under certain circumstances. CESA defines "take" as any action or attempt to "hunt, pursue, catch, capture, or kill" a listed species. Section 2081 of CESA provides a means by which agencies or individuals may obtain authorization for incidental take of state-listed species, except for certain species designated as "fully protected" under the California Fish and Game Code (see below). Under Section 2081, a take must be incidental to, and not the purpose of, an otherwise lawful activity. In general, the requirements include identification of impacts on listed species; development of mitigation measures that minimize and fully mitigate impacts; development of a monitoring plan; and assurance of funding to implement mitigation and monitoring.

Species listed as threatened or endangered by the State of California occur on the property, and impacts to them must be avoided and minimized when possible, and mitigated when necessary. The State of California does not recognize insects (including the Mount Herman June Beetle, which occurs within the project area) as endangered or threatened species pursuant to the State's Fish & Game Code (see discussion below). There are no other special-status species present on the property.

California Fish and Game Code

Ephemeral and intermittent streams, rivers, creeks, dry washes, sloughs, blue line streams on USGS maps, and watercourses with subsurface flows fall under CDFW jurisdiction. Canals, aqueducts, irrigation ditches, and other means of water conveyance may also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife. A stream is defined in Title 14, California Code of Regulations Section 1.72, as "a body of water that follows at least periodically or intermittently through a bed or channel having banks and that supports fish and other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation."

Pursuant to California Fish and Game Code Section 1603, CDFW regulates any project proposed by any person that will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds." California Fish and Game Code Section 1602 requires an entity to notify CDFW of any proposed activity that may modify a river, stream, or lake. If CDFW determines that proposed activities may substantially adversely affect fish and wildlife resources, a Lake and Streambed Alteration Agreement (LSAA) must be prepared. The LSAA sets reasonable conditions necessary to protect fish and wildlife, and must comply with CEQA. The applicant may then proceed with the activity in accordance with the final LSAA.

Certain sections of the California Fish and Game Code describe regulations pertaining to protection of certain wildlife species. For example, Code Section 2000 prohibits take of any bird, mammal, fish, reptile, or amphibian except as provided by other sections of the code. The California Fish and Game Code Sections 3503, 3513, and 3800 (and other sections and subsections) protect native birds, including their nests and eggs, from all forms of take.

Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by the CDFW. Raptors (i.e., eagles, hawks, and owls) and their nests are specifically protected in California under Code Section 3503.5. Section 3503.5 states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto."

Bats and other non-game mammals are protected by California Fish and Game Code Section 4150, which states that all non-game mammals or parts thereof may not be taken or possessed except as provided otherwise in the code or in accordance with regulations adopted by the commission. Activities resulting in mortality of nongame mammals (e.g., destruction of an occupied nonbreeding bat roost, resulting in the death of bats), or disturbance that causes the loss of a maternity colony of bats (resulting in the death of young), may be considered "take" by the CDFW.

No streams or lakes occur on the property, and therefore no LSAA is necessary. Impacts to species protected by the Fish and Game Code resulting from the implementation of the project must be avoided and minimized, or mitigated as necessary, and are discussed below. The State of California does not recognize insects (including the Mount Herman June Beetle, which occurs at within the project area) as endangered or threatened species pursuant to the State's Fish & Game Code, but is protected under the California Environmental Quality Act (see discussion above).

City of Santa Cruz Local Ordinances

Although the property is located outside of Santa Cruz City limits, the property is considered to be within City jurisdiction rather than jurisdiction of the County of Santa Cruz. Thus, only City ordinances apply to this project.

Heritage Tree Ordinance

The City of Santa Cruz Heritage Tree Ordinance requires a permit for the removal or pruning of trees (more than 25% of the total tree mass) over 14-inches in diameter breast height (dbh), as measured 4.5 feet from the ground, from the City of Santa Cruz Parks and Recreation Department. Trees identified for removal within the project area must be measured, and any trees over 14-inches dbh must be permitted prior to removal.

Sensitive Habitat Ordinance

The Sensitive Habitat Ordinance (conservation regulations) identifies and protects the natural environmental resources of the City of Santa Cruz in areas having significant and critical environmental characteristics. The conservation regulations have been developed in general accord with the policies and principles of the General Plan, as specified in the Environmental Quality and Safety Elements of the General Plan, and the Local Coastal Program, and any adopted area or specific plans. The Sensitive Habitat Ordinance (conservation regulations) intend to accomplish the following:

1. Minimize cut, fill, earthmoving, grading operations, and other such man-made effects on the natural terrain;

2. Minimize water runoff and soil erosion caused by human modifications to the natural terrain;
3. Minimize fire hazard and risks associated with landslides and unstable slopes by regulating development in areas of steep canyons and arroyos and known landslide deposits;
4. Preserve riparian areas and other natural habitat by controlling development near the edge of ponds, streams, or rivers;
5. Encourage developments which use the desirable, existing features of land such as natural vegetation, climatic characteristics, viewsheds, possible geologic and archaeological features, and other features which preserve a land's identity;
6. Maintain and improve to the extent feasible existing water quality by regulating the quantity and quality of runoff entering local watercourses;
7. Maintain and improve to the extent feasible existing air quality by achieving or exceeding state air quality guidelines;
8. Serve as part of the Local Coastal Implementation Plan of the Local Coastal Program.

Habitat for the MHJB receives consideration under the Sensitive Habitat Ordinance of the City of Santa Cruz; therefore, project implementation would be subject to ordinance requirements.

3. Methodology

Harris and Associates (Harris) biologists reviewed biological technical documents from the City Water Department regarding the natural resources on the property and within the project area, including an existing plant list, and the *Low-Effect Habitat Conservation Plan for the Issuance of an Incidental Take Permit Under Section 10(a)(1)(B) of the Endangered Species Act for the Federally Endangered Mount Hermon June Beetle, Zayante Band-Winged Grasshopper, and Ben Lomond Spineflower for the City of Santa Cruz Graham Hill Water Treatment Plant Operations, Maintenance, and Construction Activities* (HCP).

To identify federally- and state-listed species potentially occurring in the project area, Harris biologists obtained an official species list from the USFWS Information for Planning and Conservation online planning tool (U.S. Fish and Wildlife Service 2018), queried the California Department of Fish and Wildlife's California Natural Diversity Database (CNDDB) for special-status species occurrences within the U.S. Geological Survey Felton 7.5-minute topographic quadrangle (California Department of Fish and Wildlife 2018) and a 2-mile buffer around the project area (**Figure 3**), and queried the California Native Plant Society's (CNPS) Rare and Endangered Plant Inventory (California Native Plant Society 2018) for special-status plant occurrences in the Felton quadrangle. The USFWS species lists, CNPS query, and the combined results of the CNDDB and IPaC queries (per RWQCB request) are provided in **Appendix B**.

A general habitat and natural resources assessment, including the potential for special-status species and habitats to occur within the project area was conducted during a reconnaissance-level pedestrian survey by Harris biologists (Shannon Bane and Wendy Young) on March 20, 2018.

4. Results

Project Location

The project area is located at 715 Graham Hill Road, Santa Cruz, California, 95060. The parcel (APN 060-141-05) consists of 12.71 acres, and houses a water treatment facility operated by the City. The parcel is located within the Felton 7.5' U.S. Geological Survey (USGS) topographic quadrangle, at DD (NAD 83) 37.00053 -122.03356, UTM 585991E 4095368N Zone 10, PLSS Section M 11S 02W 1. It is located within the Monterey Bay Watershed (HUC 8).

Habitats

The following habitats were identified on the property using existing biological resource documents and during the field visit and are described below: developed, mixed evergreen forest, Maritime Coast Range ponderosa pine forest, grassland, oak woodland, a slide area, and an unverified wetland (**Figure 4**). A list of plants for the property identified by the City's botanist is included in **Appendix C.** Only the slide area and Maritime Coast Range ponderosa pine forest fall within the project area; impacts to these habitats are discussed in the Impact Analysis section that follows.

Developed

The majority of the property (approximately 8 acres) is developed with a water treatment facility, including an office building, water tanks, pumps, treatment areas, parking lots, sidewalks, roads, and other infrastructure. Landscaped areas surround the developed area, and much of the vegetation consists of ornamental plants.

Mixed Evergreen Forest

The area surrounding the tanks and developed area is a mixed evergreen forest consisting of coast redwood (*Sequoia sempervirens*), coast live oak (*Quercus agrifolia*), canyon oak (*Quercus chrysolepis*), California bay laurel (*Umbellularia californica*), and madrone (*Arbutus menziesii*).

Understory species include both native and non-native plants. Understory species around the tanks and buildings are indicative of disturbance, most likely due to previous grading and ongoing maintenance activities such as mowing, and include: cutleaf plantain (*Plantago coronopus*), wild oat (*Avena barbata*), thistles, and bristly ox-tongue (*Picris echioides*).

Maritime Coast Range Ponderosa Pine Forest

Maritime Coast Range Ponderosa Pine Forest is listed by CDFW as a rare and unique ecosystem found in Santa Cruz County, California. This habitat is restricted to pockets of Zayante soils, which developed from the Santa Margarita formation (sandstone and limestone formed by Miocene marine terraces) and are geologically distinct from the volcanic origins of the Santa Cruz Mountains (USFWS 1997). Zayante soils are endemic to Santa Cruz County and occur in three locations. The largest Zayante soil deposit is in the vicinity of the communities of Ben Lomond, Felton, Mount Hermon, Olympia, and Scotts Valley. A second, smaller area is located in Bonny Doon (USFWS 1997). The third, and smallest, cluster is found near the community of Corralitos (and is not similar to the other two locations in terms of vegetation) (USFWS 1997).

Zayante soils are deep, coarse-textured, poorly developed, and well drained, creating a warmer and drier microclimate that supports three unique habitats that occur singularly or as a mosaic: northern maritime chaparral, ponderosa pine forest, and sand parkland. These habitats, as mosaics, are referred to as: “Maritime Coast Range Ponderosa Pine Forest”, “Zayante sand hills habitat”, “ponderosa sand parkland”, “ponderosa pine sandhills”, and/or “silver-leafed manzanita mixed chaparral” (HCP).

Maritime Coast Range Ponderosa Pine Forest in Santa Cruz County is a disjunct, remnant occurrence of Ponderosa pine, which typically occurs at higher elevations in the Sierra Mountains (within California). The Ponderosa pine trees in this habitat are widely-spaced in low-density, open, park-like stands with an herbaceous understory of grasses and forb, and often co-occurs with other special-status, endemic species, including: Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*) (federally endangered), Santa Cruz wallflower (*Erysimum teretifolium*) (federally endangered), Santa Cruz cypress (*Cupressus abramsiana*) (federally endangered), Silverleaf Manzanita (*Arctostaphylos silvicola*) (CNPS 1B), and Ben Lomond buckwheat (*Eriogonum nudum* var. *decurrens*) (CNPS 1B) (USFWS 1997, HCP). Although Ponderosa pine do occur in the project area, the other special-status plants do not.

Two federally-endangered insects are associated with Maritime Coast Range Ponderosa Pine Forest, including the Mount Hermon June beetle (MHJB) (*Polyphylla barbata*) and Zayante band-winged grasshopper (ZBWG) (*Trimerotropis infantilis*). These two insect species and the Ben Lomond spineflower are protected via the City’s low-effect HCP (see discussion in Federal Endangered Species Act, above). The HCP provides both protection for these species and their habitat, Maritime Coast Range Ponderosa Pine Forest, as well as a mechanism for incidental take for activities related to construction, maintenance, and operations, as specified in the HCP.

The HCP covers all 5.7 acres of Maritime Coast Range Ponderosa Pine Forest on the south side of the property (HCP). In this location, Ponderosa pines co-occur with coast live oaks and coyote bush (*Baccharis pilularis*). Of the 5.7 acres of habitat, 0.88 acres are occupied by the federally endangered Mount Hermon June Beetle. No other listed species associated with Maritime Coast Range Ponderosa Pine Forest currently occur on the property.

Grassland

A small strip of grassland extends downslope and south of the project area, and contains both native and non-native grasses, including California oat grass (*Danthonia californica*), California brome (*Bromus carinatus*), Pacific bentgrass (*Agrostis exarata*), and red fescue (*Festuca rubra*).

Oak Woodland

The area between the water treatment facility and slide area and the north boundary of the property supports grasslands interspersed with trees and shrubs, mostly coast live oak and coyote bush (*Baccharis pilularis*). Grasses are the same combination of native and non-native species that are found in the other grassland on the property including California oat grass, California brome, Pacific bentgrass, and red fescue. The existing assemblage is most like an oak woodland in structure and species composition, but is likely the result of natural recruitment and plantings after the initial construction of the water treatment facility.

Slide Area

An area of fill resulting from a landslide and subsequent grading and soil stockpiling is present to the north of the three existing tanks. This area has an assemblage of vegetation characteristic of disturbed areas that undergo natural recruitment, and is dominated by non-native grasses such as ripgut brome (*Bromus diandrus*), rattlesnake grass (*Briza* spp.) and bentgrass (*Agrostis* spp.), coyote bush, and small coast live oaks.

Unverified Wetland

Within the mixed evergreen forest, on the slope southwest of the project area, is an opening in the canopy that supports a very small (0.02 acre), unverified wetland area. The source of water in this area may be the result of a natural seep or runoff from the facility. The wet area is dominated by non-native plants, including calla lilies (*Zantedeschia aethiopica*) and poison hemlock (*Conium maculatum*).

Common Wildlife Species

Common wildlife species that are expected to occur in the project area include species that are tolerant of disturbance from ongoing operations and maintenance of the water treatment facility, or those that utilize the trees and open areas surrounding it. The lower density of housing in areas around the facility, and the proximity to protected areas like Henry Cowell Redwoods (approximately one mile) and riparian areas along San Lorenzo River (approximately 680 feet) make it likely that wildlife may pass through or occur on the property, especially birds. Common wildlife species that are associated with the habitats that occur within the property, and therefore may occur within the project area include: bushtits (*Psaltriparus minimus*), California towhees (*Melozone crissalis*), California scrub jays (*Aphelocoma californica*), acorn woodpeckers (*Melanerpes formicivorus*), coyotes (*Canis latrans*), raccoons (*Procyon lotor*), and western fence lizard (*Sceloporus occidentalis*).

Special-Status Species That May Potentially Be Affected by the Project

Harris identified suitable habitat for the following species as being potentially affected by the proposed action.

- **Mount Hermon June Beetle (federally endangered).** The MHJB is restricted to habitats within Zayante sandy soils, including: maritime Coast Range Ponderosa pine forest, northern maritime chaparral, and sand parkland (see discussion in Maritime Coast Range Ponderosa Pine Forest, above) (USFWS 1997; HCP). In addition, adults have been found in disturbed sandy areas where remnants of these habitats still occur. Ponderosa pine grows at all known MHJB locations and is a useful indicator of suitable habitat for the MHJB.

  MHJB are known to occur at the water treatment facility in Maritime Coast Range Ponderosa Pine Forest habitat. Surveys in 2004 and 2008 detected MHJB in the covered area: immediately south of the water tank to the paved service road. Subsequent monitoring reports indicate that a very small population of the MHJB persists at the site.
- **Zayante Band-winged Grasshopper (federally endangered).** The preferred habitat of the ZBWG is barren or sparsely vegetated, sunlit sand, which are features of the open sand parkland

plant community. This species is included in the HCP due to the extremely limited amount of habitat for this species in the County, but likely does not occur within the project area. Inclusion in this section ensures consistency with the HCP, and ensures adequate avoidance, minimization, and mitigation for ZBWG.

- **Ben Lomond Spineflower (federally endangered).** Ben Lomond spineflower occurs in Zayante sandhills habitat, and, like the ZBWG, is included in the HCP due to the extremely limited amount of habitat for this species in the County, but likely does not occur within the project area. Inclusion in this section ensures consistency with the HCP, and ensures adequate avoidance, minimization, and mitigation for Ben Lomond spineflower.
- **Nesting Birds (protected).** Nesting Birds are protected by the Migratory Bird Treaty Act, California Fish and Game Code, and California Environmental Quality Act. Nesting birds may occur on the property in trees, shrubs, and on the ground during nesting season (February 1-September 1) (CDFW 2018).
- **Hoary Bat (*Lasiurus cinereus*) (uncommon).** All native Bats are protected under the California Fish and Game Code. Hoary bats generally roost in dense foliage of medium to large trees within open habitats or habitat mosaics with access to trees for cover and open areas or habitat edges for feeding and nearby water sources. This species may roost in the larger trees and forage within project area.
- **American Badger (*Taxidea taxus*) (CDFW Species of Special Concern).** American badgers occur in remote areas with grasslands and loose soil. Given the small size of the grasslands within the project area, the development on the property, including fencing, and lack of loose soils, it is unlikely that American badgers occur on the property.

Species That Do Not Occur In the Project Area

The project area does not fall within the boundaries of Critical Habitat for any listed species. The following species occur near the project area, but either 1) habitat does not exist for these species within the project area, nor have previous surveys found these species; or 2) the project area is upslope and some distance away from aquatic resources that would support these species.

- Marsh Microseris (*Microseris paludosa*)
- White-Rayed Pentachaeta (*Pentachaeta bellidiflora*)
- San Francisco Popcorn Flower (*Plagiobothrys diffusis*)
- Santa Cruz Clover (Holocarpha macradenia)
- California red-legged frog (*Rana draytonii*)
- Coho salmon (*Oncorhynchus kisutch*) – central California coast Evolutionary Significant Unit
- Steelhead (*Oncorhynchus mykiss irideus*) – central California coast Distinct Population Segment

Protective measures will be implemented that will ensure that project impacts will not extend beyond the project area. Refer to the discussion of Best Management Practices and Avoidance and Minimization Measures, below.

Additional discussion of species identified during research but not present in the project area is included in the combined CNDDB and IPaC table in **Appendix B.**

5. Impact Analysis

Impacts resulting from implementation of the project, including both construction and ongoing operations and maintenance of the water treatment facility, are discussed below.

Construction Impacts

The majority of the project construction impacts would occur on existing developed areas and within the footprint of the existing tanks, or in the landslide area just west of, and adjacent to, the tanks. Both of these areas are mostly developed and/or disturbed. However, the removal and trimming of trees on the slide area and adjacent to the existing tanks will be necessary for heavy equipment access during tank removal and installation. In addition, some construction is planned within the HCP occupied area, including widening the access road, tree removal and trimming, trenching and pipe placement, construction of a new electrical building, and grading for temporary parking. In addition to these direct impacts, noise may affect wildlife in the immediate vicinity. These impacts are described below.

Development within the Landslide Area

A new tank will be constructed on a new pad that will be graded in an area adjacent to the existing tanks on a slope created via a past landslide. The removal of trees, shrubs, grasses, and forbs will be necessary to clear a pad for the proposed new tank (see discussion of tree removal, below). Impacts include the loss of habitat for plants and wildlife, potential for erosion into downslope areas, and noise impacts to wildlife.

Tree Removal and Trimming

The pad that supports the current tanks is very small, and in order for heavy equipment to access the site for both removal and installation of the new tanks, some trees that are adjacent to the existing tanks must be removed. The tree removal plan (**Figure 2**) shows the number, size, and location of the trees that are identified for removal. In total, 33 trees will need to be removed. Of these, 29 trees are adjacent to the existing tanks and 4 are located within or adjacent to the HCP occupied area. Eighteen of the 33 trees identified for removal are considered Heritage Trees (larger than 14-inches dbh) and a permit must be submitted and approved prior to their removal.

The two large trees (38-inch and 21-inch dbh) identified for removal in the HCP occupied area ponderosa pines, which are an important species for the life cycle of the MHJB. Their removal is considered “take” and is a covered activity in the HCP, but will need to be discussed with the USFWS (see discussion of take in *Widening of the Access Road and Associated Tree Removal and Trimming*, below).

Widening of the Access Road and Associated Tree Removal and Trimming

In order for heavy equipment to access the project area, the existing access road will need to be widened from 12-feet to 20-feet, including a 4-foot-wide shoulder, in order to accommodate the delivery of the new tanks to the existing tank pad. To accomplish this, up to 21 trees that overhang or are very close to the side of the road may be removed or trimmed. This includes 14 coast live oak trees, three olive trees (*Olea* spp.), one Toyon (*Heteromeles arbutifolia*) tree, and three Ponderosa pine trees. The removal of trees in the area covered by the HCP, including the Ponderosa pine trees, will result in “incidental take”. Under the Federal Endangered Species Act,

"take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct; incidental take is a take that results from activities that are otherwise lawful. Incidental take in conjunction with a permitted activity, in this case, construction of the project, is covered under the HCP, which requires mitigation (discussed below in the Mitigation section).

Trenching and Pipe Placement

The project identifies a pipe alignment through the HCP occupied area. Open trenching and pipe placement within the trenches will impact Maritime Coast Range Ponderosa Pine Forest and the sensitive species that occur there, including MHJB. This temporary disturbance of Maritime Coast Range Ponderosa Pine Forest habitat and potential harm or death of MHJB is considered "take" and must be mitigated through the HCP, as discussed above. In addition, these temporarily-impacted areas must be revegetated using native species typical of Maritime Coast Range Ponderosa Pine Forest and/or sandhills habitat, per the HCP (**Appendix A**).

Construction of a New Electrical Building

At the end of the access road, adjacent to the existing tanks, an area will be cleared for construction of a new 16-foot by 40-foot building that will house electrical equipment. The grading of this area and construction of the electrical building will be a permanent impact on Maritime Coast Range Ponderosa Pine Forest and the sensitive species that occur there, including MHJB. Loss of Maritime Coast Range Ponderosa Pine Forest habitat and harm or death of MHJB is considered "take" and must be mitigated through the HCP, as discussed above.

Temporary Parking

Two areas are identified for temporary parking adjacent to the HCP occupied area during construction. Grading and use of these areas for parking will impact Maritime Coast Range Ponderosa Pine Forest and the sensitive species that occur there, including MHJB. This is particularly impactful if vehicle use of the area occurs during MHJB the annual flight period (mid-June through July). This temporary disturbance of Maritime Coast Range Ponderosa Pine Forest habitat and potential harm or death of MHJB is considered "take" and must be mitigated through the HCP, as discussed above. In addition, these temporarily-impacted areas must be revegetated using native species typical of Maritime Coast Range Ponderosa Pine Forest and/or sandhills habitat, per the HCP (**Appendix A**).

Operation

The operations and maintenance (O&M) of the water treatment facility are not expected to change from current O&M activities, and are therefore not expected to result in additional impacts. Impacts from O&M activities that may affect federally-protected species are covered under the existing HCP, and generally include inspection and monitoring of the facilities, weed management, native planting, vehicle access, facility maintenance and pipeline repair. A detailed description of these activities is available in the HCP.

6. Best Management Practices and Avoidance and Minimization Measures

The following Best Management Practices and Avoidance and Minimization Measures will be included in the project.

Avoidance and Minimization Measure 1: Education Materials and Training

A binder with information containing any permits and environmental requirements for the project, including avoidance of special-status species and habitats, will be created and kept at the project area at all times. In addition, prior to starting the project, all employees, contractors, and visitors who will be present during project activities shall receive training from a qualified individual on the contents of the binder, including species identification, avoidance and minimization measures, and stop work and reporting requirements.

Avoidance and Minimization Measure 2: Compliance with the City of Santa Cruz Heritage Tree Ordinance

Preconstruction activities should include identifying, marking, and measuring the trees that will be removed or trimmed for heavy equipment access to the project area. Any Heritage Trees (trees with 14-inch diameter at breast-height) must be permitted for removal.

Avoidance and Minimization Measure 3: Preconstruction Surveys and Protection Measures

Nesting Birds

To protect nesting birds, no project activities shall be completed from February 1 through August 31 unless the following Avian Nesting Surveys are completed by a qualified biologist:

- **Birds of Prey.** Survey for nesting activity of birds of prey within the project area and a 500-foot radius within 30 days prior to starting project activities shall be undertaken. If any active nests are observed, these nests shall be designated as Environmentally Sensitive Areas (ESAs) and protected by a minimum 500-foot avoidance buffer until the breeding season has ended, or until a qualified biologist has determined that the young have fledged and are no longer reliant upon the nest site or parental care for survival.
- **Other Avian Species.** Survey for nesting activity within the project area and a 250-foot radius within 30 days prior to starting project activities shall be undertaken. If any nesting activity is found, Permittee shall designate nests and nest substrate (trees, shrubs, ground, or burrows) as an ESA and protected with a minimum 250-foot buffer until young have fledged and are no longer reliant on the nest site or parental care.

If the schedule requires that construction occur more than one year, nesting bird surveys and protection measures, as necessary, must be repeated every nesting season until the project is complete. In addition, if there are any significant pauses in construction or vegetation removal during the nesting bird season, the RWQCB requests that an additional nesting bird survey (and

protection measures, if necessary) be completed prior to construction/vegetation removal beginning again.

Bat Species

If present, bats shall not be disturbed without specific notice to and consultation with CDFW. Preconstruction surveys of suitable roosting habitat features shall be conducted within the project area and a 300-foot buffer by a qualified biologist within 14 days prior to the start of project construction activity, during the appropriate time of day to maximize detectability to determine if bat species are roosting within or near the project area. Surveys may include observational methods or echolocation monitoring to determine whether bats are present. A survey report shall be completed that includes, but is not limited to, the survey methodology and biologist qualifications and, if bats are present, the colony size, roost location, and characteristics. If surveys confirm that bats daytime roost in areas impacted by the project, the permittee shall maintain a 300-foot buffer around bat roost sites during project activities.

American Badger

Preconstruction surveys for American badger and their sign or burrows shall be conducted within 30 days of the start of construction. Any American badger detected within the project area during project activities shall be allowed to move out of the work area of its own volition. If American badger is denning on or immediately adjacent to the project work area, the permittee shall consult with CDFW to determine whether the animal(s) may be evicted from the den. Eviction of badgers will not be approved by CDFW unless it is confirmed that no dependent young are present.

Avoidance and Minimization Measure 4: Work Timing

Many of the special-status animals with a potential to occur within the project area are active at dusk and during the night. To avoid impacts to these species, all work activities shall be confined to daylight hours (after 8:00 a.m. and before sunset) per the City's Noise Ordinance (Section 9.36.010).

Avoidance and Minimization Measure 5: Erosion Control

To protect the small seep area adjacent to the project area, erosion control measures, such as silt fencing and straw wattles, shall be installed and maintained along the southern edge of the project area. Erosion control shall be inspected and maintained until the project is complete.

Avoidance and Minimization Measure 6: Temporary Fencing to Protect Resources Outside of the Construction Zone

Prior to project commencement, the City will delineate the boundary of construction. Prior to the onset of construction activities, the contractor will install temporary fencing to prevent impacts beyond the construction area. This will protect trees and other vegetation, and other wildlife species, including MHJB and common wildlife species listed above.

Avoidance and Minimization Measure 7: Implement Habitat Conservation Plan BMPs and Avoidance and Minimization Measures

The following BMPs and Avoidance and Minimization Measures are from the HCP and are designed to protect MHJB and Zayante sandhills/Maritime Coast Range Ponderosa Pine Forest habitat.

- **Measure 7a: Locate Project Activities on and Adjacent to Current Development.** To the extent practical, the covered activities of this HCP that occur on the portion of the project area characterized by Zayante sands will be located either within the footprint of the existing water treatment facilities (i.e., existing buildings, water tanks, service roads, pipelines, etc.) or immediately adjacent to the existing water treatment facilities.
- **Measure 7b: Delineate Boundaries of the Impact Area.** Temporary fencing and signs will be erected before any vegetation clearing, excavation, or grading activities occur to clearly delineate the boundaries of the project's impact area. Warning signs will be posted on the temporary fencing to alert workers not to proceed beyond the fence. All protective fencing will remain in place until the operation and maintenance or construction activities have been completed. Signs will include the following language: "NOTICE: SENSITIVE HABITAT AREA. DO NOT ENTER."
- **Measure 7c: Cover Exposed Soils.** Adult males of the MHJB actively search for breeding females during the evenings between about May 15 and August 15. During this period, both sexes burrow into duff and Zayante sandy soils during the daytime. If construction or other ground disturbing activities occur during any portion of the MHJB flight season, all exposed Zayante soils within the impact area will be covered by tarps, plywood, erosion control fabric, or another suitable impervious material. This will prevent adult males from burrowing into the exposed soils and subsequently being injured or killed by soil disturbance (e.g., digging, grading, covering, etc.).
- **Measure 7d: Dust Control.** Appropriate dust control measures, such as periodically wetting down of work areas, will be used as necessary during excavation or any soil disturbing activities in the impact area or any other covered activities that generate dust.
- **Measure 7e: New Outdoor Lighting.** Adult MHJBs are active at dusk and may be distracted by incandescent, mercury vapor, sodium, and black light sources, which can disrupt normal behaviors and breeding activities. Thus, any new outdoor lighting installed as part of this project will use bulbs certified to not attract nocturnal insects.
- **Measure 7f: Landscaping Elements That Degrade MHJB Habitat.** Because MHJB adults emerge from the soil to attract and search for mates, turf grass, dense ground covers (such as ivy), weed matting, aggregate, and mulch can degrade habitat conditions and will not be used in this project. Material for revegetation will use plants endemic to the Zayante Sandhills.

7. Mitigation

Mitigation for incidental take of species covered under the HCP resulting from the implementation of the project is included in the incidental take permit. These measures are described below.

Mitigation Measure 1: Habitat Conservation Plan Implementation (Creation and Management of an Off-Site Mitigation Area)

The City operates under an active low effect HCP for several federally listed species that include Mount Hermon June beetle, and Ben Lomond spineflower. This tank replacement project is a covered activity under the HCP.

To mitigate for incidental take, the HCP includes the creation and management of an off-site mitigation area: 17.0 acres at the City of Santa Cruz's Laguna Creek watershed property (APN 080-241-18) in Bonny Doon (Preserve) (HCP; McGraw 2017). Although this parcel measures a total of 171.4 acres, only the southwestern portion of the parcel, which is characterized by Zayante soils and sandhills habitat, is part of the mitigation area. This property is adjacent to the Bonny Doon Preserve, which is managed by the California Department of Fish & Wildlife (CDFW). The Preserve is located within the southwestern corner of Section 18 of T10S R2W of the Davenport 7.5' USGS topographic quadrangle.

The purpose of the Preserve is to protect and manage habitat for the federally endangered Mount Hermon June beetle, Zayante band-winged grasshopper, Ben Lomond spineflower, and other co-occuring species (McGraw 2017). The City manages and monitors habitat in the Preserve, and will continue to do so for the duration of their 30-year incidental take permit (from 2013 to 2043), to achieve goals and objectives for the Sandhills ecosystem, communities, and endangered species, as outlined in the Habitat Management and Monitoring Plan (HMMP) for the Laguna Sandhills Preserve (McGraw 2014). Strategies prescribed in the HMMP for ecosystem and community goals, include managing to reduce exotic plants, trespass, and fire.

Mitigation Measure 2: Habitat Conservation Plan Implementation (Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants)

Temporarily impacted areas at the water treatment facility will be cleared of vegetation or graded to assist in construction of the proposed project, but will not be permanently covered by new structures or other hardscape after the project is completed. After project completion, temporarily impacted areas with Zayante soils will be revegetated with plants native to the Zayante Sandhills, including: sticky monkeyflower (*Mimulus aurantiacus*), deer weed (*Lotus scoparius*), silver bush lupine (*Lupinus albifrons* var. *albifrons*), Ponderosa pine, and coast live oak. Other sandhill endemic plants may be appropriate depending upon the location of the impact area and soil conditions. These native plants will provide suitable habitat conditions for MHJBs that might eventually colonize the temporarily impacted portion of the impact area. Revegetated areas will not include any landscape elements that degrade habitat for the MHJB, including mulch, bark, weed matting, rock, aggregate, or turf grass.

8. Conclusion and Recommendations

Implementation of the project will result in incidental take of habitat (Zayante sandhills/Maritime Coast Range Ponderosa Pine Forest habitat) and species (Mount Hermon June Beetle) covered under the City's existing HCP, which requires the implementation of specific best management

practices, avoidance and minimization measures, and mitigation as set forth in the terms of the HCP and incidental take permit.

The implementation of additional avoidance and minimization measures, including preconstruction surveys, will protect species, habitats, and other natural resources that occur within and adjacent to the project area, including nesting birds and American badger (within 30-days of the start of project construction) and bats (within 14-days of the start of project construction).

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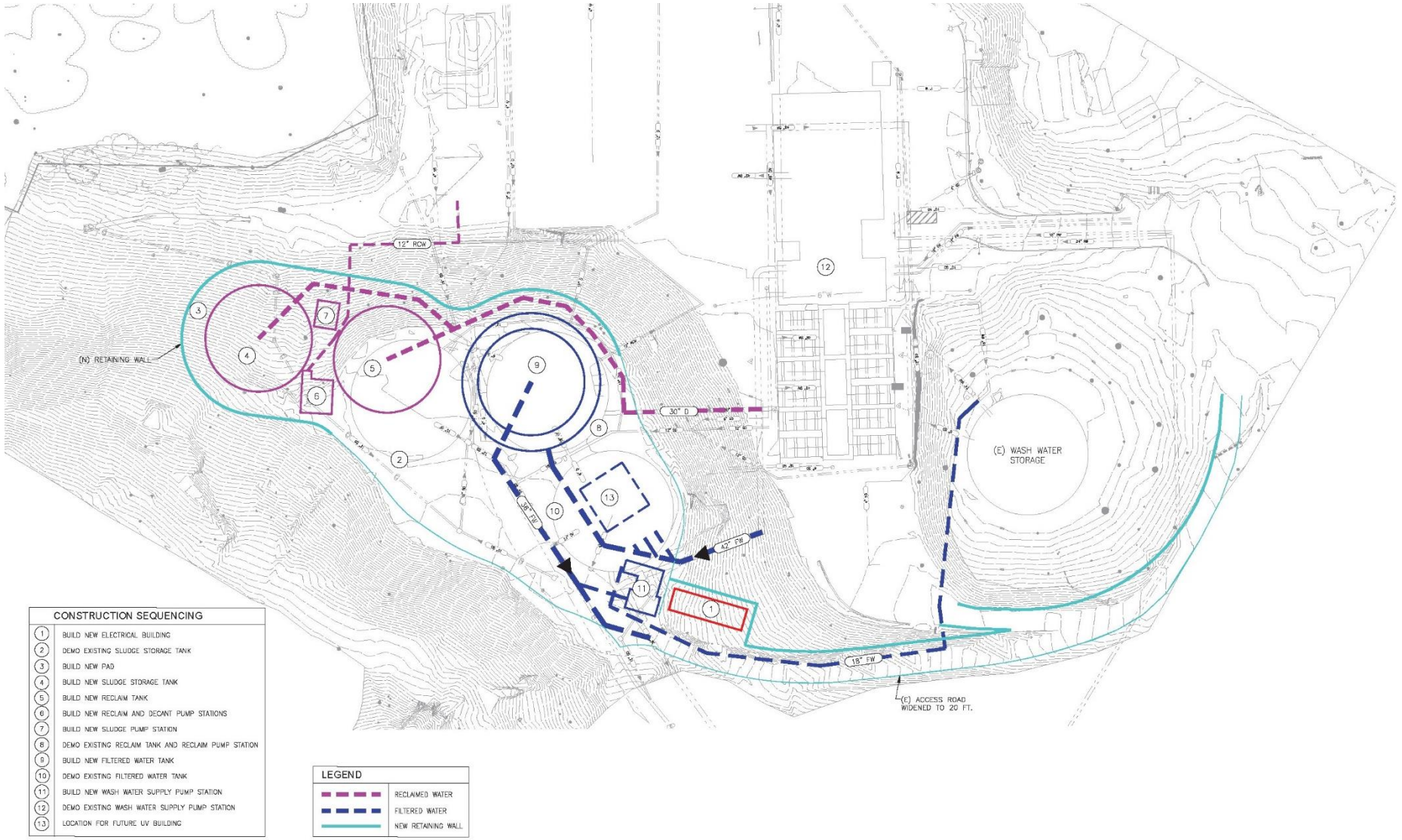

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Figure 1

GHWTP Concrete Tanks Replacement Project Components

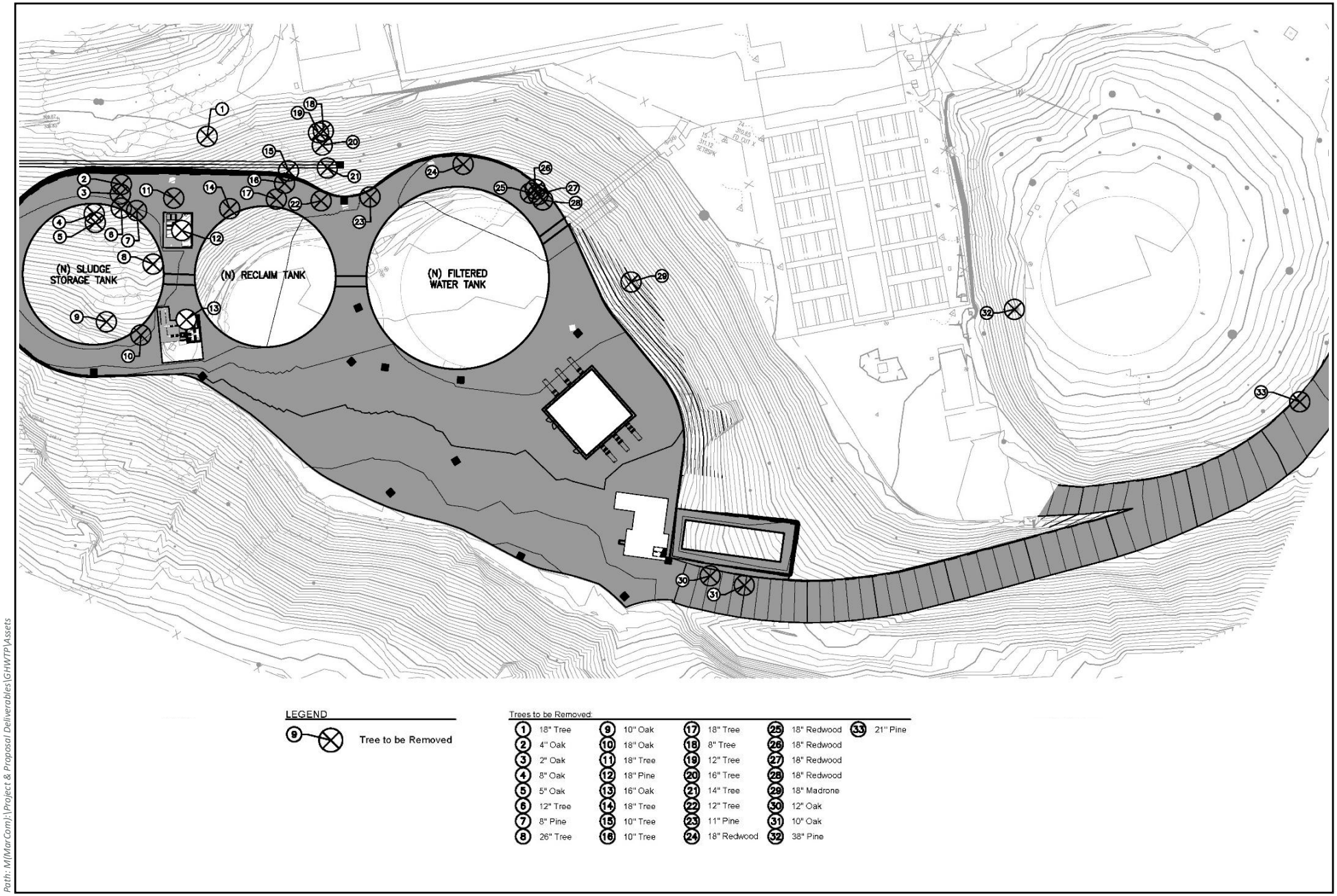

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Figure 2
GHWTP Concrete Tanks Replacement Project Tree Removal Plan

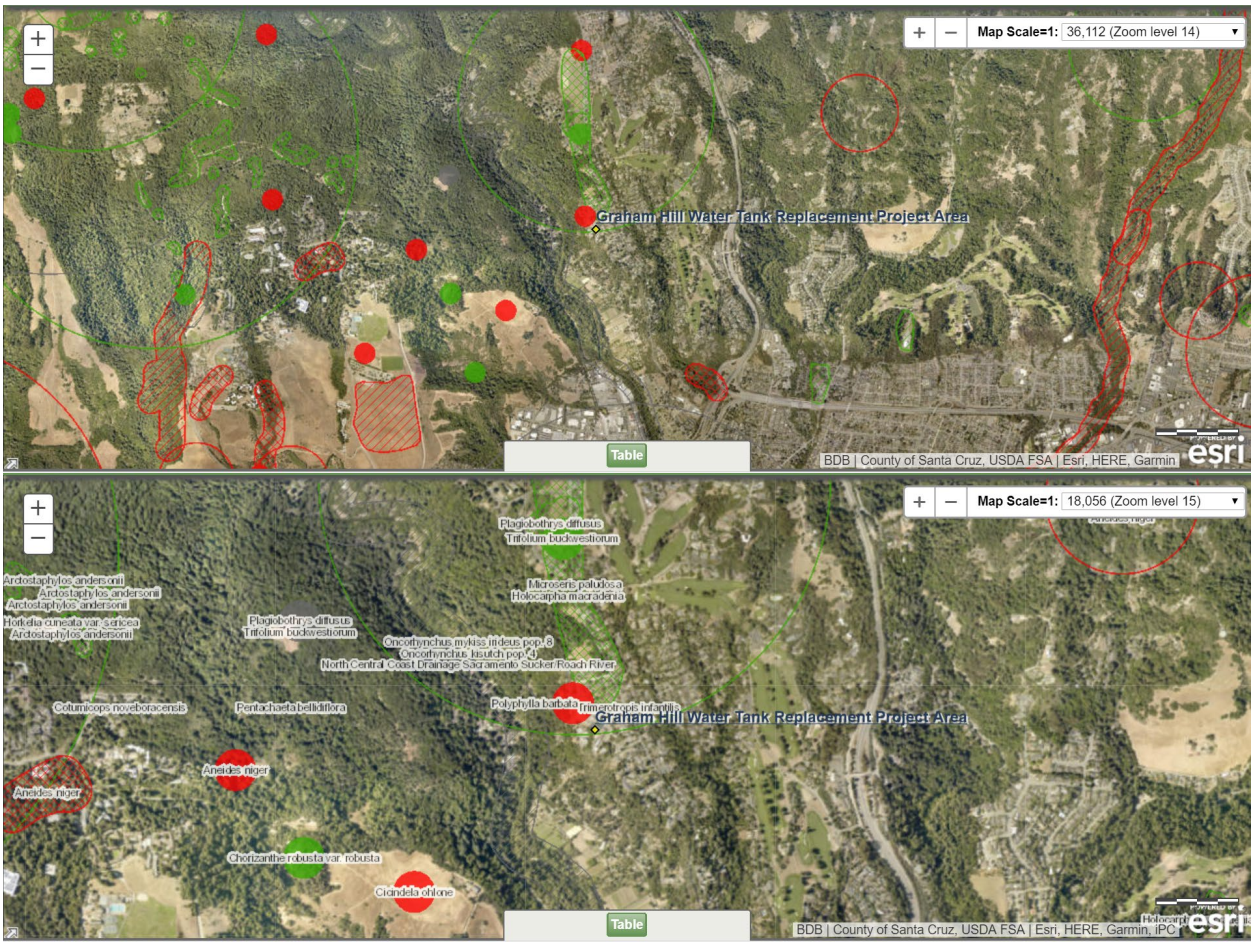

Figure 3. California Natural Diversity Database Results for the Project Area and 2-Mile Buffer (CDFW 2018).

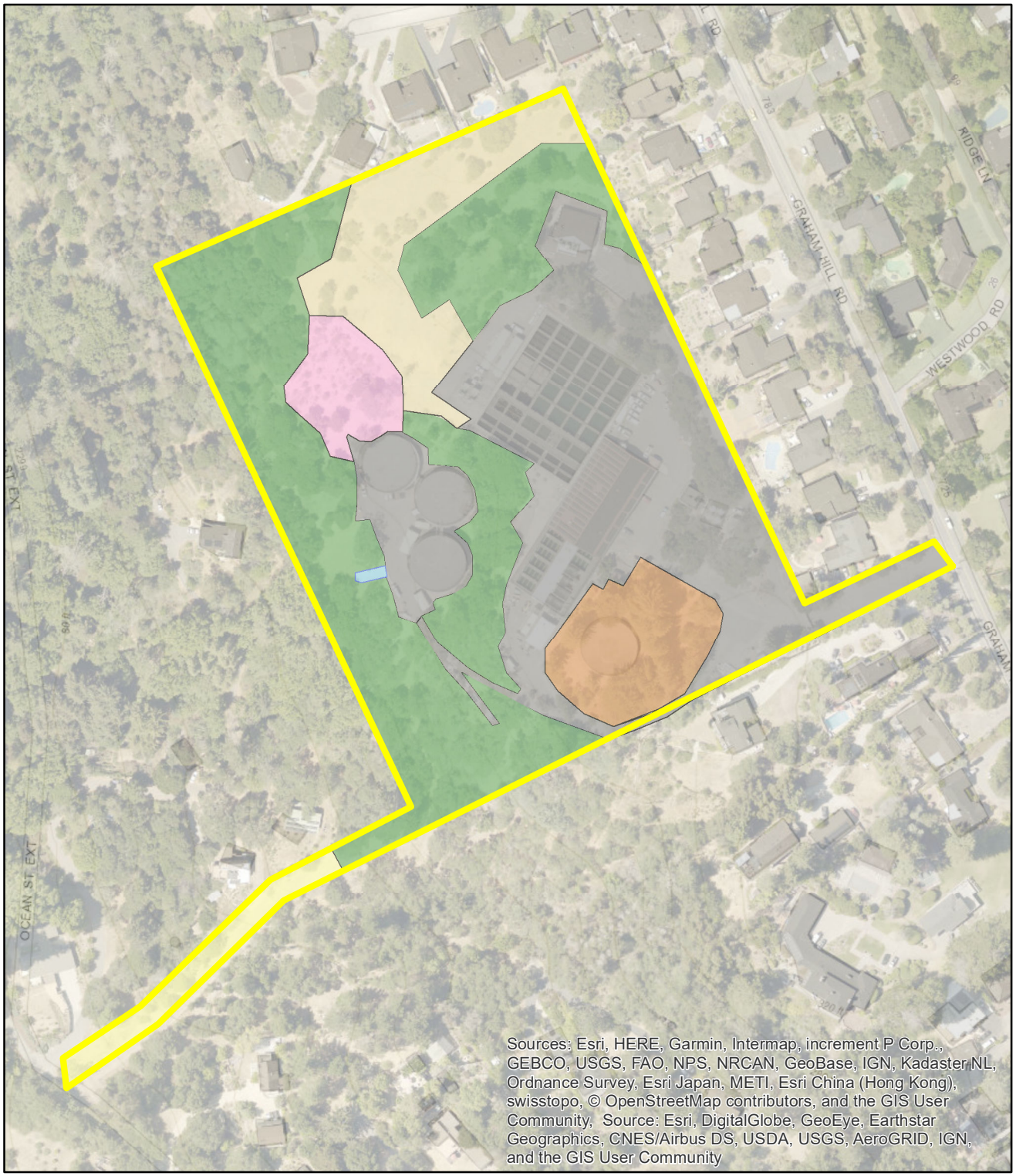

Figure 4. Habitat Types

Legend

PropertyBoundary

Habitat Type

- Developed
- Grassland
- Maritime Coast Range Ponderosa Pine Forest
- Mixed Evergreen Forest
- Oak Woodland
- Seep
- Slide Area

N

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Harris & Associates

Appendix A

Habitat Conservation Plan and Incidental Take Permit

LOW-EFFECT HABITAT CONSERVATION PLAN

for the

ISSUANCE OF AN INCIDENTAL TAKE PERMIT UNDER SECTION 10(a)(1)(B) OF THE ENDANGERED SPECIES ACT

for the

FEDERALLY ENDANGERED MOUNT HERMON JUNE BEETLE ZAYANTE BAND WINGED GRASSHOPPER AND BEN LOMOND SPINEFLOWER

for the

CITY OF SANTA CRUZ
GRAHAM HILL WATER TREATMENT PLANT
OPERATIONS, MAINTENANCE, AND CONSTRUCTION ACTIVITIES

June 2013

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Prepared for:

City of Santa Cruz
Chris Berry – Project Manager

EXECUTIVE SUMMARY

The City of Santa Cruz ("City") has applied for a permit from the U.S. Fish and Wildlife Service (Service) pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973 (ESA) as amended (16 U.S.C. 1531 *et seq.*) to incidentally take the federally endangered Mount Hermon June beetle (*Polyphylla barbata*), the federally endangered Zayante band-winged grasshopper *(Trimerotropis infantilis),* and the federally endangered Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*). The incidental take is anticipated to occur as a result of the City's covered activities within the Plan Area located at the Graham Hill Water Treatment Plant (Facility). These activities include all current and future activities of the City in relation to Operation and Maintenance (O&M) activities and construction activities at the Facility. The City proposes to mitigate the effects to the Mount Hermon June beetle (MHJB) by fully implementing the Habitat Conservation Plan (Plan or HCP). The Plan emphasizes protection of habitat through impact avoidance and implementation of measures designed to minimize impacts to MHJB. To mitigate for unavoidable impacts to MHJB, the City will protect suitable sandhills habitat demonstrated to be occupied by the MHJB at its Bonny Doon property and/or purchase credits from the Service approved Zayante Sandhills Conservation Bank, or other such Service approved bank if one is approved in the future. Habitat protection will be assured or credits will be purchased prior to the initiation of any ground disturbing or construction related activities that may result in take.

This Plan has been prepared in consultation with the Service to fulfill the requirements of Section 10(a)(2)(A) of the Act as part of a Section 10(a)(1)(B) take permit being sought for the covered activities within the Plan Area.

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1.0 INTRODUCTION

The Mount Hermon June beetle (*Polyphylla barbata*) (MHJB) was federally listed as endangered on January 24, 1997 (USFWS 1997). The Zayante band-winged grasshopper *(Trimerotropis infantilis)* (ZBWG) was federally listed as an endangered species in 1997. The Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*) (BLS) was federally listed as endangered in 1994 (USFWS 1994). The City has applied for a permit from the Service pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973 as amended (16 U.S.C. 1531 *et seq.*) to incidentally take the federally endangered MHJB, ZBWG, and BLS. The take of MHJB would occur as a result of operations at the Facility located in Santa Cruz County within the known geographic range of the MHJB. The MHJB is endemic to the Zayante Sand hills ecosystem, elements of which are found at the Facility. Potential take of MHJB and ZBWG could also result as a result of management activities conducted on the habitat preserve to be established for MHJB.

This HCP incorporates minimization and mitigation measures to offset impacts to the MHJB associated with O&M activities and construction activities at the Facility, and to offset impacts related to management of the habitat preserve.

1.1 Background and Purpose

The City of Santa Cruz Water Department is a municipal utility that is currently owned and operated by the City. The City is located on the central coast of California where the San Lorenzo River flows into Monterey Bay at the northern end of the state's Central Coast hydrologic region. The city provides water service to an area approximately 30 square miles in size, including the entire City of Santa Cruz, adjoining unincorporated areas of Santa Cruz County, a small part of the City of Capitola, and coastal agricultural lands north of the city. The Santa Cruz water system has four main production elements to meet the production needs of this area. These elements are as follows:

1) The North Coast Sources

2) The San Lorenzo River

3) Loch Lomond Reservoir

4) The Live Oak wells

As part of the system, the City operates the Facility which was put in service in 1960, and currently has a capacity of 24 mgd (million gallons per day) and the Live Oak Groundwater Treatment Plant, with a capacity of 1 mgd. The Facility is a conventional treatment plant and processes all water from the City's surface sources for delivery to service area customers. The Facility consists of the treatment plant and associated office and facility buildings. In addition to the plant and facilities, a paved access road, security

entry gate, and driveway and parking areas are located on the site. Several acres on the site do not have buildings or paved areas and are left in their natural vegetative condition. The ongoing operation of the Facility and the associated O&M and construction related activities will be the subject of this HCP.

The adoption of this HCP will ensure the Water Department's ability to provide protections to MHJB and its habitat while at the same time meeting the goals outlined in the Department's mission statement below.

> "To provide a safe, clean, and continuous supply of water for municipal and fire protection purposes that meets or exceeds local, State, and Federal standards for public health and environmental quality, and to provide courteous, responsive, and efficient service in the most cost-effective manner to our customers."

1.2 Permit Holder and Permit Duration

The City of Santa Cruz is the applicant for the incidental take permit. The duration of the section 10(a)(1)(B) permit for this project is thirty (30) years from the date of issuance. The permit would allow the City or their successors to incidentally take, either directly or indirectly, MHJB and ZBWG within the geographical boundaries of the Plan Area identified in the HCP over that time period.

1.3 Plan Area

The Plan Area consists of the 12.71 acres of the Facility property located at 715 Graham Hill Road, Santa Cruz, California, 95060. The project parcel (APN 060-141-05) is located within the Felton 7.5' U.S. Geological Survey (USGS) topographic quadrangle, in 37° 0'4.13"N 122° 1'58.80"W T11S R2W La Carbonera Rancho. The Plan Area includes 5.7 acres of suitable habitat composed of areas of Zayante rock outcrop and Watsonville soils, and areas with just Zayante rock outcrop soils. There is currently 0.88 acre of occupied habitat out of the 5.7 acres in the Plan Area at the Facility.

In addition, the Plan Area includes 17.0 acres at the City of Santa Cruz's Laguna Creek watershed property (APN 080-241-18) in Bonny Doon. Although this parcel measures a total of 171.4 acres, only the southwestern portion of the parcel, which is characterized by Zayante soils and sandhills habitat, will be used as a mitigation area. This property is adjacent to the Bonny Doon Preserve that is managed by the California Department of Fish & Wildlife (CDFW). It is located within the southwestern corner of Section 18 of T10S R2W of the Davenport 7.5' USGS topographic quadrangle. Surveys during the summer and fall of 2011 by entomologist Dr. Richard Arnold confirmed that the MHJB inhabits this location and that the ZBWG does not currently occur there. Botanist Kathy Lyons conducted surveys for listed plants indigenous to the Zayante Sandhills at this location and confirmed the presence of the BLS at the Bonny Doon mitigation site.

1.4 Regulatory Framework

1.4.1 Federal Endangered Species Act

The Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*), provides for the protection and conservation of fish, wildlife, and plants that have been federally listed as threatened or endangered. Activities otherwise prohibited by section 9 of the Act and subject to the civil and criminal enforcement provisions of section 11 of the Act may be authorized for Federal entities pursuant to the requirements of section 7 of the Act and for other persons pursuant to section 10 of the Act. Section 10(a)(2)(A) of the Act states that no permit may be issued authorizing any taking referred to in Section 10(a)(1)(B) unless the applicant submits to the Secretary (the Secretary of the Interior) a HCP that specifies:

1) the impact which will likely result from such taking;

2) what steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps;

3) what alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and

4) such other measures that the Secretary may require as being necessary or appropriate for purposes of the plan.

All HCPs must meet the following criteria in order to receive a permit:

1) the taking will be incidental;

2) the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;

3) the applicant will ensure that adequate funding for the plan will be provided;

4) the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and

5) the measures, if any required under subparagraph (A)(iv) will be met.

This Plan has been prepared in consultation with the Service to fulfill the requirements of Section 10(a)(2)(A) of the Act as part of a Section 10(a)(1)(B) take permit being sought for the covered activities within the Plan Area.

1.4.2 Section 10(a)(1)(B) Process – HCP Plan Requirements

The section 10 process for obtaining an incidental take permit has three primary phases:

1) the HCP development phase;

2) the formal permit processing phase; and

3) the post-issuance phase.

During the HCP development phase, the project applicant prepares a plan that integrates the proposed project or activity with the protection of listed species. An HCP submitted in support of an incidental take permit application must include the following information:

- impacts likely to result from the proposed taking of the species for which permit coverage is requested;

- measures that will be implemented to monitor, mitigate for, and minimize impacts;

- funding that will be made available to undertake such measures;

- procedures to deal with unforeseen circumstances;

- alternative actions considered that would not result in take; and

- additional measures the Service may require as necessary or appropriate for purposes of the plan.

The Service has determined this document to be a "Low-Effect" HCP. A low-effect HCP is one "involving: (1) minor or negligible effects on federally-listed, proposed or candidate species and their habitats … and (2) minor or negligible effects on other environmental values or resources. 'Low-effect' incidental take permits are those permits that, despite their authorization of some small level of incidental take, individually or cumulatively have a minor or negligible effect on species covered …" (USFWS 1996).

A low-effect HCP is defined as having:

- minor or negligible effects on federally listed, proposed, or candidate species and their habitats that are covered under the HCP; and

- minor or negligible effects on other environmental resources.

The impacts are assessed on both a project and cumulative basis. Implementation of low-effect HCPs and their associated incidental take permits, despite authorization of some small level of incidental take, individually and cumulatively have a minor or negligible effect on the species covered in the HCP. The determination of whether an HCP qualifies for the low-effect category is based on the anticipated impacts of the project prior to implementation of the mitigation plan. The purpose of the low-effect HCP is to expedite handling of HCPs for activities with inherently low impacts; it is not intended for projects with significant potential impacts that are subsequently reduced through mitigation programs. Environmental compliance under the National Environmental Protection Act (NEPA) for low-effect HCPs is achieved via a categorical exclusion because the incidental take permit issued involves no individual or cumulative significant effects on the environment.

The HCP development phase concludes and the permit-processing phase begins when a complete application package is submitted to the appropriate permit-issuing office of the Service. The complete application package for a low-effect HCP consists of:

1) an HCP;

2) a completed permit application; and

3) a $100 permit fee from the applicant, except where the applicant is a governmental entity, in which case the applicant is exempt from the fee requirement.

The Service must publish a Notice of Receipt of a Permit Application in the Federal Register; prepare a section 7 Biological Opinion; prepare a Set of Findings that evaluates the action 10(a)(1)(B) permit application in the context of permit issuance criteria (see below); and prepare an Environmental Action Statement, a brief document that serves as the Service's record of compliance with NEPA for categorically excluded actions (see below). An implementing agreement is not required for a low-effect HCP. A section 10 (a)(1)(B) incidental take permit is granted upon determination by the Service that all requirements for permit issuance have been met.

After receipt of a complete application, a low-effect HCP and permit application is typically processed within approximately 12 months. This schedule includes the Federal Register notification and a 30-day public comment period.

During the post-issuance phase, the permittee and other responsible entities implement the HCP and the Service monitors the permittee's compliance with the HCP and the long-term progress and success of the HCP.

1.4.3 National Environmental Policy Act

The National Environmental Policy Act (NEPA) was enacted by Congress in 1969 to ensure that federal agencies consider the environmental impacts of their actions and decisions. NEPA requires the federal government to use all practicable means and measures to protect environmental values and makes environmental protection a part of the mandate of every federal agency and department. NEPA requires analysis and a detailed statement of the environmental impact of any proposed federal action that significantly affects the quality of the human environment. NEPA regulations require that the Service ensures that permits issued pursuant to an HCP have been evaluated consistent with NEPA requirements, and that the public has been provided with an opportunity to participate in the determination of the scope of analysis and to review and comment on the NEPA documentation.

HCPs, such as this one, which qualify as "low-effect" according to the Service's 1996 HCP Handbook, are categorically excluded from NEPA analysis (Department of Interior Manual 516DM2, Appendix 1, and Manual 516DM6, Appendix 1).

2.0 COVERED ACTIVITIES

2.1 Introduction

This low-effect HCP addresses covered activities necessary for the City's Facility to meet the water demands of its customers now and into the future. These demands entail the efficient delivery of quality drinking water. The covered activities are the result of the daily O&M of the facilities as well as any future Facility expansion that may be required to meet regulatory requirements or necessary changes in treatment capacity of the Facility. The City is seeking Take Authorization for the following covered activities under section 10 (a)(1)(B) of the ESA.

2.2 Operations and Maintenance Activities

O&M activities at the facility include all of the day-to-day operations necessary for the safe and efficient delivery of quality drinking water to the citizens of Santa Cruz. These O&M activities generally include inspection and monitoring of the facilities, weed management, native planting, vehicle access, facility maintenance and pipeline repair. These activities are described in detail below.

- **Inspection and monitoring of the facilities**. The operation and maintenance of the facilities requires that inspection and monitoring take place on a routine or periodic basis depending on the particular facility. The inspection and monitoring will include but not be limited to visual inspection or testing of

facilities to ensure safe and reliable operation. Leak detection, safety assessments, and facility efficiency may all be tested as part of this activity.

- **Ponderosa pine mulching.** Mulching around the base of ponderosa pines (*Pinus ponderosa*) is conducted to reduce fuel ladder potential and reduce necessity for weed control activities in vicinity of trees. Ponderosa pine seedlings are retained and released from surrounding vegetation (including native coast live oaks (*Quercus agrifolia*) and Douglas fir (*Pseudotsuga menziesii*)) as possible. In general, due to their complex, deep root systems and drought tolerance, natives are retained on road cuts and steep slopes to maximize slope stability and water conservation. Specifically, oaks, native grasses (purple needlegrass (*Nassella pulchra*), California oatgrass (*Danthonia californica*)) and other understory/perennial shrubs (sticky monkeyflower (*Mimulus aurantiacus*), toyon (*Heteromeles arbutifolia*), etc.) are retained and introduced as possible to stabilize naturally friable soils on site and reduce landscape water use. There is a focus on exotic/invasive plant control for fire hazard reduction, security, and facility access/maintenance retention.

- **Landscape Management**. Landscape management at the Facility is conducted to protect production facilities and associated property. Landscape management includes security maintenance (i.e., sitelines, fencelines, etc.), maintenance of safe employee working conditions (i.e., poison oak (*Toxicodendron diversilobum*) removal, clearing around accessways, valves, and other equipment), fire hazard control, erosion control, exotic/invasive plant species control (*see* Weed management below) and retention of native tree species (*see* Native planting below). Landscape management may include the use of tractor mounted mower, weed whip, lopping, chainsaw, hand pulling or torch.

  Landscape management is conducted on an ongoing basis throughout the year, and may involve work periods of a few hours to a few weeks depending on the activity. Landscape management includes:

  - mulching in the fall;
  - planting of natives during the late fall/early winter;
  - chainsaw work on an as needed basis throughout the year in response to trees falling on fence lines and exotics removal needs (i.e., acacia, etc.);
  - spraying/torching primarily in the spring/early summer;
  - lopping throughout the year as necessary;

- weed whipping throughout the year as necessary;
- mowing in the spring/summer/fall; and
- limited hand pulling of exotic plants, primarily in the winter.

- **Weed management**. Weed management occurs throughout the site on an ongoing basis to prevent encroachment on native vegetation (ponderosa pine, coast live oak, etc.) by exotic species such as cotoneaster (*Coneaster* sp.), rattlesnake grass (*Glyceria canadensis*), woodsorrel (*Oxalis* sp.), etc. Weed management occurs primarily in the spring and summer periods and is performed with limited herbicide applications (per limitations of the City's Integrated Pest Management policy), torch, hand pulling, mulching with wood chips, and weed whip. Exotic/invasive plant removal is conducted on road cuts and steep slopes using methods that minimize soil disturbance.

- **Native planting**. Natives are planted throughout the site as necessary to re-establish the historic flora and exclude exotic species. Natives include ponderosa pine, coast live oak, monkeyflower, and other species characteristic of dry, upland south facing slopes in the coastal zone of the Santa Cruz Mountains. Planting is done by hand with standard tools including trowels and shovels. Revegetation may be watered by hand, and is only rarely irrigated with drip systems.

- **Vehicle access**. An unsurfaced access road traverses the site and is primarily utilized by utility/pickup trucks to get access to the tank and electric controls at the top of the promontory adjacent to the site occupied by MHJB. Vehicle use of this access road occurs on an infrequent, though ongoing basis.

- **Facility maintenance**. Maintenance activities at the Facility may include rehabilitation, replacement, repair and maintenance of existing infrastructure and related facilities such as water measurement devices, scientific measuring devices, and water quality monitoring stations.

- **Pipeline repair**. Several water pipelines cross the property. These are critical pieces of infrastructure for the City's water delivery system. Pipeline rights-of-way are regularly inspected for leaks and the rights-of-way are maintained to allow for inspection of the pipeline(s). Usually, an 8-foot swath is mowed or weed-whipped to allow inspection. Inspection occurs on an ongoing basis. Inspection is conducted by Water Department and includes walking the route by foot.

  Pipeline repairs are conducted on an as-needed basis as identified through the staff inspections. Repairs may be required as a result of damage to the pipeline through natural causes (earthquakes, landslides, etc.) or through deterioration of

infrastructure over time. Repair projects are designed by engineers as necessary with appropriate permits obtained before work is started. Any discharge from the pipeline is to land and is absorbed into the ground and involves minimal or no runoff to storm sewers or receiving waters.

2.3 Construction Activities

Changes in regulatory requirements, growing demands for water, or the updating and replacement of aging facilities may require a variety of construction activities to be included as covered activities. These activities covered under the plan will be restricted to the current property boundary of the facility and will be designed to minimize impacts to covered species. Even with appropriate minimization measures, the scope of some of these activities (i.e., grading, clearing, boring, and facility demolition/expansion) is such that they will require authorization for Take under the HCP. Construction related activities considered to be covered activities under the plan include the following:

- **Grading/clearing**. Grading and clearing activities will occur from time to time in order to allow better vehicle access to various areas of the site, provide increased parking for future staff, prepare staging areas for future construction related materials, or to prepare proper pads for new facilities. These activities will often involve large earthmoving equipment and the removal or redistribution of soil around the site.

- **Construction of new facilities**. In order to respond to evolving demands placed on the facility, the need for system expansion may arise in the future and this may entail the construction of new service buildings, new containment structures, new pipelines, and other necessary facilities. This construction may involve the demolition of old structures to be replaced by new structures. Aside from the grading and clearing outlined above, these activities have the potential to alter the vegetation communities and hydrology of the site.

2.4 Conservation Activities at the Bonny Doon Mitigation Site

The Bonny Doon mitigation site may require fencing to protect it, periodic removal of invasive plants, planting of plants indigenous to the sandhills, and vegetation clearing or other activities to comply with state and local fire prevention regulations. These and other ground disturbing activities could impact life stages of the MHJB (and ZBWG should it occur at the site over time) and require authorization for take under the ITP. Such activities could also adversely affect the endangered BLS. Although surveys by entomologist Richard Arnold during the summer and fall of 2011 did not find the endangered ZBWG on the mitigation site, there is the possibility that site protection or habitat management activities that are undertaken to benefit the MHJB could attract

ZBWG to the site. If that occurs, subsequent management activities could potentially cause impacts to ZBWG.

3.0 ENVIRONMENTAL SETTING

3.1 Habitat

The plant community within the Plan Area at the Facility is a remnant stand of ponderosa pine forest. Coast live oaks and coyote bush (*Baccharis pilularis*) are also prevalent. The understory primarily consists of forbs and grasses. The plant community within the Plan area at the Bonny Doon mitigation site is sand chaparral, characterized by an understory of predominately silverleaf manzanita (*Arctostaphylos silvicola*) with scattered ponderosa pine trees.

3.2 Covered Wildlife Species

3.2.1 Mount Hermon June Beetle (*Polyphylla barbata*)

Status and Distribution

The MHJB is a federally listed endangered species. Although the scientific name *Polyphylla barbata* has been used since its original description, in the literature the beetle has commonly been referred to as the Mount Hermon June beetle or the Barbate June beetle.

Throughout most of its range, the primary threats to the beetle are sand mining and urbanization. In a few instances, other types of land uses, such as agricultural conversion, recreation activities, plus pesticide use, alteration of fire cycles, and possibly even collectors, have also threatened the beetle. For these reasons, the beetle was recognized as an endangered species by the Service in 1997 (USFWS 1997) and a recovery plan was published by the Service in 1998 (USFWS 1998a). Critical habitat has not yet been proposed by the Service for the MHJB; however, the MHJB's geographic distribution largely coincides with the critical habitat for the endangered Zayante band-winged grasshopper designated by the Service (USFWS 2001).

The State of California does not recognize insects as endangered or threatened species pursuant to the State's Fish & Game Code. However, the MHJB does receive consideration under the California Environmental Quality Act (CEQA) since it satisfies the definition of a rare species under this statute. Habitat for the MHJB also receives consideration under the Sensitive Habitat Ordinance of the County of Santa Cruz.

The MHJB is restricted to the Zayante sandy soils that are found in the Scotts Valley-Mount Hermon-Felton-Ben Lomond-Santa Cruz area of the Santa Cruz Mountains. During the summer of 2008 it was also observed at a couple of locations in the Bonny Doon area (Arnold, pers. observ.; McGraw, pers. comm.). Historically, MHJB localities

were referred to as sandhills (Cazier 1938; Young 1988), but more recently this area has been called the Zayante Sandhills (USFWS 1998a). Arnold (2004a) reviewed museum specimens and other reported records for the beetle and determined that it had been observed at about 70 locations within this area.

Habitat Characteristics

Habitats in the Zayante Sandhills where MHJB has been found include northern maritime chaparral, ponderosa pine forest, sand parkland (which is a mixture of the aforementioned habitats with a shrub/subshrub and grass/forb understory), and mixed deciduous-evergreen forest. In addition, adults have been found in disturbed sandy areas where remnants of these habitats still occur. Ponderosa pine grows at all known MHJB locations and for this reason was a presumed larval food plant of the beetle. However, recent analyses of partially-digested plant fragments in fecal pellets of MHJB larvae by Kirsten Hill (2005) indicate that larvae feed on other plant species. Even if ponderosa pine is not a food plant, it is a useful indicator of suitable habitat for the MHJB.

Occurrences Within the Project Area

Arnold conducted presence-absence surveys for MHJB at the Facility in both 2004 and 2008. The 2004 survey was limited to the southern portion of the water treatment facility immediately next to an existing, above-ground water tank. The portion of the water treatment facility, immediately south of the water tank to the paved service road currently supports a mixture of plant species native to the Zayante Sandhills as well as some non-native plants. One adult male MHJB was observed on July 1, 2004.

An additional presence-absence survey was conducted on the evenings of June 12 and 19, and July 9, 2008. These surveys were conducted at 13 locations scattered throughout the entire Facility property. Four adult males of the MHJB were observed in two traps, located in the same portion of the site as Arnold's 2004 survey. These findings indicate that a very small population of the MHJB persists at the site, but is restricted to the extreme southern portion of the site. Copies of both survey reports are provided in Appendix A of this HCP.

On June 14, 2011, Arnold surveyed the Bonny Doon mitigation site. Only the 5.4-acre sandhills portion in the southwestern corner of the parcel was surveyed. Six adult males were observed at four trap locations.

Life History

Adult males measure about 0.75 inch in length and females are slightly longer. The adult male has a black head and dark brown elytra (leathery forewings) that are covered with brown hairs. The elytra also have stripes that are broken and irregular rather than continuous and well defined as in related species of June beetles. Larvae are grub-shaped (scarabaeiform) and vary in color from cream to pale yellow for the body segments and darker brown for the head.

The MHJB is univoltine, i.e., it has only one generation per year. As its common name suggests, adult emergence and seasonal activity normally starts in May or June and

continues through about mid-August; although, seasonal activity may vary from year to year depending on weather conditions. Adults are nocturnal, with most of their activity between about 8:45 and 9:30 pm. Adult males actively fly low to the ground in search of females, which are flightless. Presumably the female emits a pheromone for the males to find her.

Lifespan data from a brief capture-recapture study suggest that adult males live no longer than one week (Arnold 2000a). Dispersal data from the same capture-recapture study indicate that most adult males are quite sedentary, with home ranges of no more than a few acres. Similar data on lifespan and dispersal of females is lacking at this time since they are less frequently observed.

Specific life history information for the MHJB is unknown, but can be inferred from related species. Presumably the entire life cycle (egg, larva, pupa, and adult) takes two to three years to complete. The majority of the life cycle is spent as a subterranean larval stage that feeds on plant roots (Furniss and Carolin 1977).

3.2.2 Zayante Band-Winged Grasshopper (*Trimerotropis infantilis*)

Status and Distribution

The ZBWG was recognized as an endangered species by the Service (1997) in 1997 because of historical loss of habitat and several actual or potential future actions that could further reduce the amount of suitable habitat that currently supports the grasshopper. It occurs primarily in the open sand parkland plant community of the Zayante sand hills. Today, this habitat is limited in acreage and highly fragmented, resulting in overall small patches of habitat which supports small populations of the ZBWG.

Throughout most of its range, the primary threats to the grasshopper are loss of habitat via sand mining and urbanization, plus habitat degradation due to invasive plants and unnatural succession. In a few instances, other land uses including agricultural conversion, recreation (hikers, horseback riders, mountain bikers and off-road vehicles) have resulted in loss or degradation of habitat. Because of the small sizes of existing habitat remnants known to support the ZBWG, herbicide or insecticide use, as well as insect collectors could potentially damage the ZBWG or its habitat (U.S. Fish & Wildlife Service 1997, 1998a, and 2001). Also, the grasshopper's small population numbers raise concerns about long-term population viability.

A total of 10,560 acres was designated as critical habitat for the ZBWG by the Service (2001). This acreage generally lies between Highways 9 and 17 in the Felton-Mount Hermon-Ben Lomond-Scotts Valley area of Santa Cruz County. The critical habitat includes 610 acres of state or county-owned park lands and 9,950 acres of privately-owned lands. However, most of this acreage includes unsuitable habitats or developed and altered lands that do not currently support the ZBWG.

In 1998 a recovery plan was published by the Service (1998a) that treated two endangered insects (ZBWG and Mount Hermon June beetle) and three endangered plants that occur in the Zayante sand hills of Santa Cruz County. This recovery plan described three actions necessary to downlist or delist the ZBWG, namely:

> a) protection of the 10 known collection sites (consisting of 7 discrete areas) of sand parkland habitat via fee-title acquisition, conservation easement, or Habitat Conservation Plans;
>
> b) development and implementation of a management plan for the Quail Hollow Ranch County Park (County of Santa Cruz); and
>
> c) population numbers of the ZBWG are stable or increasing.

Rentz and Weissman (1984) described the species using specimens collected in Alma, Santa Cruz, the Santa Cruz Mountains, and from the Olympia Quarry in Felton. Arnold (1999) reviewed museum specimens and other reported records for the grasshopper and concluded that the ZBWG had historically been observed at about 20 locations within the Zayante sand hills. However, in a few instances different wording on specimen labels or in written accounts that described these sites may have actually referred to the same locations. Bona fide occurrences the ZBWG were found to be restricted to the loose and fine-grained Zayante sandy soils (Bowman and Estrada 1980) that occur in the Scotts Valley-Mount Hermon- Felton-Ben Lomond-Santa Cruz area of the Santa Cruz Mountains (i.e. the sandhills). Today the ZBWG is known from five primary locations in the Zayante sand hills (BUGGY Data Base 2011; Hoekstra 1998).

Habitat

Six plant communities characterize the Zayante sand hills, including: silverleaf manzanita chaparral with pondersoa pine, sand chaparral, and mixed silverleaf manzanita chaparral, ponderosa pine forest, dense sand parkland, and open sand parkland. These communities intergrade and occur in a mosaic pattern at some locations in the Zayante sandhills. The preferred habitat of the ZBWG is barren or sparsely-vegetated, sunlit sand, features of the open sand parkland plant community. This community is characterized by a diverse assemblage of specialty herbs indigenous to the Zayante sand hills, including the endangered Santa Cruz Wallflower (*Erysimum teretifolium*).

Chu (2002) examined microhabitats and food plant preferences of ZBWG at the North and South Ridge areas of Quail Hollow Quarry. She found ZBWG associated with more open sand (i.e., less total vegetative cover) areas and characterized by fewer invasive plant taxa. ZBWG frass (i.e., excrement) pellets were examined microscopically to identify the plants fed upon the grasshopper. The species composition of plant fragments in the frass was compared to the plant species diversity at locations where grasshoppers were captured. The frass significantly contained a higher percentage of native plant species than were found in surrounding the plant community, which indicates that these native plants were preferred food plants of the ZBWG.

Occurrences Within the Plan Area
At this time the ZBWG is not known to occur within the Plan Area. Due to the absence of open sand parkland at the Facility, habitat conditions are not suitable to support the grasshopper there. Presence-absence surveys were conducted for the grasshopper during its activity period in the summer and fall of 2011 at the Bonny Doon mitigation site, but it was not observed. Instead, *Trimerotropis thalassica*, an inhabitant of the sand chaparral community, was observed there.

Life History
Trimerotropis infantilis is one of the smaller species in this genus, hence the specific epithet (Rentz and Weissman 1984). Adult males measure about 0.50 to 0.75 inch in length, while females are slightly longer, approximately 0.75 to 0.9 inch. The body and forewings are pale gray to light brown with dark bands on the forewings. Basal areas of the hindwings are pale yellow. A cream-colored, mask-like marking surrounds the eyes. Tibia of the hindlegs are grey-blue like several other members of the genus *Trimerotropis*.

The ZBWG is univoltine, i.e., it has only one generation per year. Immatures, known as nymphs, look like adults except for the absence of wings. The nymphs are diurnal and are observed as early as May, while the adults become more prevalent beginning in July. Adults are also diurnal and remain active until the first ground-soaking rains, generally in late October or early November (Arnold 2000b, 2002a, 2002b, and 2004b).

Specific life history information for the ZBWG is unknown, but can be inferred from related species. Grasshoppers undergo an incomplete (i.e., hemimetabolous) metamorphosis, meaning that they develop from an egg to the adult through a sequence of progressively larger nymphal stages, without a larval or pupal stage as do insects that have a complete (i.e., holometabolous) metamorphosis. Presumably the entire life cycle (egg, nymph, and adult) is completed within one year. Eggs are laid in the soil and the majority of the life cycle is probably spent as a subterranean egg.

3.3 Covered Plant Species

3.3.1 Ben Lomond Spineflower ((*Chorizanthe pungens* var. *hartwegiana*)

Status and Distribution
The Ben Lomond spineflower (BLS) was listed as endangered by the Service in 1994 due to habitat destruction due to residential and golf course development, agricultural land conversion, sand mining, military activities, and encroachment by invasive plant species. BLS occurs in lower montane coniferous forest and maritime ponderosa pine sandhills. The Service published a recovery plan for BLS in 1998. (USFWS 1998b).

Habitat
In California, the spineflower genus (*Chorizanthe*) in the buckwheat family (Polygonaceae) comprises species of wiry annual herbs that inhabit dry sandy soils along

the coast and inland. Because of the patchy and limited distribution of such soils, many species of *Chorizanthe* tend to be highly localized in their distribution.

BLS is confined to outcrops of sandstone soils in the Santa Cruz Mountains from Big Basin State Park to the Felton area in the Santa Cruz Mountains. These sandstone soils support several unique plant communities, including the ponderosa pine-dominated Ben Lomond sandhills. The majority of occurrences of BLS are found on privately owned lands within the area generally bounded by the communities of Ben Lomond, Glenwood, Scotts Valley, and Felton.

Occurrences Within the Plan Area
Botanist Kathy Lyons of the Biotic Resources Group conducted surveys of the Bonny Doon mitigation site and confirmed the presence of 13 populations of BLS. BLS does not occur at the Facility.

Life History
Ben Lomond spineflower has dark pinkish to purple scarious margins on the involucral lobes and a slightly ascending to erect habit. The heads are medium in size (1 to 1.5 cm (0.4 to 0.6 in) in diameter) and distinctly aggregate. The plant is found on sandy soils that are the basis for the Ben Lomond sandhills communities in the Santa Cruz Mountains, mostly on privately owned land.

3.4 Other Zayante Sandhills Endangered Species

The Zayante Sandhills region near the water treatment facility support several special status plant and animal taxa, including four federally endangered species. Table 1 lists these taxa and their federal and state conservation statuses.

Table 1. Special-status Species of the Zayante Sandhills				
Common Name	Scientific Name	Conservation Status		
		Federal	State	CNPS
Mount Hermon June beetle	*Polyphylla barbata*	Endangered		
Zayante Band-Winged grasshopper	*Trimerotropis infantilis*	Endangered		
Ben Lomond Spineflower	*Chorizanthe pungens* var. *hartwegiana*	- Endangered		
Santa Cruz wallflower	*Erysimum teretifolium*	Endangered	Endangered	1B
Santa Cruz cypress	*Cupressus abramsiana*	Endangered	Endangered	
Silverleaf Manzanita	*Arctostaphylos silvicola*			1B
Ben Lomond buckwheat	*Eriogonum nudum* var. *decurrens*			1B

Note: CNPS is the California Native Plant Society, an organization whose lists of rare plants are often treated as endangered species by resource agencies.

Since the water treatment facility does not support open sand parkland habitat (Arnold, pers. observ.), the ZBWG, Santa Cruz wallflower, and Ben Lomond spineflower, which are indigenous to such habitat, would not be expected to occur there. Santa Cruz cypress, Ben Lomond buckwheat, and silverleaf manzanita were not observed during a habitat assessment survey at the property (Arnold, pers. observ.). However, silverleaf manzanita and Ben Lomond spineflower occur at the Bonny Doon mitigation site, and it is possible that ZBWG could occur there in the future.

4.0 IMPACT ASSESSMENT

4.1 Introduction

The effect of the HCP on MHJB is considered minor because the impacts from covered activities would generally be very small, the population of MHJB at the Facility is quite small in area and numbers, and the HCP prioritizes avoidance and minimization of impacts. The HCP further provides offsetting mitigation for any unavoidable impacts.

Most of the impacts from covered activities are expected to occur as a result of O&M activities at the Facility and leave the surrounding area undisturbed. These O&M activities are typically temporary in nature, with active human presence limited to the period of the activity (which may range from hours to days at the most). Following the O&M activities, the City will apply appropriate conservation measures for the restoration of disturbed habitat where appropriate. As a result, the O&M activities result in a temporary ecological disturbance instead of a permanent impact to the landscape. Due to the limited scale of the project and associated impacts, population-level effects are

limited, and allow opportunity for habitat re-establishment in some areas. Most potential impacts to MHJB are expected to result from access road maintenance or repair of existing facilities; however some additional impacts could occur from construction of new facilities.

It is also possible for covered activities in the habitat preserve to cause impacts to MHJB and BLS. Covered activities at the habitat preserve could also impact ZBWG, should it occur at the site in the future.

4.2 Direct and Indirect Impacts

Direct and indirect impacts to MHJB and its habitat are expected to occur at the Facility and the Bonny Doon mitigation site as a result of covered activities. O&M activities and construction-related activities will have direct impacts as a result of removal of MHJB habitat. Indirect impacts may occur as a result of fugitive dust created by O&M or construction activities. Habitat management activities at the habitat preserve may disturb the soil where life stages of the MHJB could be affected, or create dust during the adult activity period. Habitat management activities at the habitat preserve could similarly affect BLS, and also ZBWG should that species show up in the future. Management activities at the habitat preserve will be timed to avoid the bloom period for BLS and the flight season for ZBWG to minimize potential adverse effects. Both the direct and indirect impacts of the covered activities are expected to be minimal and will be minimized and mitigated according to the measures in Section 5.2.

4.3 Cumulative Effects

Operations and maintenance and future construction activities at the Facility will result in a negligible cumulative impact to the MHJB. Although up to 0.88 acre of MHJB occupied habitat and up to 4.82 acres of additional suitable habitat could be impacted under the HCP, this potential impact is not expected to affect the range-wide survival of the beetle due to the occurrence and abundance of this species and its habitat at several nearby locations, as well as elsewhere throughout its entire geographic range. In addition, any affected acreage will be compensated for through the permanent protection of prime habitat at the Bonny Doon mitigation site or at a conservation bank that is known to support the endangered beetle. Management activities conducted at the habitat preserve are not expected to contribute to cumulative effects on covered species.

4.4 Effects on Critical Habitat

There is currently no Critical Habitat designated for MHJB or BLS. Designated Critical Habitat for ZBWG does not occur at the City's Facility or at the habitat preserve. Covered activities will therefore have no effect on Critical Habitat.

5.0 CONSERVATION STRATEGY

5.1 Biological Goals and Objectives

Section 10(a)(2)(A) of the Act requires that an HCP specify the measures that the permittee will take to minimize and mitigate to the maximum extent practicable the impacts of the taking of any federally listed animal species as a result of activities addressed by the plan. As part of the "Five Point" HCP Policy adopted by the Services in 2000, HCPs must also establish measurable biological goals and objectives (65 Fed. Reg. 35242 (June 1, 2000)). The purpose of the biological goals is to ensure that the operating conservation program in the HCP is consistent with the conservation and recovery goals established for the species. The goals are also intended to provide to the applicant an understanding of why these actions are necessary. These goals are developed based upon the species' biology, threats to the species, the potential effects of the covered activities, and the scope of the HCP.

The following biological goals and objectives were developed based on the MHJB's biology and potential impacts of the covered activities within the scope of this HCP. They include on-site measures that will minimize take of the MHJB at the project site and off-site measures that will protect in perpetuity habitat with high conversation value for the beetle.

Goal 1: Avoid and minimize, to the extent practical, take of the MHJB within the project site.

Objective 1.1: Minimize removal of plant taxa indigenous to the Zayante Sandhills that grow at the project site.

Objective 1.2: Revegetate temporarily disturbed portions of the project site with plant taxa indigenous to the Zayante Sandhills and avoid landscaping with turf grass, weed matting, aggregate, and mulch.

Objective 1.3: Within the impact area at the project site, minimize outdoor night lighting during the flight season of the MHJB or use light bulbs that are certified to not attract nocturnally-active insects.

Goal 2: Protect habitat for the MHJB at an off-site location with high conservation value for the beetle.

Objective 2.1: Permanently protect sandhills habitat known to support the MHJB at the City of Santa Cruz's Bonny Doon site and/or provide funds for the purchase of conservation credits at the Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank that would be commensurate with the potential impacts from covered activities, to protect, manage, and monitor habitat of the MHJB in perpetuity.

5.2 Minimization and Mitigation Measures

Section 10 of the Endangered Species Act requires that all applicants submit HCPs that "minimize and mitigate" the impacts of take authorized by an incidental take permit, and that issuance of the permit will not "appreciably reduce the likelihood of the survival and recovery of the species in the wild." In general, HCPs should include mitigation programs that are based on sound biological rationale, practicable, and commensurate with the impacts of the project on species for which take is requested. Additionally, the Service encourages applicants to develop HCPs that contribute to the recovery of a listed species. If any of the covered activities of this HCP might result in permanent habitat loss, then the mitigation strategy must include compensatory mitigation consisting of the permanent preservation of suitable habitat or similar measures.

In accordance with these guidelines and the requirements of the Endangered Species Act, the conservation program of this HCP is intended to achieve its biological goals and objectives and to ensure that the impacts of covered activities on the MHJB are minimized and mitigated to the maximum extent practicable.

5.2.1 Measures to Minimize Impacts

The following measures are designed to minimize the effects of the covered activities on the MHJB by reducing incidental take of individuals and the degradation of habitat at the water treatment plant Facility, and to minimize effects to MHJB, ZBWG, and BLS from management activities undertaken at the habitat preserve.

<u>Locate Project Activities On and Adjacent to Current Development</u>
To the extent practical, the covered activities of this HCP that occur on the portion of the site characterized by Zayante sands will be located either within the footprint of the existing water treatment facilities (i.e., existing buildings, water tanks, service roads, pipelines, etc.) or immediately adjacent to the existing water treatment facilities.

<u>Delineate Boundaries of the Impact Area</u>
Temporary fencing and signs will be erected before any vegetation clearing, excavation, or grading activities occur to clearly delineate the boundaries of the project's impact area.

Warning signs will be posted on the temporary fencing to alert workers not to proceed beyond the fence. All protective fencing will remain in place until the operation and maintenance or construction activities have been completed. Signs will include the following language:

"NOTICE: SENSITIVE HABITAT AREA. DO NOT ENTER."

Cover Exposed Soils

Adult males of the MHJB actively search for breeding females during the evenings between about May 15 and August 15. During this period, both sexes burrow into duff and Zayante sandy soils during the daytime. If construction or other ground disturbing activities occur during any portion of the MHJB flight season, all exposed Zayante soils within the impact area will be covered by tarps, plywood, erosion control fabric, or another suitable impervious material. Exposed soils should be covered between the hours of 7 p.m. and 7 a.m. daily. This will prevent adult males from burrowing into the exposed soils and subsequently being injured or killed by soil disturbance (i.e., digging, grading, covering, etc.).

Dust Control

Appropriate dust control measures, such as periodically wetting down of work areas, will be used as necessary during excavation or any soil disturbing activities in the impact area or any other covered activities that generate dust.

New Outdoor Lighting

Adult MHJBs are active at dusk and may be distracted by incandescent, mercury vapor, sodium, and black light sources, which can disrupt normal behaviors and breeding activities. Thus any new outdoor lighting installed as part of this project will use bulbs certified to not attract nocturnal insects.

Landscaping Elements That Degrade MHJB Habitat

Because MHJB adults emerge from the soil to attract and search for mates, turf grass, dense ground covers (such as ivy), weed matting, aggregate, and mulch can degrade habitat conditions and will not be used in this project. As described below, material for revegetation should use plants endemic to the Zayante Sandhills.

Time Habitat Management Activities to Avoid Key Times of the Year

To minimize effects to BLS, habitat management activities will be conducted outside of the bloom period, which is from April through August. If monitoring of the habitat preserve detects the presence of ZBWG, the window to avoid habitat management activities will be extended until the end of October.

5.2.2 Measures to Mitigate Impacts

To mitigate for unavoidable impacts of covered activities, the Water Department will, as a primary strategy, provide for the long-term protection and management of MHJB habitat located on the City of Santa Cruz Bonny Doon property. As a secondary strategy,

the Water Department may purchase conservation credits at the Zayante Sandhills Conservation Bank. The Water Department will also revegetate any area of temporary habitat loss on Zayante sandy soils at the water treatment facility with plants native to the Zayante Sandhills. The next two sections describe these mitigation measures in more detail.

Protect Sandhills Habitat at the City's Property in Bonny Doon

The City of Santa Cruz owns a site in Bonny Doon that supports high quality MHJB sandhills habitat. A survey conducted in the summer of 2011 confirmed that the MHJB occurs there. The Water Department will compensate for any future impacts by permanently protecting sandhills habitat occupied by the MHJB at its Bonny Doon property. To ensure mitigation in advance for impacts related to City activities covered by this HCP or other ESA take authorizations, the City will protect and manage in perpetuity 17 acres at the Bonny Doon property.

The proposed covered activities of this HCP would be authorized to impact a maximum of 5.7 acres of habitat that could potentially be used by the MHJB. The covered activities could also permanently impact life stages of the MHJB and temporarily remove their habitat if vegetation clearing and grading occurs. Impacts will be mitigated at a ratio of 1:1. This level of mitigation is commensurate with the level of impacts to MHJB habitat at the water treatment facility property because the habitat quality at the Bonny Doon property is of high quality and connects to adjacent properties that also support high quality sandhills habitat compared to the degraded habitat at the Water Department property; thus the conservation value of the habitat at the Bonny Doon site is much greater than that of the Water Department property. Maximum impacts at the water treatment facility would result in 5.7 acres of habitat mitigation at the Bonny Doon mitigation site. The remaining approximately 11.3 acres would be available to mitigate for other City activities impacting MHJB, and could be credited to the Water Department through a future HCP or Section 7 consultation.

The Water Department will be responsible for all species monitoring, habitat protection, vegetation management, and other conservation-related activities that occur at the Bonny Doon mitigation site. An annual report will be prepared for submission to the Service as described in Section 6.2 of this HCP.

Purchase Conservation Credits at the Zayante Sandhills Conservation Bank

The Water Department may compensate for any future impacts to MHJB by purchasing, at a 1:1 ratio, conservation credits from the Ben Lomond Sandhills Preserve of the Zayante Sandhills Conservation Bank. This level of mitigation is commensurate with the level of impacts to MHJB habitat at the water treatment facility property because the habitat quality at the conservation bank is prime compared to the degraded habitat at the Water Department property; thus the conservation value of the bank habitat is much greater than that of the property. Should the Water Department decide to purchase credits, it will ensure that conservation occurs in lock step with any impacts from covered activities by purchasing conservation credits sufficient to mitigate for a particular impact

before carrying out the covered activity. The Water Department will purchase conservation credits on an as-needed basis over the life of the HCP.

The Zayante Sandhills Conservation Bank was approved by the Service and the County of Santa Cruz to provide mitigation for impacts to the MHJB and other special-status plants and animals of the Zayante Sandhills from projects within the Felton USGS quad.

The operator of the conservation bank, PCO, LLC, will be responsible for all species monitoring, habitat management, and other conservation related activities that occur at the Ben Lomond Sandhills Preserve.

Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants
Some areas at the water treatment facility will be temporarily cleared of vegetation or graded but will not support any new structures or other hardscape after a covered activity has been completed. After completion of such covered activities the impact area(s) will be revegetated with plants native to the Zayante Sandhills. Suggested sandhills plants include sticky monkeyflower, deer weed (*Lotus scoparius*), silver bush lupine (*Lupinus albifrons* var. *albifrons*), ponderosa pine, and coast live oak. Other sandhill endemic plants may be appropriate depending upon the location of the impact area and soil conditions. These native plants will provide suitable habitat conditions for MHJBs that might eventually colonize the temporarily impacted portion of the impact area. As previously noted, revegetated areas should not include any landscape elements that degrade habitat for the MHJB, including mulch, bark, weed matting, rock, aggregate, or turf grass.

6.0 PLAN IMPLEMENTATION

6.1 Monitoring

Compliance monitoring by a qualified biologist will occur during all construction activities and O&M activities in suitable or occupied MHJB habitat. The biologist will ensure that all project areas are clearly delineated and impacts are restricted to those areas, that exposed Zayante soils are properly covered at night between May 15 and August 15, and that observed life stages of the MHJB are properly relocated. The qualified biologist will also be responsible for effects monitoring, which will include the calculation of areas of habitat disturbance and the number, if any, of individual MHJB relocated. All information gathered by the biologist will be included in the annual report to the Service.

If the Bonny Doon site is utilized for mitigation, a management plan will be developed within 6 months of permit issuance. The management plan will be subject to Service approval and will describe the management and monitoring of the habitat and MHJB population that will be conducted at that site. The management plan will also include measures to minimize adverse effects to MHJB, BLS, and ZBWG resulting from habitat management and monitoring.

6.2 Reporting

Reporting will include an annual summary describing the quality and type (i.e., temporary versus permanent) of MHJB habitat impacts, and will describe the type of mitigation utilized to offset the MHJB impacts (i.e., the number of credits purchased from the Zayante Sandhills Conservation Bank). If the Bonny Doon site is utilized for mitigation, then the various monitoring activities completed during the prior period will be described as well as results of MHJB monitoring. The annual report is due to the Service by March 15 of each year.

6.3 Disposition of Dead or Injured Specimens

Upon locating individuals of Covered Species that are dead or injured as a direct result of activities conducted by the City, initial notification will be made to the Ventura Fish and Wildlife Office at (805) 644-1766 within 3 working days of its finding. Written notification will be made within 5 calendar days and will include the date, time, and location of the carcass, a photograph, cause of death, if known, and any other pertinent information. Written notification will be sent to the Ventura Fish and Wildlife Office at 2493 Portola Road Suite B, Ventura, California 93003. Dead or injured specimens of the MHJB will be submitted to the designated repository at the University of California, Berkeley.

6.4 Funding

Estimated costs to implement the conservation strategy described in this HCP are itemized in Table 2. The Water Department may access various sources of funding, but primarily intends to rely on water rate payer fees to cover costs. The Water Department commits to fully fund its commitments under the HCP. Specifically, the Water Department will ensure there is a line item in the City's annual budget to cover initial setup costs and associated annual costs of monitoring and reporting, and for the purchase of credits from the Zayante Bank, as applicable. Prior to using the Bonny Doon site for mitigation, the Water Department will establish a non-wasting endowment, the size of which would be determined through a Property Analysis Record (PAR) or similar analysis, to be held by the City or an approved third party, with sufficient funds to cover costs associated with long-term management of the Bonny Doon mitigation site.

The Water Department will promptly notify the Service of any material change in its financial ability to fulfill its obligations under the HCP. In addition to providing any such notice, the Water Department will include in its Annual Report to the Service such reasonably available financial information to demonstrate the its ability to fulfill its obligations.

Table 2. Estimated costs to implement the Water Department's conservation strategy.					
Item or Activity	Conservation Strategy	Units		Costs ($)	
		Type	Number	Per Unit	Total
Minimization Measures at Facility					
	Install construction fencing	Construction Fencing	800 ft.	3	2,400.00
	Install signs	Signs	16	20	320.00
	Cover exposed soils	Geojute – 4' x 147' roll	64	80	5,120.00
	Dust control	Spray water with hose	100 applications	5	500.00
	Outdoor lights	Non-attracting insect light bulbs	4	25	100.00
Subtotal					**8,440.00** (note actual costs will vary depending upon size of project at Facility)
Mitigation Measures					
	Revegetation at Facility	1 gallon shrubs	50	10	500.00
	Sandhills habitat protection and management at Bonny Doon	Initial & Capital Costs (see PAR for details)	Various		33,009.00
Management and Monitoring at Habitat Preserve					
	MHJB Monitoring	Hour	528	150.00	79,200.00
	BLS Monitoring	Hour	220	85.00	18,700.00
	Fence Repair	Linear Feet	3,000	0.60	1,800.00
	Sign Replacement	Sign	90	25.00	2,250.00
	Reporting	Hour	240	73.00	17,520.00
	Habitat Maintenance	Hour	1,500	30.00	45,000.00
Subtotal					**197,979.00**
Grand Total					**206,419.00**

7.0 CHANGED AND UNFORESEEN CIRCUMSTANCES

7.1 Changed Circumstances Defined

Changed Circumstances are defined under the "No Surprises" rule as changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by the Applicant and the Service and that can be planned for in the HCP (e.g., the listing of a new species, or the new discovery of a currently listed species within the Plan Area). The Service and the City agree that the Changed Circumstances defined in the following subsections represent all Changed Circumstances to be addressed by the City.

7.1.1 The New Listing of Species not Covered by the Plan

The City recognizes, as noted in the Service's discussion of its "Habitat Conservation Plan Assurances ('No Surprises') Rule," (USFWS 1998b), that the future listing of a species whose conservation was not provided for in the Plan to a level sufficient to include the species as a Covered Species can be viewed as a Changed Circumstance. In the event that a species which is not a covered species pursuant to this Plan is listed by the Service subsequent to the issuance of the section 10 permit pursuant to this HCP, such listing may be considered a Changed Circumstance. In the event of a new listing of one or more species not covered by this Plan, the Service and the City will identify actions that might cause take, and the City will avoid such actions in the implementation of covered activities until approval of an amendment to the Plan to address the newly listed species, or until such measures are no longer required.

7.1.2 The New Discovery of Other Listed Species in the Plan Area

Table 1 lists special-status species of the Zayante Sandhills. It is possible that at some point during the duration of the permit, these, or other listed species, may be discovered at the Project Site. In the event of the new discovery of a listed species in the Plan Area of one or more species not covered by this Plan, the Service and the City will identify actions that might cause take, and the City will avoid such actions in the implementation of covered activities until approval of an amendment to the Plan to address the newly discovered listed species in the Plan Area, or until such measures are no longer required. Given the degraded nature and isolation of the habitat in the Plan Area, the new discovery of other listed species is not expected to occur during the term of the permit.

7.2 Unforeseen Circumstances

7.2.1 No Surprises Rule

The primary purpose of this HCP is to conserve the MHJB and to minimize and mitigate to the maximum extent practicable impacts to the MHJB resulting from City O&M Activities at the Facility. Accordingly, if this HCP meets the criteria for issuance of a Permit under Section 10 of the ESA, the Applicant will receive the assurances under the "No Surprises" rule of the United States Department of the Interior at 50 C.F.R. 17.22(b)(5)(1999) and 17.32(b)(5)for the MHJB covered under this HCP, upon approval of this HCP and issuance of a Permit to the City and for so long as the HCP is being properly implemented. Pursuant to such rule, in the event the Service makes a finding of Unforeseen Circumstances, the Service will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water or other natural resources beyond the level agreed to in this HCP with respect to MHJB without the consent of the City.

Definition of Unforeseen Circumstances and Relevant Factors
The U.S. Department of Interior's "No Surprises" rule provides at 50 C.F.R. 17.22(b)(5)(iii)(2003) and 17.32(b)(5)(iii)(2003) that:

A.) In negotiating Unforeseen Circumstances, the Director will not require the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan without the consent of the permittee.

B.) If additional conservation and mitigation measures are deemed necessary to respond to Unforeseen Circumstances, the Director may require additional measures of the permittee where the conservation plan is being properly implemented, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation program for the affected species, and maintain the original terms of the conservation plan to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee.

Further, any additional measures required of the City by the Service in the event of an Unforeseen Circumstances finding must maintain the original terms of this HCP to the maximum extent possible and must be limited to modifications within the conserved habitat areas and to the Subregional Plan's operating conservation program for MHJB.

A.) Defined – For purposes of this HCP "Unforeseen Circumstances" (defined in 50 C.F.R. Section 17.3) (2003) means changes in circumstances affecting a

species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the MHJB. The term "Unforeseen Circumstances" as defined in this HCP is intended to have the same meaning as it is used in 50 C.F.R. § 17.3 and in California Fish and Game Code section 2805(k).

B.) Relevant Factors - Pursuant to the "No Surprises" rule at 50 C.F.R. 17.22(b)(5)(iii)(C)(2003), the Service has the burden of demonstrating that Unforeseen Circumstances exist, using the best scientific and commercial data available. The findings must be clearly documented and based upon reliable technical information regarding the status and habitat requirements of the MHJB. The Service will consider, but not be limited to, the following factors:

- the size of the current range of the MHJB;
- the percentage of the MHJB range adversely affected by this HCP;
- the percentage of MHJB range that has been conserved by this HCP;
- the ecological significance of that portion of the MHJB range affected by this HCP;
- the level of knowledge about the MHJB and the degree of specificity of the MHJB's conservation program under this HCP; and
- whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the MHJB in the wild.

C.) Notice - If either of the Wildlife Agencies (the Service or CDFW) or the Applicant becomes aware of the existence of a potential Unforeseen Circumstance, each shall immediately notify the other of the existence of a potential Unforeseen Circumstance. Except where there is a substantial threat of imminent, significant adverse impacts to MHJB, the Service will provide the Applicant and CDFW thirty (30) calendar days notice of a proposed written finding of Unforeseen Circumstances prior to adopting the finding, during which time the Wildlife Agencies will meet with the Applicant to discuss the proposed finding, to provide the Applicant with an opportunity to submit information to rebut or propose amendments to the proposed finding, and to consider any proposed changes to the conservation strategies for the HCP. During the time necessary to determine the nature and extent of any

additional or modified mitigation, the Applicant will avoid contributing to appreciably reducing the likelihood of the survival and recovery of the MHJB.

Effects of Unforeseen Circumstances on Take Authorization

Notwithstanding the limits on conservation and mitigation measures identified above under Section 5.0 the Permit for this HCP may be revoked if the Service determines that continuation of the covered activities would be inconsistent with the criterion set forth in 16 U.S.C. § 1539(a)(2)(B)(iv), as provided in 50 C.F.R. 17.22(b)(8) and 17.32(b)(8) (USFWS 2004), and the inconsistency has not been remedied. Nothing in this HCP shall preclude the Service and any Federal, State, local or Tribal government agency, or a private entity, from taking additional actions at their own expense to protect or conserve the MHJB. The existence of Unforeseen Circumstances does not authorize the Applicant to violate any Federal, State or local laws, ordinances, regulations or policies.

7.3 Amendments

7.3.1 Minor Amendments

The Service or the City may propose minor modifications to the HCP by providing notice to the other party. Such notice shall include a statement of the reason for the proposed modification and an analysis of its environmental effects, including its effects on operations under the HCP and on covered species. Minor amendments are permissible without amending the underlying section 10(a)(1)(B) permit provided that the Service determines that the changes do not 1) cause additional take of MHJB that was not analyzed in connection with the original HCP, 2) result in operations under the HCP that are significantly different from those analyzed in connection with the original HCP, or 3) have adverse effects on the environment that are new or significantly different from those analyzed in connection with the original HCP.

7.3.2 Major Amendments

Amendments that do not fit the definition of a minor amendment will be processed as major amendments in accordance with all applicable legal requirements, including but not limited to the Federal Endangered Species Act, the National Environmental Policy Act, and the Service's permit regulations. Major permit amendments require written notification to the Service and the same justification and supporting information for compliance with a standard incidental take permit application, including conservation planning requirements and compliance with issuance criteria.

When the Service or the Applicant believes that a formal amendment to the HCP is required, consultation with the Service will include the Service's Regional Office. The Applicant will prepare the appropriate documentation for submission to the Service. The documentation will include a description of the event or activity and an assessment of its

impacts. The amendment will describe changes to the mitigation measures to ensure that MHJB is appropriately protected.

7.4 Suspension or Revocation

The Service may suspend or revoke the Permit for cause in accordance with the laws and regulations in force at the time of such suspension or revocation (See 50 C.F.R. sections 13.27-13.29, 17.22(b)(8), 17.32(b)(8)). Such suspension or revocation may apply to the entire Permit, or only to specified portions of the Permit Area or covered activities. In the event of suspension or revocation, Applicant's obligations under the HCP will continue until the Service determines that all Take of Covered Species that occurred under the Permits has been fully mitigated in accordance with the HCP.

7.5 Renewal of the Section 10(a)(1)(B) Permit

Upon expiration, the Section 10(a)(1)(B) permit may be renewed without the issuance of a new permit, provided that the permit is renewable, and that biological circumstances and other pertinent factors affecting covered species are not significantly different than those described in the original HCP. To renew the permit, the City shall submit to the Service, in writing:

- a request to renew the permit;
- reference to the original permit number;
- certification that all statements and information provided in the original HCP and permit application, together with any approved HCP amendments, are still true and correct, and inclusion of a list of changes;
- a description of any take that has occurred under the existing permit; and
- a description of any portions of the project still to be completed, if applicable, or what activities under the original permit the renewal is intended to cover.

If the Service concurs with the information provided in the request, it shall renew the permit consistent with permit renewal procedures required by Federal regulation (50 C.F.R. § 13.22). If the City files a renewal request and the request is on file with the issuing Service office at least 30 days prior to the permits expiration, the permit shall remain valid while the renewal is being processed, provided the existing permit is renewable. However, the City may not take listed species beyond the quantity authorized by the original permit. If the City fails to file a renewal request within 30 days prior to permit expiration, the permit shall become invalid upon expiration. The City and the mitigation bank operator must have complied with all annual reporting requirements to

qualify for a permit renewal. Changes to the HCP that would qualify as a formal amendment will be handled in accordance with section 6.4.2.

7.6 Permit Transfer

In the event that the landowner transfers ownership of a property covered by the HCP, the Service will regard the new owner as having the same rights and obligations with respect to the permits as the original landowner, provided the new owner agrees through the execution of a Certificate of Inclusion to be bound by the terms and conditions of the HCP as it affects the Facility property.

7.7 Other Measures

Section 10(a)(2)(A)(iv) of the ESA states that a HCP must specify other measures that the Director may require as being necessary or appropriate for purposes of the plan. When conservation plans involve multiple parties, the Service may require that an Implementing Agreement be drafted and signed by each party to the HCP. The Service has determined this document to be a "low-effect" HCP with negligible or minor effects on listed species, whereby an Implementation Agreement is not required. No other measures that the Director may require have been identified for this HCP.

8.0 ALTERNATIVES TO THE PROPOSED ACTION CONSIDERED

8.1 Alternative #1 – No Action Alternative

An alternative to this HCP is the no action alternative. Under the no action alternative, no permit would be issued. This would mean that the City O&M Activities located in MHJB Habitat at the Facility would remain subject to "take" prohibitions of the ESA, and the Applicant would need to avoid take of MHJB. Complete avoidance of impacts will not be possible for some of the Applicant's activities at the Facility. As such, the Applicant would be required to obtain Incidental Take permits for those activities with unavoidable impacts. This process would occur on a project-by-project basis, but without a set of comprehensive conservation measures in advance. The result would be that the Applicant would only mitigate for impacts to occupied MHJB habitat. This approach has the potential to miss or to inadequately examine conservation issues and measures which may be too ill defined, unrecognized or vague to enable a clear and meaningful impact analysis or to articulate the needed mitigation measures.

8.2 Alternative #2 – Project-by-project Alternative

The other alternative considered was the project-by-project approach to permitting that still relied on the conservation measures identified in this HCP as the standard set of

measures to be used for individual permitting. Like the No Action alternative, this alternative would not address MHJB incidental take permitting at a programmatic level. Under this alternative, the Applicant's activities occurring in MHJB habitat at the Facility would remain subject to the "take" prohibitions and permitting under the ESA. Although utilizing the comprehensive conservation measures for all activities would avoid the application of haphazard conservation measures, this type of permitting for individual activities that disturb minor amounts of habitat is much too inefficient and cumbersome. This alternative would also result in an unnecessary economic burden on the Applicant.

The proposed plan addresses MHJB from a habitat basis at a programmatic level, and therefore provides more comprehensive conservation. In addition, the HCP provides the Applicant with long-term predictability concerning the nature of its operations for which incidental takings are permitted, avoiding potential facility-compromising delays.

9.0 LITERATURE CITED

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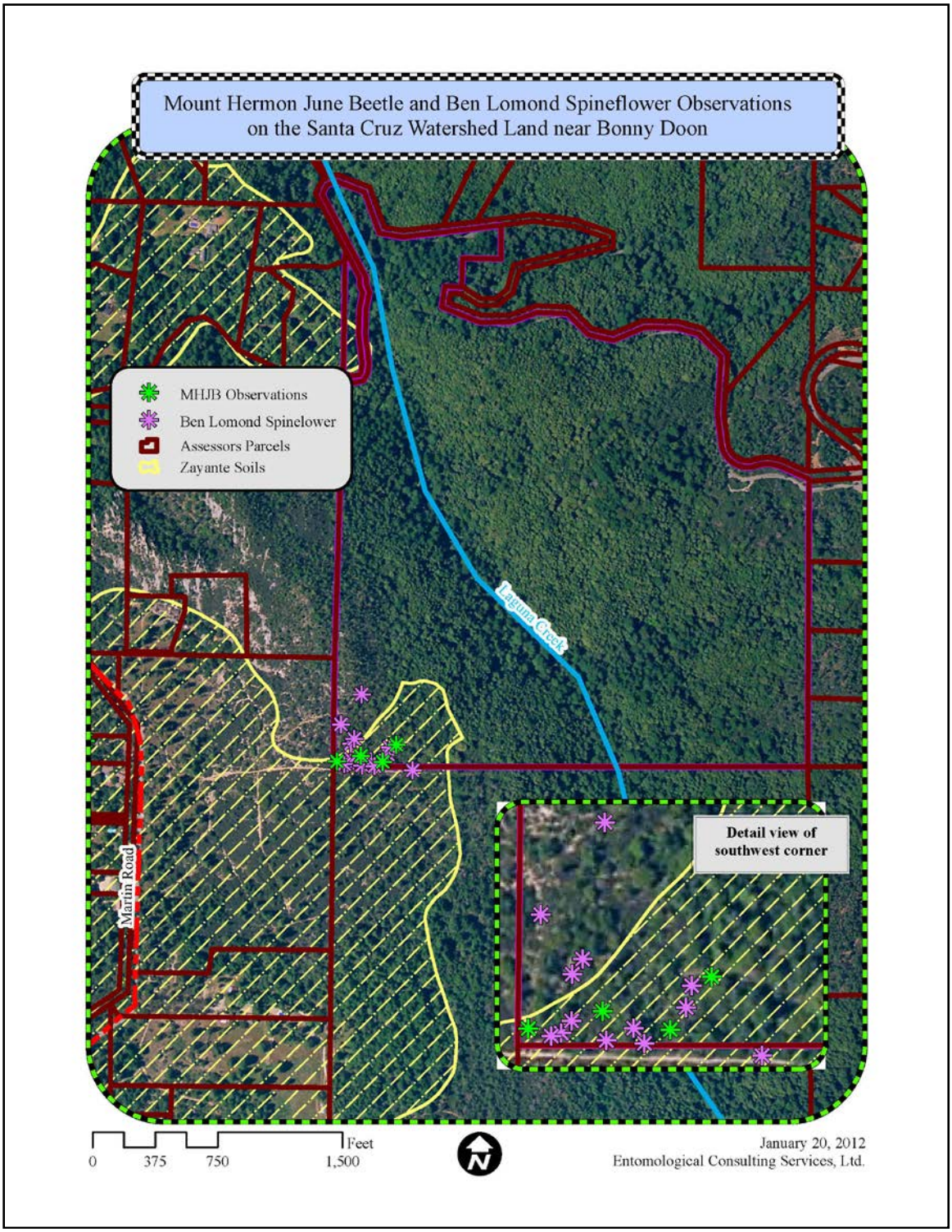
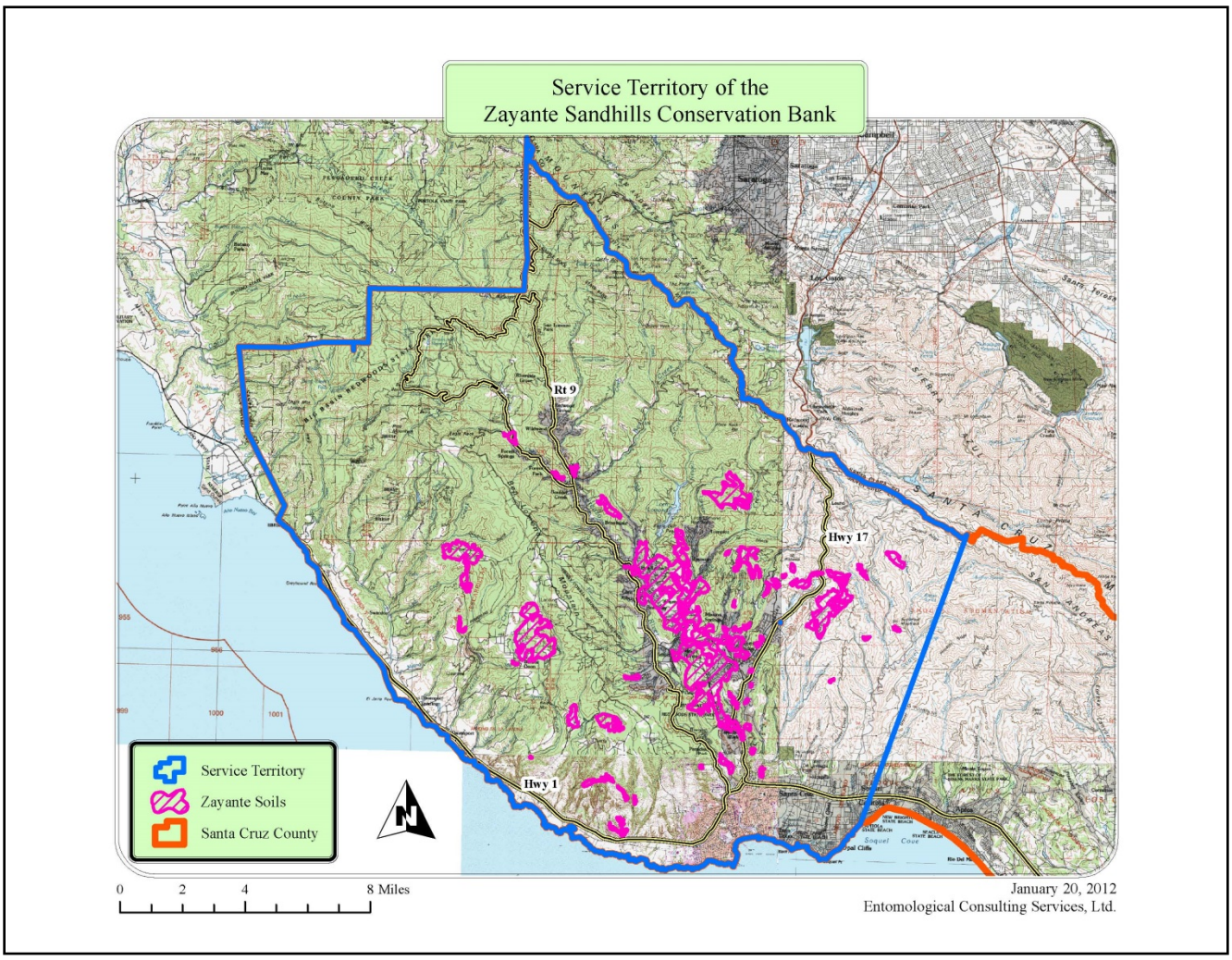
Appendix A: MHJB and Spineflower Survey Results Map



Appendix B: Zayante Sandhills Conservation Bank Map



DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 1539(a)

REGULATIONS
50 CFR 17.22

50 CFR 13

1. PERMITTEE

CITY OF SANTA CRUZ
809 CENTER ST
SANTA CRUZ, CA 95060
U.S.A.

3. NUMBER
TE15139B-0

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
September 4, 2013	September 4, 2043

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
MARTIN BERNAL
CITY MANAGER

9. TYPE OF PERMIT
NATIVE ENDANGERED SP. HABITAT CONSERVATION PLAN - E WILDLIFE

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
The plan area includes 12.7 acres of the Graham Hill Water Treatment Plant property located at 715 Graham Hill Road, Santa Cruz, California, 95060 (parcel APN 060-141-05), and 17.0 acres at the City of Santa Cruz's Laguna Creek watershed property (parcel APN 080-241-18) in Bonny Doon.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. All sections and provisions of Title 50 Code of Federal Regulations, parts 13 and 17.32, are conditions of this permit.

E. The authorization granted by this permit is subject to compliance with, and implementation of the Low-Effect Habitat Conservation Plan for the Mount Hermon June Beetle, Zayante Band-Winged Grasshopper, and Ben Lomond Spineflower at the City of Santa Cruz Graham Hill Water Treatment Plant, 715 Graham Hill Road, Santa Cruz, California, 95060 (project parcel APN 060-141-05) (HCP), hereby incorporated by reference. This permit and the HCP are binding upon the Permittee, and any authorized officer, employee, contractor, or agent conducting covered activities.

F. The Permittee, and its authorized officers, employees, contractors, and agents are authorized under the Endangered Species Act of 1973, as amended (Act), to incidentally take the endangered Mount Hermon June beetle (*Polyphylla barbata*) and Zayante band-winged grasshopper (*Trimerotropis infantilis*), to the extent that take of these species would otherwise be prohibited under section 9 of the Act, and its implementing regulations, or pursuant to a rule promulgated under section 4(d) of the Act. Take may only occur incidental to otherwise lawful covered activities within the plan area defined in the HCP, which includes the 12.7 acres of the Graham Hill Water Treatment Plant property and 17.0 acres at the City of Santa Cruz's Laguna Creek watershed property (parcel APN 080-241-18) in Bonny Doon, as conditioned herein. This permit authorizes the incidental take of all life stages of the Mount Hermon June beetle and Zayante band-winged grasshopper in the form of harassment, harm, capture, injury, and mortality caused by operations, maintenance, or construction on the parcel.

G. The Permittee must refer to the permit number above in all correspondence and reports concerning permit activities. Any questions you may have about this permit should be directed to the Field Supervisor of the Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, California 93003, telephone (805) 644-1766.

H. A copy of this permit must be on the premises of the Graham Hill Water Treatment Plant property and at the City of Santa Cruz's Laguna Creek watershed in Bonny Doon, or in the possession of the Permittee or its designated agents while conducting activities that may result in incidental take.

I. Only qualified individuals authorized by the Service under the authority of this permit and its associated biological opinion may conduct monitoring, relocation, or surveys for Mount Hermon June beetles and Zayante band-winged grasshoppers. The Permittee must request our approval of any additional individual(s) it wishes to employ to conduct these activities. The Permittee must provide the names, addresses, phone numbers, and qualifications of the requested individuals to work with the Mount Hermon June beetle and Zayante band-winged grasshopper to the Ventura Fish and Wildlife Office at least 30 days prior to the start of the requested activities. Individuals may conduct the requested activities only following the

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ISSUED BY	TITLE	DATE
~~Karen P. Root~~ Acting	FIELD OFFICE SUPERVISOR	September 4, 2013

written concurrence of the Service.

J. Annual reports must meet all requirements referenced in the HCP and be provided by the Permittee to the Service by January 31 of each year.

K. Upon locating a dead or injured Mount Hermon June beetle or Zayante band-winged grasshopper, initial notification must be made by telephone and in writing to the Ventura Fish and Wildlife Office in Ventura, California, (2493 Portola Road, Suite B, Ventura, California 93003, (805) 644-1766) within three working days of the finding. The report must include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

Care must be taken in handling dead specimens to preserve biological material in the best possible state for later analysis. Should any injured Mount Hermon June beetles or Zayante band-winged grasshoppers survive, the applicant must contact the Service regarding their final disposition. Any remains of intact Mount Hermon June beetles or Zayante band-winged grasshoppers should be placed with the California Academy of Sciences Entomology Department (Contact: David Kavanaugh, California Academy of Sciences Entomology Department, 875 Howard Street, San Francisco, California, 94103 (415) 321-8310). Arrangements regarding proper disposition of potential museum specimens must be made with the California Academy of Sciences by the Service prior to conducting any project related activities.

Appendix B

Results from California Native Plant Society Rare Plant Inventory, US Fish and Wildlife Service Information for Planning and Consultation, and California Natural Diversity Database

CNDDB Results for the Project Area and 2-mile Buffer
June 28, 2018

Scientific Name	Common Name	Life Form	Status	Habitat	Microhabitat	Potential to Occur in Project Area
ANIMALS						
Ambystoma californiense	California tiger salamander	Amphibians	T/T/WL, V	Central Valley DPS federally listed as threatened. Santa Barbara and Sonoma counties DPS federally listed as endangered.	Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	Habitat for this species not present in the Project Area. Nearest occurrence near Watsonville, 12 miles south.
Aneides niger	Santa Cruz black salamander	Animal	- / - / SSC	Mixed deciduous and coniferous woodlands and coastal grasslands in San Mateo, Santa Cruz, and Santa Clara counties.	Adults found under rocks, talus, and damp woody debris.	Unlikely to occur in Project Area, because it is over 650 feet from a creek (San Lorenzo), which is not known to support this species. Nearest occurrence along Branciforte Creek.
Athene cunicularia	burrowing owl	Animal	- / - / SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation.	Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Habitat for this species is not present in the Projet Area or immediate vicinity. Nearest occurrence at UCSC lower campus.
Bombus occidentalis	western bumble bee	Animal	- / - / S	Once common & widespread, species has declined precipitously from central CA to southern B.C., perhaps from disease.	No information.	Unlikely to occur on site due to lack of nectar plants. Nearest occurrence in Ben Lomond area.
Brachyramphus marmoratus	marbled murrelet	Birds	T/E/S	Feeds near-shore; nests inland along coast from Eureka to Oregon border and from Half Moon Bay to Santa Cruz.	Nests in old-growth redwood-dominated forests, up to six miles inland, often in Douglas-fir.	Habitat for this species not present in the Project Area. No old-growth redwoods occur on or near the Project Area.
Charadrius alexandrinus nivosus	western snowy plover	Birds	T/-/SSC, BCC	Sandy beaches, salt pond levees & shores of large alkali lakes.	Needs sandy, gravelly or friable soils for nesting.	Habitat for this species not present in the Project Area. No beaches or dunes present on site.
Cicindela ohlone	Ohlone tiger beetle	Animal	E / E / -	Remnant native grasslands with California oatgrass & purple needlegrass in Santa Cruz County.	Substrate is poorly-drained clay or sandy clay soil over bedrock of Santa Cruz mudstone.	Soils and habitat for this species are not present in the Project Area. Nearest occurrence at UCSC lower campus.
Coturnicops noveboracensis	yellow rail	Animal	- / - / SSC	Summer resident in eastern Sierra Nevada in Mono County.	Freshwater marshlands.	Habitat for this species not present on site. Only occurrence for this species is from 1903 in vicinity of Graham Hill Road.
Danaus plexippus pop. 1	monarch - California overwintering population	Animal	- / - / S	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico.	Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	Habitat for this species not present on site. Nearest occurrence at UCSC Arboretum.
Dicamptodon ensatus	California giant salamander	Animal	- / - / SSC	Known from wet coastal forests near streams and seeps from Mendocino County south to Monterey County, and east to Napa County.	Aquatic larvae found in cold, clear streams, occasionally in lakes and ponds. Adults known from wet forests under rocks and logs near streams and lakes.	Habitat for this species not present on site. Nearest occurrence in Cave Gulch.
Elanus leucurus	white-tailed kite	Animal	- / - / S	Rolling foothills and valley margins with scattered oaks & river bottomlands or marshes next to deciduous woodland.	Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Unlikely to occur in the Project Area due to lack of tall, dense trees. Nearest occurrence at UCSC upper campus.
Empidonax traillii extimus	southwestern willow flycatcher	Birds	E/E/-	Riparian woodlands in Southern California.		Habitat for this species not present in the Project Area. This species occurs in southern California
Emys marmorata	western pond turtle	Animal	- / - / SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation.	Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	Habitat for this species not present on site. Nearest occurrence at UCSC lower campus.
Enhydra lutris nereis	southern sea otter	Mammals	T/-/FP, SSC	Nearshore marine environments from about Ano Nuevo, San Mateo Co. to Point Sal, Santa Barbara Co.	Needs canopies of giant kelp & bull kelp for rafting & feeding. Prefers rocky substrates with abundant invertebrates.	Habitat for this species not present in the Project Area. No kelp forests occur on site.
Eucyclogobius newberryi	tidewater goby	Fish	E/-/SSC, V	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River.	Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	Habitat for this species not present in the Project Area. No lagoons or still waters on site.
Euphilotes enoptes smithi	Smith's blue butterfly	Insects	E/-/CI	Most commonly associated with coastal dunes & coastal sage scrub plant communities in Monterey & Santa Cruz counties.	Hostplant: Eriogonum latifolium and Eriogonum parvifolium are utilized as both larval and adult foodplants.	Habitat for this species not present in the Project Area. No coastal dunes or coastal sage scrub habitat on site.
Fissilicreagris imperialis	Empire Cave pseudoscorpion	Animal	- / - / V	Known only from Empire Cave in Santa Cruz County.	Found under rocks and wood in the dark to twilight zones of the cave.	Habitat for this species not present on site. Nearest occurrence is in Cave Gulch caves.
Lasiurus cinereus	hoary bat	Animal	- / - / -	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding.	Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	This species may roost or forage in the Project Area. Nearest occurrence at Mount Hermon.

CNDDB Results for the Project Area and 2-mile Buffer
June 28, 2018

Scientific Name	Common Name	Life Form	Status	Habitat	Microhabitat	Potential to Occur in Project Area
Laterallus jamaicensis coturniculus	California black rail	Animal	- / T / S	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays.	Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Habitat for this species not present on site.
Lytta moesta	moestan blister beetle	Animal	- / - / -	Valley & foothill grassland	No information.	Unlikely to occur in the Project Area due to the very small size of the grassland on site. General location for entire county.
Meta dolloff	Dolloff Cave spider	Animal	- / - / V	Known from caves in the Santa Cruz area.	This species is an orb-weaver and occurs from the cave mouth into deep twilight.	Habitat for this species not present on site. Nearest occurrence is in Cave Gulch caves.
Neochthonius imperialis	Empire Cave pseudoscorpion	Animal	- / - / -	Known only from Empire Cave in Santa Cruz County.	No information.	Habitat for this species not present on site. Nearest occurrence in Empire Cave.
North Central Coast Drainage Sacramento Sucker/Roach River	North Central Coast Drainage Sacramento Sucker/Roach River	Animal	- / - / -	San Lorenzo River and tributaries.	No information.	Habitat for this species not present on site. Occurs in San Lorenzo River and its tributaries.
Oncorhynchus kisutch pop. 4	coho salmon - central California coast ESU	Animal	E / E / -	Federal listing = pops between Punta Gorda & San Lorenzo River. State listing = pops south of Punta Gorda.	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen.	Habitat for this species not present on site. Occurs in San Lorenzo River and its tributaries.
Oncorhynchus mykiss irideus pop. 8	steelhead - central California coast DPS	Animal	T / - / -	From Russian River, south to Soquel Creek and to, but not including, Pajaro River. Also San Francisco and San Pablo Bay basins.	Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water & sufficient dissolved oxygen.	Habitat for this species not present on site. Occurs in San Lorenzo River and its tributaries.
Polyphylla barbata	Mount Hermon (=barbate) June beetle	Animal	E / - / -	Known only from sand hills in vicinity of Mt. Hermon, Santa Cruz County.	Zayante sandhills	Occurs on site and in the Project Area in low numbers.
Rana draytonii	California red-legged frog	Animal	T / - / SSC, V	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.	Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	Habitat for this species not present on site. Nearest occurrence at UCSC Upper Moore Creek.
Riparia riparia	bank swallow	Animal	- / T / S	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Habitat for this species not present on site. Nearest location at Seabright.
Sternula antillarum browni	California least tern	Birds	E/E/FP	Nests along the coast from San Francisco Bay south to northern Baja California.	Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, land fills, or paved areas.	Habitat for this species not present in the Project Area. No beaches or salt flats present on site.
Stygobromus mackenziei	Mackenzie's Cave amphipod	Animal	- / - / V	Known only from Empire Cave (type locality), a metamorphosed limestone cave subject to intermittent flooding.	No information.	Habitat for this species not present on site. Nearest occurrence is in Cave Gulch caves.
Taxidea taxus	American badger	Animal	- / - / SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Unlikely to occur in Project Area due to small size and lack of habitat. Nearest occurrence at UCSC lower campus.
Thamnophis sirtalis tetrataenia	San Francisco gartersnake	Reptiles	E/E/FP	Vicinity of freshwater marshes, ponds and slow-moving streams in San Mateo County and extreme northern Santa Cruz County.	Prefers dense cover and water depths of at least one foot. Upland areas near water are also very important.	Habitat for this species not present in the Project Area. No ponds or marshes occur on site. This species occurs further north, near San Francisco.
Trimerotropis infantilis	Zayante band-winged grasshopper	Animal	E / - / -	Isolated sandstone deposits in the Santa Cruz Mountains (the Zayante Sand Hills ecosystem).	Mostly on sand parkland habitat but also in areas with well-developed ground cover & in sparse chaparral with grass.	Unlikely to occur in Project Area due to lack of sand parkland habitat. Surveys have not identified this species on site and concluded unlikely to occur on site (see HCP).
Vireo bellii pusillus	least Bell's vireo	Birds	E/E/-	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft.	Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	Habitat for this species not present in the Project Area. This species occurs in southern California
PLANTS						
Arctostaphylos andersonii	Anderson's manzanita	Plant	- / - / 1B.2	Broadleafed upland forest, chaparral, north coast coniferous forest.	Open sites, redwood forest. 60-760 m.	Habitat for this species not present on site, no manzanita species found on site. Nearest occurrence at UCSC upper campus.
Arctostaphylos silvicola	Bonny Doon manzanita	Plant	- / - / 1B.2	Chaparral, closed-cone coniferous forest, lower montane coniferous forest.	Only known from Zayante (inland marine) sands in Santa Cruz County. 150-520 m.	Habitat for this species not present on site, no manzanita species found on site. Nearest occurrence in Henry Cowell State Park.

CNDDB Results for the Project Area and 2-mile Buffer
June 28, 2018

Scientific Name	Common Name	Life Form	Status	Habitat	Microhabitat	Potential to Occur in Project Area
Arenaria paludicola	marsh sandwort	Dicots	E/E/1B.1	Marshes and swamps.	Growing up through dense mats of Typha, Juncus, Scirpus, etc. in freshwater marsh. Sandy soil. 3-170 m.	Habitat for this species not present in the Project Area. No marshes or swamps occur on site.
Chorizanthe robusta var. robusta	robust spineflower	Plant	E / - / 1B.1, S	Cismontane woodland, coastal dunes, coastal scrub, chaparral.	Sandy terraces and bluffs or in loose sand. 9-245 m.	Habitat for this species not present on site. Nearest occurrence in Pogonip Park
Chorizanthe robusta var. hartwegiana	Ben Lomond spineflower	Plant	E / - / 1B.1	Lower montane coniferous forest.	No information.	Unlikely to occur on site; surveys of Ponderosa pine forest did not detect this species. However, this species is included in the site's HCP. Nearest occurrence at corner of Graham Hill Rd. and Lockwood Lane.
Dacryophyllum falcifolium	tear drop moss	Plant	- / - / 1B.3, S	North Coast coniferous forest.	Limestone substrates and rock outcrops. 50-275 m.	Habitat for this species not present on site. Nearest occurrence in Cave Gulch.
Erysimum menziesii	Menzies' wallflower	Dicots	E/E/1B.1	Coastal dunes.	Localized on dunes and coastal strand. 1-25 m.	Habitat for this species not present in the Project Area. No coastal dunes occur on site.
Erysimum teretifolium	Santa Cruz wallflower	Plant	E / E / 1B.1	Lower montane coniferous forest, chaparral.	Inland marine sands (Zayante coarse sand). 180-515 m.	Habitat for this species (sand parkland) not present on site (see HCP). Previous surveys did not detect this species. Nearest occurrence 0.3 mile west of corner of Graham Hill Rd. and Lockwood Lane.
Hesperocyparis abramsiana var. a	Santa Cruz cypress	Gymnosperms	T/E/1B.2	Chaparral, closed-cone coniferous forest, lower montane coniferous forest.	Restricted to the Santa Cruz Mountains, on sandstone & granitic-derived soils; often w/Pinus attenuata, redwoods. 300-1085 m.	This species is not present on site. Nearest location is Bonny Doon or Mount Hermon.
Holocarpha macradenia	Santa Cruz tarplant	Plant	T / E / 1B.1	Coastal prairie, coastal scrub, valley and foothill grassland.	Light, sandy soil or sandy clay; often with nonnatives. 10-220 m.	Habitat for this species not present on site. Nearest occurrence is at Graham Hill Showgrounds.
Horkelia cuneata var. sericea	Kellogg's horkelia	Plant	- / - / 1B.1, S	Closed-cone coniferous forest, coastal scrub, coastal dunes, chaparral.	Old dunes, coastal sandhills; openings. Sandy or gravelly soils. 5-430 m.	Unlikely to occur on site; habitat for this species not present. Previous surveys did not detect this species. Nearest occurrence is along Graham Hill Road 2 miles south of Felton (from 1953).
Horkelia marinensis	Point Reyes horkelia	Plant	- / - / 1B.2	Coastal dunes, coastal prairie, coastal scrub.	Sandy flats and dunes near coast; in grassland or scrub plant communities. 2-775 m.	Habitat for this species not present on site. Nearest occurrence west of UCSC at Meder Rd.
Microseris paludosa	marsh microseris	Plant	- / - / 1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland.	3-610 m.	Unlikely to occur on site, which is outside the elevation range of this species. Previous surveys did not detect this species. Occurrence listed as in Graham Hill vicinity, but may be unreliable.
Monolopia gracilens	woodland woollythreads	Plant	- / - / 1B.2	Chaparral, valley and foothill grassland, cismontane woodland, broadleafed upland forest, North Coast coniferous forest.	Grassy sites, in openings; sandy to rocky soils. Often seen on serpentine after burns, but may have only weak affinity to serpentine. 120-975 m.	Unlikely to occur on site due to the very small size of the grassland. Previous surveys did not detect this species. Nearest occurrence at Mount Hermon (1930 record, unconfirmed).
Pentachaeta bellidiflora	white-rayed pentachaeta	Plant	E / E / 1B.1	Valley and foothill grassland, cismontane woodland.	Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock. 35-610 m.	Unlikely to occur on site due to the very small size of the grassland. Previous surveys did not detect this species. Nearest occurrence along beach cliffs in Santa Cruz.
Plagiobothrys diffusus	San Francisco popcornflower	Plant	- / E / 1B.1	Valley and foothill grassland, coastal prairie.	Historically from grassy slopes with marine influence. 45-360 m.	Unlikely to occur on site due to the very small size of the grassland. Previous surveys did not detect this species. Nearest occurrence is at Graham Hill Showgrounds.
Polygonum hickmanii	Scotts Valley polygonum	Dicots	E/E/1B.1	Valley and foothill grassland.	Purisima sandstone or mudstone with a thin soil layer; vernally moist due to runoff. 210-230 m.	Habitat for this species not present in the Project Area. Nearest location is in Scotts Valley, approximately 2 miles away.
Sidalcea malachroides	maple-leaved checkerbloom	Plant	- / - / -	Broadleafed upland forest, coastal prairie, coastal scrub, north coast coniferous forest, riparian forest.	Woodlands and clearings near coast; often in disturbed areas. 0-730 m.	Habitat for this species not present on site. Occurrence is a general location for entire county.
Trifolium buckwestiorum	Santa Cruz clover	Plant	- / - / 1B.1	Coastal prairie, broadleafed upland forest, cismontane woodland.	Moist grassland. Gravelly margins. 30-550 m.	Unlikely to occur in seep area adjacent to Project Area because of dense non-native, invasive species. Closest occurrence is south of Graham Hill Showgrounds.
E: Federally Endangered		1B.1: Plants rare, threatened, or endangered in California and elsewhere; Seriously threatened in California				
T: Federally Threatened		1B.2: Plants rare, threatened, or endangered in California and elsewhere; Moderately threatened in California				
S: USFS or BLM Sensitive Species		1B.3: Plants rare, threatened, or endangered in California and elsewhere; Not very threatened in California				
V: IUCN Vulnerable Species						

IPaC **U.S. Fish & Wildlife Service**

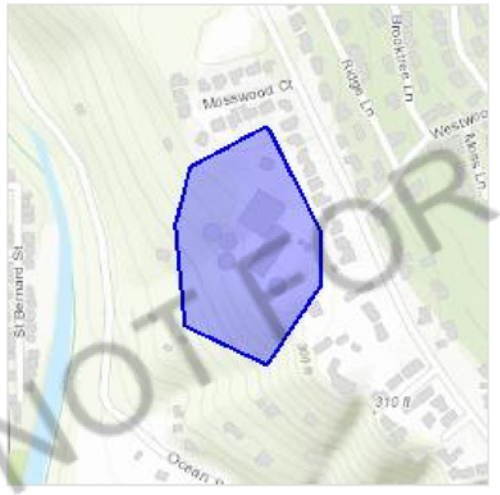
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Santa Cruz County, California



Local office

Ventura Fish And Wildlife Office

(805) 644-1766
(805) 644-3958

2493 Portola Road, Suite B
Ventura, CA 93003-7726

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Southern Sea Otter Enhydra lutris nereis — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/8560
Marine mammal

Birds

NAME	STATUS
California Least Tern Sterna antillarum browni No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
Least Bell's Vireo Vireo bellii pusillus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/5945	Endangered
Marbled Murrelet Brachyramphus marmoratus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Southwestern Willow Flycatcher Empidonax traillii extimus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6749	Endangered
Western Snowy Plover Charadrius alexandrinus nivosus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8035	Threatened

Reptiles

NAME	STATUS
San Francisco Garter Snake Thamnophis sirtalis tetrataenia No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5956	Endangered

Amphibians

NAME	STATUS
California Red-legged Frog Rana draytonii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

California Tiger Salamander Ambystoma californiense — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/2076

Fishes

NAME	STATUS
Tidewater Goby Eucyclogobius newberryi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/57	Endangered

Insects

NAME	STATUS
Mount Hermon June Beetle Polyphylla barbata No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3982	Endangered
Ohlone Tiger Beetle Cicindela ohlone No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8271	Endangered
Smith's Blue Butterfly Euphilotes enoptes smithi There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4418	Endangered
Zayante Band-winged Grasshopper Trimerotropis infantilis There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1036	Endangered

Flowering Plants

NAME	STATUS
Ben Lomond Spineflower Chorizanthe pungens var. hartwegiana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7498	Endangered
Ben Lomond Wallflower Erysimum teretifolium No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7429	Endangered

Marsh Sandwort Arenaria paludicola No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2229	Endangered
Menzies' Wallflower Erysimum menziesii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2935	Endangered
Santa Cruz Tarplant Holocarpha macradenia There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6832	Threatened
Scotts Valley Polygonum Polygonum hickmanii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3222	Endangered
Scotts Valley Spineflower Chorizanthe robusta var. hartwegii There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7108	Endangered

Conifers and Cycads

NAME	STATUS
Santa Cruz Cypress Cupressus abramsiana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1678	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Allen's Hummingbird Selasphorus sasin — Breeds Feb 1 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9637

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black Oystercatcher Haematopus bachmani — Breeds Apr 15 to Oct 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9591

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Black Swift Cypseloides niger — Breeds Jun 15 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8878

Black Turnstone Arenaria melanocephala — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Burrowing Owl Athene cunicularia — Breeds Mar 15 to Aug 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

Clark's Grebe Aechmophorus clarkii — Breeds Jan 1 to Dec 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lawrence's Goldfinch Carduelis lawrencei — Breeds Mar 20 to Sep 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9464

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Long-billed Curlew Numenius americanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Marbled Godwit Limosa fedoa — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Mountain Plover Charadrius montanus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3638

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

Rufous Hummingbird selasphorus rufus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Song Sparrow Melospiza melodia This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Feb 20 to Sep 5
Spotted Towhee Pipilo maculatus clementae This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/4243	Breeds Apr 15 to Jul 20
Tricolored Blackbird Agelaius tricolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3910	Breeds Mar 15 to Aug 10
Whimbrel Numenius phaeopus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9483	Breeds elsewhere
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Wrentit Chamaea fasciata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 10

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

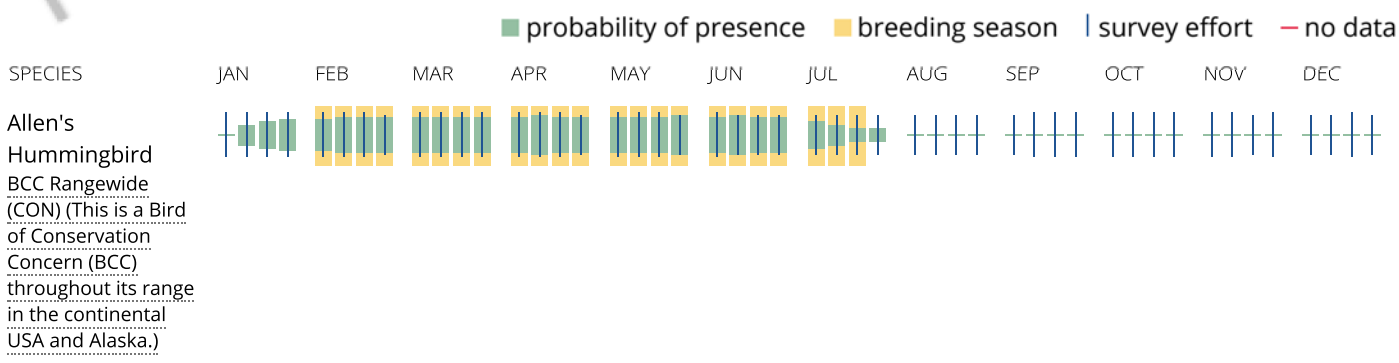
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

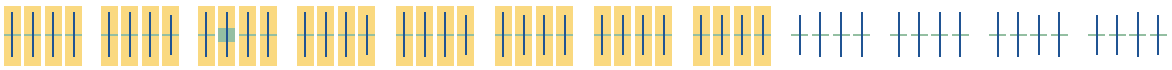
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

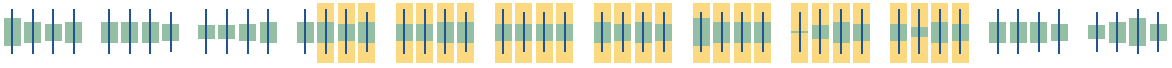
Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



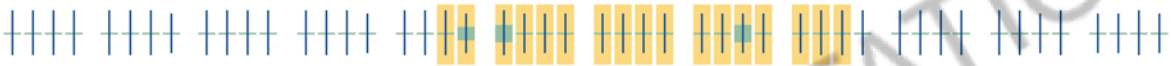
Bald Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



Black Oystercatcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Black Skimmer
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Black Swift
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Black Turnstone
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Lawrence's Goldfinch
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

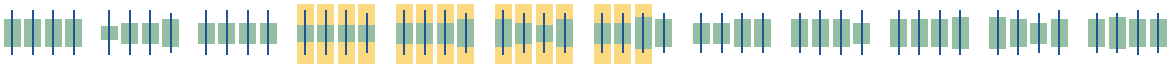
SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Long-billed Curlew
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Mountain Plover
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Oak Titmouse
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

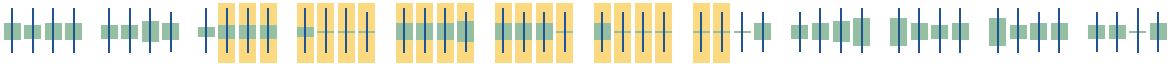
Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

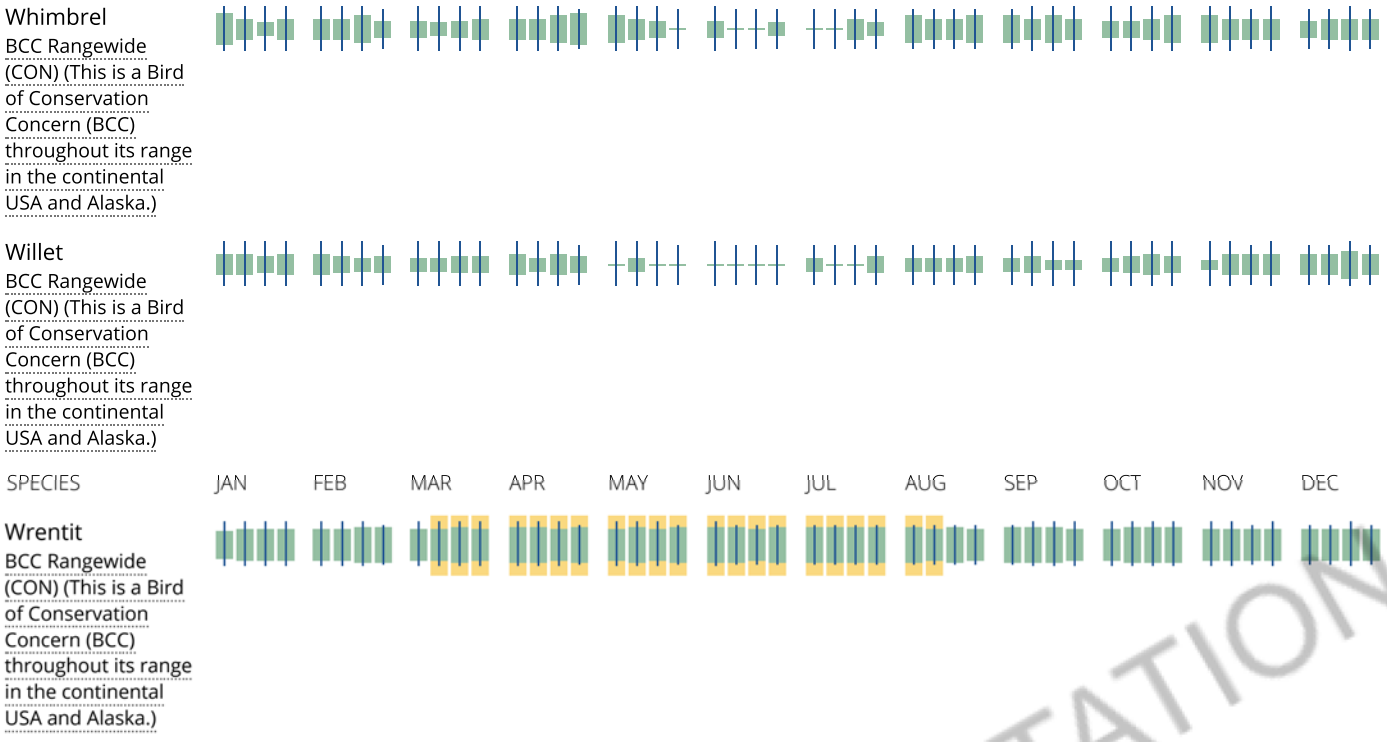
Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Song Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Spotted Towhee
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)





Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the *nanotag studies* or *contact Caleb Spiegel or Pam Loring*.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look

carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Marine mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take (to harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill) of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME

Southern Sea Otter Enhydra lutris nereis
https://ecos.fws.gov/ecp/species/8560

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

THERE ARE NO KNOWN WETLANDS AT THIS LOCATION.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix C

Plant List for Santa Cruz Water Treatment Facility

California Native Plant Society Rare Plant Inventory
Search Results for Santa Cruz County, CA
June 28, 2018

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Agrostis blasdalei	Blasdale's bent grass	Poaceae	perennial rhizomatous herb	May-Jul	1B.2	S2	G2
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	1B.2	S2S3	G2G3
Anomobryum julaceum	slender silver moss	Bryaceae	moss		4.2	S2	G5?
Arabis blepharophylla	coast rockcress	Brassicaceae	perennial herb	Feb-May	4.3	S4	G4
Arctostaphylos andersonii	Anderson's manzanita	Ericaceae	perennial evergreen shrub	Nov-May	1B.2	S2	G2
Arctostaphylos glutinosa	Schreiber's manzanita	Ericaceae	perennial evergreen shrub	(Nov)Mar-Apr	1B.2	S1	G1
Arctostaphylos hookeri ssp. hookeri	Hooker's manzanita	Ericaceae	perennial evergreen shrub	Jan-Jun	1B.2	S2	G3T2
Arctostaphylos ohloneana	Ohlone manzanita	Ericaceae	evergreen shrub	Feb-Mar	1B.1	S1	G1
Arctostaphylos pajaroensis	Pajaro manzanita	Ericaceae	perennial evergreen shrub	Dec-Mar	1B.1	S1	G1
Arctostaphylos regismontana	Kings Mountain manzanita	Ericaceae	perennial evergreen shrub	Dec-Apr	1B.2	S2	G2
Arctostaphylos silvicola	Bonny Doon manzanita	Ericaceae	perennial evergreen shrub	Jan-Mar	1B.2	S1	G1
Arenaria paludicola	marsh sandwort	Caryophyllaceae	perennial stoloniferous herb	May-Aug	1B.1	S1	G1
Calandrinia breweri	Brewer's calandrinia	Montiaceae	annual herb	(Jan)Mar-Jun	4.2	S4	G4
Calochortus umbellatus	Oakland star-tulip	Liliaceae	perennial bulbiferous herb	Mar-May	4.2	S3?	G3?
Calochortus uniflorus	pink star-tulip	Liliaceae	perennial bulbiferous herb	Apr-Jun	4.2	S4	G4
Calyptridium parryi var. hesseae	Santa Cruz Mountains pussypaws	Montiaceae	annual herb	May-Aug	1B.1	S2	G3G4T2

California Native Plant Society Rare Plant Inventory
Search Results for Santa Cruz County, CA
June 28, 2018

Campanula californica	swamp harebell	Campanulaceae	perennial rhizomatous herb	Jun-Oct	1B.2	S3	G3
Carex comosa	bristly sedge	Cyperaceae	perennial rhizomatous herb	May-Sep	2B.1	S2	G5
Carex saliniformis	deceiving sedge	Cyperaceae	perennial rhizomatous herb	Jun(Jul)	1B.2	S2	G2
Castilleja ambigua var. ambigua	johnny-nip	Orobanchaceae	annual herb (hemiparasitic)	Mar-Aug	4.2	S4	G4T5
Castilleja latifolia	Monterey Coast paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	Feb-Sep	4.3	S4	G4
Ceanothus rigidus	Monterey ceanothus	Rhamnaceae	perennial evergreen shrub	Feb-Apr(Jun)	4.2	S4	G4
Centromadia parryi ssp. congdonii	Congdon's tarplant	Asteraceae	annual herb	May-Oct(Nov)	1B.1	S2	G3T2
Chorizanthe pungens var. hartwegiana	Ben Lomond spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
Chorizanthe pungens var. pungens	Monterey spineflower	Polygonaceae	annual herb	Apr-Jun(Jul-Aug)	1B.2	S2	G2T2
Chorizanthe robusta var. hartwegii	Scotts Valley spineflower	Polygonaceae	annual herb	Apr-Jul	1B.1	S1	G2T1
Chorizanthe robusta var. robusta	robust spineflower	Polygonaceae	annual herb	Apr-Sep	1B.1	S1	G2T1
Clarkia concinna ssp. automixa	Santa Clara red ribbons	Onagraceae	annual herb	(Apr)May-Jun(Jul)	4.3	S3	G5?T3
Collinsia multicolor	San Francisco collinsia	Plantaginaceae	annual herb	(Feb)Mar-May	1B.2	S2	G2
Corethrogyne leucophylla	branching beach aster	Asteraceae	perennial herb	May,Jul,Aug,Sep,Oct,Dec	3.2	S3	G3Q
Cypripedium fasciculatum	clustered lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
Cypripedium montanum	mountain lady's-slipper	Orchidaceae	perennial rhizomatous herb	Mar-Aug	4.2	S4	G4
Dacryophyllum falcifolium	tear drop moss	Hypnaceae	moss		1B.3	S2	G2

California Native Plant Society Rare Plant Inventory
Search Results for Santa Cruz County, CA
June 28, 2018

Elymus californicus	California bottle-brush grass	Poaceae	perennial herb	May-Aug(Nov)	4.3	S4	G4
Eriogonum nudum var. decurrens	Ben Lomond buckwheat	Polygonaceae	perennial herb	Jun-Oct	1B.1	S1	G5T1
Erysimum ammophilum	sand-loving wallflower	Brassicaceae	perennial herb	Feb-Jun	1B.2	S2	G2
Erysimum franciscanum	San Francisco wallflower	Brassicaceae	perennial herb	Mar-Jun	4.2	S3	G3
Erysimum teretifolium	Santa Cruz wallflower	Brassicaceae	perennial herb	Mar-Jul	1B.1	S1	G1
Fissidens pauperculus	minute pocket moss	Fissidentaceae	moss		1B.2	S2	G3?
Fritillaria agrestis	stinkbells	Liliaceae	perennial bulbiferous herb	Mar-Jun	4.2	S3	G3
Gilia tenuiflora ssp. arenaria	Monterey gilia	Polemoniaceae	annual herb	Apr-Jun	1B.2	S2	G3G4T2
Grimmia torenii	Toren's grimmia	Grimmiaceae	moss		1B.3	S2	G2
Grimmia vaginulata	vaginulate grimmia	Grimmiaceae	moss		1B.1	S1	G2G3
Grindelia hirsutula var. maritima	San Francisco gumplant	Asteraceae	perennial herb	Jun-Sep	3.2	S1	G5T1Q
Hesperevax sparsiflora var. brevifolia	short-leaved evax	Asteraceae	annual herb	Mar-Jun	1B.2	S2	G4T3
Hesperocyparis abramsiana var. abramsiana	Santa Cruz cypress	Cupressaceae	perennial evergreen tree		1B.2	S1	G1T1
Hoita strobilina	Loma Prieta hoita	Fabaceae	perennial herb	May-Jul(Aug-Oct)	1B.1	S2	G2
Holocarpha macradenia	Santa Cruz tarplant	Asteraceae	annual herb	Jun-Oct	1B.1	S1	G1
Horkelia cuneata var. sericea	Kellogg's horkelia	Rosaceae	perennial herb	Apr-Sep	1B.1	S1?	G4T1?
Horkelia marinensis	Point Reyes horkelia	Rosaceae	perennial herb	May-Sep	1B.2	S2	G2
Hosackia gracilis	harlequin lotus	Fabaceae	perennial rhizomatous herb	Mar-Jul	4.2	S3	G3G4

Lasthenia californica ssp. macrantha	perennial goldfields	Asteraceae	perennial herb	Jan-Nov	1B.2	S2	G3T2
Leptosiphon ambiguus	serpentine leptosiphon	Polemoniaceae	annual herb	Mar-Jun	4.2	S4	G4
Leptosiphon grandiflorus	large-flowered leptosiphon	Polemoniaceae	annual herb	Apr-Aug	4.2	S3S4	G3G4
Lilium rubescens	redwood lily	Liliaceae	perennial bulbiferous herb	Apr-Aug(Sep)	4.2	S3	G3
Lomatium parvifolium	small-leaved lomatium	Apiaceae	perennial herb	Jan-Jun	4.2	S4	G4
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	perennial evergreen shrub	Apr-Sep	1B.2	S2	G2Q
Micropus amphibolus	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	3.2	S3S4	G3G4
Microseris paludosa	marsh microseris	Asteraceae	perennial herb	Apr-Jun(Jul)	1B.2	S2	G2
Mielichhoferia elongata	elongate copper moss	Mielichhoferiaceae	moss		4.3	S4	G5
Mimulus rattanii ssp. decurtatus	Santa Cruz County monkeyflower	Phrymaceae	annual herb	May-Jul	4.2	S1S3	G4T1T3Q
Monardella sinuata ssp. nigrescens	northern curly-leaved monardella	Lamiaceae	annual herb	(Apr)May-Jul(Aug-Sep)	1B.2	S2	G3T2
Monolopia gracilens	woodland woolythreads	Asteraceae	annual herb	(Feb)Mar-Jul	1B.2	S3	G3
Orthotrichum kellmanii	Kellman's bristle moss	Orthotrichaceae	moss	Jan-Feb	1B.2	S2	G2
Pedicularis dudleyi	Dudley's lousewort	Orobanchaceae	perennial herb	Apr-Jun	1B.2	S2	G2
Penstemon rattanii var. kleei	Santa Cruz Mountains beardtongue	Plantaginaceae	perennial herb	May-Jun	1B.2	S2	G4T2
Pentachaeta bellidiflora	white-rayed pentachaeta	Asteraceae	annual herb	Mar-May	1B.1	S1	G1
Perideridia gairdneri ssp. gairdneri	Gairdner's yampah	Apiaceae	perennial herb	Jun-Oct	4.2	S3S4	G5T3T4
Pinus radiata	Monterey pine	Pinaceae	perennial evergreen tree		1B.1	S1	G1

California Native Plant Society Rare Plant Inventory
Search Results for Santa Cruz County, CA
June 28, 2018

Piperia candida	white-flowered rein orchid	Orchidaceae	perennial herb	(Mar)May-Sep	1B.2	S3	G3
Piperia michaelii	Michael's rein orchid	Orchidaceae	perennial herb	Apr-Aug	4.2	S3	G3
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.2	S2	G3T2Q
Plagiobothrys chorisianus var. hickmanii	Hickman's popcornflower	Boraginaceae	annual herb	Apr-Jun	4.2	S3	G3T3Q
Plagiobothrys diffusus	San Francisco popcornflower	Boraginaceae	annual herb	Mar-Jun	1B.1	S1	G1Q
Polygonum hickmanii	Scotts Valley polygonum	Polygonaceae	annual herb	May-Aug	1B.1	S1	G1
Puccinellia simplex	California alkali grass	Poaceae	annual herb	Mar-May	1B.2	S2	G3
Ranunculus lobbii	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	4.2	S3	G4
Rosa pinetorum	pine rose	Rosaceae	perennial shrub	May,Jul	1B.2	S2	G2
Sanicula hoffmannii	Hoffmann's sanicle	Apiaceae	perennial herb	Mar-May	4.3	S3	G3
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3
Sidalcea malachroides	maple-leaved checkerbloom	Malvaceae	perennial herb	(Mar)Apr-Aug	4.2	S3	G3
Silene verecunda ssp. verecunda	San Francisco campion	Caryophyllaceae	perennial herb	(Feb)Mar-Jun(Aug)	1B.2	S1	G5T1
Stebbinsoseris decipiens	Santa Cruz microseris	Asteraceae	annual herb	Apr-May	1B.2	S2	G2
Toxicoscordion fontanum	marsh zigadenus	Melanthiaceae	perennial bulbiferous herb	Apr-Jul	4.2	S3	G3
Trifolium buckwestiorum	Santa Cruz clover	Fabaceae	annual herb	Apr-Oct	1B.1	S2	G2
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	1B.2	S2	G2

Usnea longissima	Methuselah's beard lichen	Parmeliaceae	fruticose lichen (epiphytic)	4.2	S4	G4

Suggested Citation

California Native Plant Society, Rare Plant Program. 2018. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 28 June 2018].

Appendix B. Air Quality and Greenhouse Gas Conformity Analysis

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Harris & Associates

Technical Memorandum

Date: February 7th, 2019

To: Jessica Martinez-McKinney, Associate Planner, City of Santa Cruz Water Department

From: Wendy Young, Project Manager

cc: Sharon Toland and David Craft, Air Quality Specialists

Subject: Graham Hill Water Treatment Plant Concrete Tank Replacement Project - Air Quality and Greenhouse Gas Conformity Analysis

1. Introduction

The City of Santa Cruz (City) is proposing the Graham Hill Water Treatment Plant (GHWTP) Concrete Tank Replacement Project (project). The project involves replacing three concrete tanks and two associated pump stations at the GHWTP, located at 715 Graham Hill Road in Santa Cruz, California. The tanks being replaced are 1) filtered water storage, 2) reclaimed water storage, and 3) sludge storage. The Reclaim Pump Station and Wash Water Supply Pump Station were also designated for replacement. In addition, a new at-grade Decant Port Effluent Pump Station and Sludge Pump Station vault will be constructed. These facilities and associated appurtenances are a part of the existing GHWTP water treatment process. The project is not increasing the system's capacity for collection and treatment, but will replace the existing degraded system. This memorandum presents the results of Harris & Associates' air quality and greenhouse gas (GHG) conformity analysis of the project, prepared in accordance with the State Water Resources Control Board requirements for the Drinking Water State Revolving Fund (DWSRF) program.

The City is seeking financial assistance to construct the project through the DWSRF Loan Program, which is partially funded by the U.S. Environmental Protection Agency (US EPA) and subject to federal environmental regulations, including the General Conformity Rule for the Clean Air Act (CAA). Clean Air Act general conformity analyses applies to projects in areas either not meeting federal national ambient air quality standards or that are subject to a maintenance plan. An analysis is required for each criteria pollutant for which an area is considered as being in federal nonattainment or maintenance. If project emissions are below the 'de minimis' level and less than 10 percent of the emissions inventory for the pollutants for which the area is in non-attainment, then further general conformity analysis is not required. If project emissions are above the de minimis level, then a conformity determination for the area must be made.

2. Regulatory Setting

The CAA of 1970 required the US EPA to establish National Ambient Air Quality Standards (NAAQS) with states retaining the option to adopt more stringent standards or to include other specific pollutants. The 1990 CAA Amendments require that each state have an air pollution control plan called the State Implementation Plan (SIP). The SIP includes strategies and control measures to attain the NAAQS by deadlines established by the CAA. The CAA Amendments dictate that states containing areas violating the NAAQS revise their SIPs to include extra control measures to reduce air pollution. The US EPA reviews the SIPs to determine whether the plans would conform to the 1990 CAA Amendments and achieve the air quality goals.

The US EPA has classified air basins (or portions thereof) as being in "attainment," "nonattainment," or "unclassified" for each criteria air pollutant, based on whether or not the NAAQS have been achieved. If an area is designated unclassified, it is because inadequate air quality data were available as a basis for a nonattainment or attainment designation. **Table 1** lists the attainment status of Santa Cruz, located within the North Central Coast Air Basin (NCCAB), for the criteria pollutants. The US EPA classifies the NCCAB as in attainment or unclassified for all pollutants with respect to federal air quality standards. The NCCAB is not in nonattainment status for any pollutant under federal standards.

The state of California, under the California Clean Air Act (CCAA), has established standards for criteria pollutants that are generally stricter than federal standards. As shown in **Table 1**, the NCCAB is currently in nonattainment status for respirable particulate matter (PM_{10}), and transitional nonattainment status for ozone. An area is designated transitional nonattainment if, during a single calendar year, the state standard is not exceeded more than three times at any monitoring location within the district.

Table 1. North Central Coast Air Basin Attainment Status			
Pollutant	Averaging Time	California Standards	Federal Standards
Ozone (O_3)	1 Hour	Nonattainment – Transitional	No Federal Standard
	8 Hour		Attainment
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	Nonattainment	No Federal Standard
	24 Hour		Unclassified[1]
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	Attainment	Attainment
	24 Hour	No State Standard	
Carbon Monoxide (CO)	8 Hour	Unclassified	Unclassified/Attainment
	1 Hour		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	No State Standard	Attainment
	1 Hour	Attainment	No Federal Standard
Lead	Calendar Quarter	No State Standard	Attainment
	30 Day Average	Attainment	No Federal Standard
	Rolling 3-Month Average	No State Standard	Attainment
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	No State Standard	Attainment
	24 Hour	Attainment	Attainment
	1 Hour	Attainment	No Federal Standard
Sulfates	24 Hour	Attainment	No Federal Standard
Hydrogen Sulfide	1 Hour	Unclassified	No Federal Standard
Visibility Reducing Particulates	8 Hour (10:00 a.m. to 6:00 p.m., PST)	Unclassified	No Federal Standard

Notes:

[1] Unclassified; indicates data are not sufficient for determining attainment or nonattainment.

Source: CARB 2017, EPA 2017

3. Significance Thresholds

Federal De Minimis Levels

The Code of Federal Regulations (CFR) provides guidance to document CAA Conformity Determination requirements. 40 CFR Part 93.153(b)(2) defines de minimis levels; that is, the minimum thresholds for which a conformity determination must be performed for criteria pollutants for which an air basin is in nonattainment or maintenance. The NCCAB is in attainment or designated as "unclassified" for all pollutants. As a result, no federal conformity determination is required. However, the CAA section of the State Water Resources Control Board Evaluation

Form for Environmental Review and Federal Coordination requires quantification of a project's pollutant emissions, regardless of area designation.

Council on Environmental Quality

The Council on Environmental Quality (CEQ) in 2014 proposed 25,000 metric tons (MT) of carbon dioxide equivalent (CO2e) as the minimum level of annual GHG emissions that would require additional environmental analysis to determine whether the project would result in a significant impact (CEQ 2014). In 2016, this threshold was removed from the CEQ's Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. In 2017 the guidance document was withdrawn entirely by the CEQ for further review pursuant to Executive Order 13783: Promoting Energy Independence and Economic Growth. No new Guidance has been provided by the CEQ or another federal agency.

Monterey Bay Air Resources District

The project is in the NCCAB, which is comprised of Monterey, Santa Cruz, and San Benito Counties, covering an area of 5,159 square miles along the central coast of California. The Monterey Bay Air Resources District (MBARD) consists of all three counties within the NCCAB; therefore, Santa Cruz is within the jurisdiction of the MBARD. The MBARD significance criteria are used in this analysis to determine the project's impact on air quality based on the MBARD CEQA Air Quality Guidelines.

Emissions from construction activities represent temporary impacts that are typically short in duration, depending on the size, phasing, and type of project. The MBARD identifies a quantitative threshold for PM_{10} emissions of 82 pounds per day (lbs/day). The MBARD identifies general earthmoving screening values to determine consistency with this threshold. Projects that propose grading of up to 8.2 acres total with minimal earthmoving or grading of 2.2 acres per day or less are considered not to exceed the threshold of 82 lbs/day. For a project that would exceed these area screening values, modeling may be used to refute or validate a determination of significance.

The MBARD does not identify quantitative thresholds for other criteria pollutants during construction. Construction projects using typical construction equipment such as dump trucks, scrappers, bulldozers, compactors and front-end loaders that temporarily emit precursors of ozone [i.e., volatile organic compounds (VOC) or oxides of nitrogen (NOx)], are accommodated in the emission inventories of State- and federally-required air plans and would not have a significant impact on the attainment and maintenance of ozone AAQS. However, a project that would use non-typical equipment would have the potential to result in a significant impact related to emissions of VOCs or NOx.

Regarding operational emissions of criteria pollutants, an exceedance of any threshold identified in Table 5-3 of the CEQA Air Quality Guidelines would represent a significant impact on local or regional air quality. As addressed in the analysis below, the proposed project is not anticipated to result in operational emissions. As such, no operational emissions have been quantified for comparison to district thresholds and CEQA Air Quality Guidelines Table 5-3 is not duplicated in this report.

Neither the MBARD nor federal agencies have identified a quantitative threshold for GHG emissions. Previously, the City had determined that the 25,000 MT per year CEQ screening level was the most appropriate significance threshold to use for the proposed project because, as an applicant to the Clean Water State Revolving Fund Loan Program, the project would be subject to federal environmental regulations. The City of Santa Cruz adopted a Climate Action Plan (CAP) in 2012. The CAP is consistent with AB 32 goals, but does not meet the standards for a Qualified GHG Reduction Plan for tiering under CEQA because it does not establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable.

At the state level, the CARB 2017 Scoping Plan establishes a framework of action for California to reduce statewide emissions to achieve the statewide emissions reduction goals of AB 32, S-3-05, and SB 32 (CARB, 2017). The 2017 Scoping Plan Update states "There are recent examples of land use development projects in California that have demonstrated that it is feasible to design projects that achieve zero net additional GHG emissions." The CARB recognizes that achieving no net increase in annual ongoing GHG emissions would demonstrate that a project is not participating in climate change impacts. As such, it is reasonable to assume that a project that would not result in on-going annual operations would not result in significant GHG emissions.

As evidenced by the NAAQS and CAAQS, California state regulations are generally more stringent than federal guidelines. In the absence of guidance from the CEQ or other federal agency, it is also reasonable to assume that a project that would not result in on-going annual operations also would not result in significant GHG emissions at the federal level.

4. Impact Analysis

Project emissions were estimated using the CalEEMod Model, version 2016.3.2, based on construction information provided by the City of Santa Cruz (2019). Detailed assumptions and modeling data sheets are provided in **Attachment A**. Construction of the project is anticipated to begin in 2019, and would result in the construction of a total of 16,171 square feet (SF) of tanks and auxiliary structures and equipment. The total area of disturbance area would be approximately 1.315 acres. The demolition of the tank and construction of the replacement tanks would be phased so that the GHWTP would remain in service throughout the implementation time of the project. However, due to input limitations in the CalEEMod model, to avoid overestimating emissions over repeated construction and demolition phases, the total number of working days required for site preparation and demolition, building construction, and coating activities are modeled. The anticipated construction fleet, hours of operation of construction equipment, and worker vehicle and truck trips were provided by the City of Santa Cruz. The time and total exported material for each phase are included in **Table 2.**

Table 2. Construction Duration and Materials Excavation			
Construction Phase	Exported Material (Cubic Yards)	Vehicle Trips	Total Number of Working Days
Site Preparation and Tank Demolition	5,320 CY (1,700 CY of demolished material and 3,620 CY of soil	26 daily vehicle trips 1,320 total truck trips	120
Construction of New Structures, Tanks and Pipelines	N/A	26 daily vehicle trips 9,120 total truck trips	370
Tank Coating	N/A	26 daily vehicle trips	30

Criteria Pollutant Emissions

Maximum daily emissions levels associated with construction of the proposed project are shown in **Table 3**. Annual emissions are shown in **Table 4**.

A screening level of 8.2 acres can be used to determine whether the project would have the potential to exceed the MBARD threshold of 82 lbs/day for PM_{10} emissions. A total of 1.315 acres of disturbance is anticipated for the proposed project, which is less than 20 percent of the screening level. Additionally, as shown in **Table 3**, the project is estimated to generate a maximum of 11 lbs/day of PM_{10}. Regarding the remaining pollutants, the proposed project would employ typical construction equipment. It would not require any non-typical construction equipment or techniques that have not been accounted for in the NCCAB emissions inventories. Therefore, the proposed project would not result in a significant impact related to criteria pollutant emissions during construction.

The NCCAB is in attainment or unclassified for all federal ambient air quality standards. As such, a comparison to federal de minimis thresholds to determine CAA consistency is not required. As shown **Table 4**, annual emissions from construction of the proposed project would be minimal. Construction emissions are not anticipated to exceed emissions inventories for the basin. Therefore, the project would not have the potential to significantly impact the ability of the NCCAB to maintain attainment status. A significant impact would not occur.

The proposed project does not increase the capacity for wastewater collection or treatment at the GHWTP. Following construction, operation of the tanks and supporting structures would be the same as existing conditions and would not result in an increase in criteria pollutant emissions. Therefore, operational emissions would be less than significant, and no modeling was warranted.

Table 3. Estimated Construction Daily Maximum Air Pollutant Emissions (lbs/day)						
Phase	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Demolition and Site Preparation	3	30	20	<1	3	1
Structure Construction	2	26	14	<1	11	3
Coating	17	2	2	<1	<1	<1

Notes:
Emission quantities are rounded to the nearest whole number. Exact values are provided in ***Attachment A****.*
PM_{10} – Particulate Matter less than 10 microns
$PM_{2.5}$ – Particulate matter less than 2.5 microns
NO_X – Oxides of Nitrogen
SO_X – Oxides of Sulfur
CO – Carbon Monoxide
VOC – Volatile organic compounds

Table 4. Estimated Construction Annual Pollutant Emissions (tons/year)						
Phase	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Demolition and Site Preparation	<1	2	1	<1	<1	<1
Structure Construction	1	4	3	<1	<1	<1
Coating	<1	<1	<1	<1	<1	<1

Notes:
Emission quantities are rounded to the nearest whole number. Exact values are provided in ***Attachment A****.*
PM_{10} – Particulate Matter less than 10 microns
$PM_{2.5}$ – Particulate matter less than 2.5 microns
NO_X – Oxides of Nitrogen
SO_X – Oxides of Sulfur
CO – Carbon Monoxide
VOC – Volatile organic compounds

GHG Emissions

The total GHG emissions estimated for construction of the proposed project are provided in **Table 5**.

Table 5. Estimated Total Construction GHG Emissions	
Phase	Metric Tons CO2e
Demolition and Site Preparation	291
Structure Construction	874
Coating	7
Total GHG Emissions	1,172

*Note: Emission quantities are rounded to the nearest whole number. Exact values are provided in **Attachment A**.*

As shown in **Table 5**, the proposed project would result in a total one-time contribution of approximately 1,172 metric tons (MT) CO2e over the multiple year construction period. Following construction, operation of the tanks and supporting structures would be the same as existing conditions and would not result in an increase in criteria pollutant emissions or GHG emissions. Therefore, the proposed project would not result in a net increase in on-going annual operations. The City of Santa Cruz CAP does not include any GHG reduction strategies related to construction. Because the project would not have any on-going GHG emissions, it would not impact the ability of the state or City to meet GHG reduction goals. As such, the proposed project would not result in significant GHG emissions.

5. Clean Air Act Evaluation Form

The CAA section of the State Water Resources Control Board Evaluation Form for Environmental Review and Federal Coordination requires reporting of estimated project criteria pollutant emissions. **Table 6** duplicates the chart for reporting project emissions, to be included in the evaluation form for the proposed project.

Table. 6 Clean Air Act Evaluation Form					
Pollutant	Federal Status (Attainment, Nonattainment, Maintenance, or Unclassified)	Nonattainment Rates (i.e., moderate, serious, severe, or extreme)	Threshold of Significance for Project Air Basin (if applicable)	Construction Emissions (Tons/Year)	Operation Emissions (Tons/Year)
Ozone (O3)	Attainment	Not applicable	Not applicable	See NOx and VOC	Not applicable
Carbon Monoxide (CO)	Unclassified	Not applicable	Not applicable	3	Not applicable
Oxides of Nitrogen (NOx)	Attainment	Not applicable	Not applicable	4	Not applicable
Reactive Organic Gases (ROG)	Not applicable	Not applicable	Not applicable	See VOC	Not applicable
Volatile Organic Compounds (VOC)	Not applicable	Not applicable	Not applicable	1	Not applicable
Lead (Pb)	Attainment	Not applicable	Not applicable	Not applicable	Not applicable
Particulate Matter less than 2.5 microns in diameter ($PM_{2.5}$)	Attainment	Not applicable	Not applicable	<1	Not applicable
Particulate Matter less than 10 microns in diameter (PM_{10})	Unclassified	Not applicable	82 lbs/day (construction)	<1	Not applicable
Sulfur Dioxide (SO_2)	Attainment	Not applicable	Not applicable	<1	Not applicable

6. Summary

Implementation of the GHWTP tank replacement project would not result in significant criteria pollutant or GHG emissions for either construction or operational activities. No mitigation measures would be required.

7. References

Bay Area Air Quality Management District. 2017. CEQA Air Quality Guidelines. May 2017.

California Air Resources Board. 2017. Air Quality Standards and Area Designations. December 4, 2017.

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Monterey Bay Air Resources District (formerly Monterey Bay Unified Air Pollution Control District). CEQA Air Quality Guidelines. 2008.

United States Environmental Protection Agency. 2017. Nonattainment Areas for Criteria Pollutants (Green Book). December 4, 2017. Available online, https://www.epa.gov/green-book.

Attachment A

CalEEMod Results

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GHWTP Tank Replacement

North Central Coast Air Basin, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Unrefrigerated Warehouse-No Rail	16.17	1000sqft	1.32	16,171.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

GHWTP Tank Replacement - North Central Coast Air Basin, Winter

Project Characteristics -

Land Use - Adjusted lot acreage to equal distrubance area of 1.315 acre

Construction Phase - Based on working days provided by the city

Off-road Equipment - Construction fleet provided by city

Off-road Equipment -

Off-road Equipment - Fleet provided by the City

Demolition -

Grading - APE is 1.45 acre

Off-road Equipment -

Trips and VMT - Trips provided by the city

Architectural Coating - SF for tank coating provided by city

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	8,086.00	8,170.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	24,257.00	36,000.00
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Nonresidential_Interior	150.00	250.00
tblArchitecturalCoating	EF_Residential_Exterior	100.00	250.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	250.00
tblAreaCoating	Area_Nonresidential_Exterior	8086	8170
tblAreaCoating	Area_Nonresidential_Interior	24257	24510
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	200.00	370.00
tblConstructionPhase	NumDays	20.00	120.00
tblLandUse	LotAcreage	0.37	1.32
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Scrapers

GHWTP Tank Replacement - North Central Coast Air Basin, Winter

tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Pavers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Other Material Handling Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	3.00
tblOffRoadEquipment	UsageHours	8.00	3.00
tblSolidWaste	SolidWasteGenerationRate	15.20	15.36
tblTripsAndVMT	HaulingTripNumber	552.00	1,320.00
tblTripsAndVMT	HaulingTripNumber	0.00	9,120.00
tblTripsAndVMT	VendorTripNumber	3.00	0.00
tblTripsAndVMT	WorkerTripNumber	28.00	26.00
tblTripsAndVMT	WorkerTripNumber	7.00	26.00
tblTripsAndVMT	WorkerTripNumber	1.00	26.00
tblWater	IndoorWaterUseRate	3,739,312.50	3,778,625.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.7184	29.7646	20.0986	0.0530	10.3961	1.1290	11.2001	2.5689	1.0396	3.3143	0.0000	5,299.1159	5,299.1159	1.3538	0.0000	5,332.9608
2020	1.9816	23.3983	13.0379	0.0515	0.8083	0.6975	1.5058	0.2155	0.6465	0.8620	0.0000	5,158.4905	5,158.4905	0.9844	0.0000	5,183.0996
2021	17.4066	20.5126	12.4543	0.0512	1.6042	0.5959	2.2000	0.4109	0.5524	0.9633	0.0000	5,125.6548	5,125.6548	0.9818	0.0000	5,150.2006
Maximum	**17.4066**	**29.7646**	**20.0986**	**0.0530**	**10.3961**	**1.1290**	**11.2001**	**2.5689**	**1.0396**	**3.3143**	**0.0000**	**5,299.1159**	**5,299.1159**	**1.3538**	**0.0000**	**5,332.9608**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.7184	29.7646	20.0986	0.0530	10.3961	1.1290	11.2001	2.5689	1.0396	3.3143	0.0000	5,299.1159	5,299.1159	1.3538	0.0000	5,332.9608
2020	1.9816	23.3983	13.0379	0.0515	0.8083	0.6975	1.5058	0.2155	0.6465	0.8620	0.0000	5,158.4905	5,158.4905	0.9844	0.0000	5,183.0996
2021	17.4066	20.5126	12.4543	0.0512	1.6042	0.5959	2.2000	0.4109	0.5524	0.9633	0.0000	5,125.6548	5,125.6548	0.9818	0.0000	5,150.2006
Maximum	**17.4066**	**29.7646**	**20.0986**	**0.0530**	**10.3961**	**1.1290**	**11.2001**	**2.5689**	**1.0396**	**3.3143**	**0.0000**	**5,299.1159**	**5,299.1159**	**1.3538**	**0.0000**	**5,332.9608**

GHWTP Tank Replacement - North Central Coast Air Basin, Winter

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

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.4085	2.0000e-005	1.6500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5400e-003	3.5400e-003	1.0000e-005		3.7700e-003
Energy	6.6000e-004	6.0400e-003	5.0700e-003	4.0000e-005		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		7.2450	7.2450	1.4000e-004	1.3000e-004	7.2881
Mobile	0.0599	0.3265	0.7468	2.1400e-003	0.1690	2.1700e-003	0.1712	0.0453	2.0400e-003	0.0473		216.3536	216.3536	0.0116		216.6425
Total	**0.4690**	**0.3326**	**0.7535**	**2.1800e-003**	**0.1690**	**2.6400e-003**	**0.1717**	**0.0453**	**2.5100e-003**	**0.0478**		**223.6022**	**223.6022**	**0.0117**	**1.3000e-004**	**223.9343**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.4085	2.0000e-005	1.6500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5400e-003	3.5400e-003	1.0000e-005		3.7700e-003
Energy	6.6000e-004	6.0400e-003	5.0700e-003	4.0000e-005		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		7.2450	7.2450	1.4000e-004	1.3000e-004	7.2881
Mobile	0.0599	0.3265	0.7468	2.1400e-003	0.1690	2.1700e-003	0.1712	0.0453	2.0400e-003	0.0473		216.3536	216.3536	0.0116		216.6425
Total	**0.4690**	**0.3326**	**0.7535**	**2.1800e-003**	**0.1690**	**2.6400e-003**	**0.1717**	**0.0453**	**2.5100e-003**	**0.0478**		**223.6022**	**223.6022**	**0.0117**	**1.3000e-004**	**223.9343**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/29/2019	12/13/2019	5	120	
2	Building Construction	Building Construction	12/14/2019	5/14/2021	5	370	
3	Architectural Coating	Architectural Coating	5/15/2021	6/25/2021	5	30	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 36,000; Non-Residential Outdoor: 8,170; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

GHWTP Tank Replacement - North Central Coast Air Basin, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Excavators	2	7.00	158	0.38
Demolition	Scrapers	1	2.00	367	0.48
Demolition	Graders	1	1.00	187	0.41
Demolition	Plate Compactors	1	2.00	8	0.43
Demolition	Off-Highway Trucks	2	6.50	402	0.38
Demolition	Cranes	1	4.00	231	0.29
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	3.00	97	0.37
Building Construction	Cement and Mortar Mixers	0	0.00	9	0.56
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Building Construction	Paving Equipment	0	0.00	132	0.36
Building Construction	Rollers	0	0.00	80	0.38
Building Construction	Tractors/Loaders/Backhoes	2	3.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Plate Compactors	1	2.00	8	0.43
Building Construction	Pavers	1	1.00	130	0.42
Building Construction	Off-Highway Trucks	2	6.50	402	0.38
Building Construction	Other Material Handling Equipment	1	1.00	168	0.40
Building Construction	Pumps	1	1.00	84	0.74
Building Construction	Air Compressors	1	1.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	11	26.00	0.00	1,320.00	12.30	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	10	26.00	0.00	9,120.00	12.30	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	26.00	0.00	0.00	12.30	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.0150	0.0000	1.0150	0.1537	0.0000	0.1537			0.0000			0.0000
Off-Road	2.4610	26.1231	18.2402	0.0416		1.1094	1.1094		1.0208	1.0208		4,116.9002	4,116.9002	1.3007		4,149.4180
Total	**2.4610**	**26.1231**	**18.2402**	**0.0416**	**1.0150**	**1.1094**	**2.1244**	**0.1537**	**1.0208**	**1.1745**		**4,116.9002**	**4,116.9002**	**1.3007**		**4,149.4180**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1061	3.4977	0.6556	8.8700e-003	0.1922	0.0176	0.2098	0.0527	0.0168	0.0695		935.6046	935.6046	0.0416		936.6436
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1513	0.1437	1.2029	2.4800e-003	0.2432	2.0800e-003	0.2453	0.0645	1.9200e-003	0.0664		246.6111	246.6111	0.0115		246.8992
Total	**0.2574**	**3.6415**	**1.8585**	**0.0114**	**0.4354**	**0.0197**	**0.4551**	**0.1172**	**0.0187**	**0.1359**		**1,182.2156**	**1,182.2156**	**0.0531**		**1,183.5428**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.0150	0.0000	1.0150	0.1537	0.0000	0.1537			0.0000			0.0000
Off-Road	2.4610	26.1231	18.2402	0.0416		1.1094	1.1094		1.0208	1.0208	0.0000	4,116.9002	4,116.9002	1.3007		4,149.4180
Total	**2.4610**	**26.1231**	**18.2402**	**0.0416**	**1.0150**	**1.1094**	**2.1244**	**0.1537**	**1.0208**	**1.1745**	**0.0000**	**4,116.9002**	**4,116.9002**	**1.3007**		**4,149.4180**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1061	3.4977	0.6556	8.8700e-003	0.1922	0.0176	0.2098	0.0527	0.0168	0.0695		935.6046	935.6046	0.0416		936.6436
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1513	0.1437	1.2029	2.4800e-003	0.2432	2.0800e-003	0.2453	0.0645	1.9200e-003	0.0664		246.6111	246.6111	0.0115		246.8992
Total	**0.2574**	**3.6415**	**1.8585**	**0.0114**	**0.4354**	**0.0197**	**0.4551**	**0.1172**	**0.0187**	**0.1359**		**1,182.2156**	**1,182.2156**	**0.0531**		**1,183.5428**

3.3 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7708	18.0890	11.0351	0.0294		0.7625	0.7625		0.7058	0.7058		2,904.4341	2,904.4341	0.8868		2,926.6038
Total	**1.7708**	**18.0890**	**11.0351**	**0.0294**		**0.7625**	**0.7625**		**0.7058**	**0.7058**		**2,904.4341**	**2,904.4341**	**0.8868**		**2,926.6038**

3.3 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2376	7.8377	1.4690	0.0199	10.1529	0.0394	10.1923	2.5044	0.0377	2.5421		2,096.4898	2,096.4898	0.0931		2,098.8181
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1513	0.1437	1.2029	2.4800e-003	0.2432	2.0800e-003	0.2453	0.0645	1.9200e-003	0.0664		246.6111	246.6111	0.0115		246.8992
Total	**0.3890**	**7.9814**	**2.6719**	**0.0224**	**10.3961**	**0.0415**	**10.4376**	**2.5689**	**0.0396**	**2.6085**		**2,343.1009**	**2,343.1009**	**0.1047**		**2,345.7173**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7708	18.0890	11.0351	0.0294		0.7625	0.7625		0.7058	0.7058	0.0000	2,904.4341	2,904.4341	0.8868		2,926.6038
Total	**1.7708**	**18.0890**	**11.0351**	**0.0294**		**0.7625**	**0.7625**		**0.7058**	**0.7058**	**0.0000**	**2,904.4341**	**2,904.4341**	**0.8868**		**2,926.6038**

3.3 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2376	7.8377	1.4690	0.0199	10.1529	0.0394	10.1923	2.5044	0.0377	2.5421		2,096.4898	2,096.4898	0.0931		2,098.8181
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1513	0.1437	1.2029	2.4800e-003	0.2432	2.0800e-003	0.2453	0.0645	1.9200e-003	0.0664		246.6111	246.6111	0.0115		246.8992
Total	**0.3890**	**7.9814**	**2.6719**	**0.0224**	**10.3961**	**0.0415**	**10.4376**	**2.5689**	**0.0396**	**2.6085**		**2,343.1009**	**2,343.1009**	**0.1047**		**2,345.7173**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6348	16.0356	10.6191	0.0294		0.6667	0.6667		0.6171	0.6171		2,843.0077	2,843.0077	0.8855		2,865.1459
Total	**1.6348**	**16.0356**	**10.6191**	**0.0294**		**0.6667**	**0.6667**		**0.6171**	**0.6171**		**2,843.0077**	**2,843.0077**	**0.8855**		**2,865.1459**

3.3 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2095	7.2358	1.3532	0.0197	0.5651	0.0288	0.5939	0.1510	0.0275	0.1785		2,076.3170	2,076.3170	0.0889		2,078.5391
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1373	0.1269	1.0656	2.4000e-003	0.2432	2.0000e-003	0.2452	0.0645	1.8400e-003	0.0664		239.1658	239.1658	9.9500e-003		239.4147
Total	**0.3468**	**7.3627**	**2.4188**	**0.0221**	**0.8083**	**0.0308**	**0.8391**	**0.2155**	**0.0294**	**0.2449**		**2,315.4828**	**2,315.4828**	**0.0988**		**2,317.9538**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6348	16.0356	10.6191	0.0294		0.6667	0.6667		0.6171	0.6171	0.0000	2,843.0077	2,843.0077	0.8855		2,865.1459
Total	**1.6348**	**16.0356**	**10.6191**	**0.0294**		**0.6667**	**0.6667**		**0.6171**	**0.6171**	**0.0000**	**2,843.0077**	**2,843.0077**	**0.8855**		**2,865.1459**

3.3 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2095	7.2358	1.3532	0.0197	0.5651	0.0288	0.5939	0.1510	0.0275	0.1785		2,076.3170	2,076.3170	0.0889		2,078.5391
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1373	0.1269	1.0656	2.4000e-003	0.2432	2.0000e-003	0.2452	0.0645	1.8400e-003	0.0664		239.1658	239.1658	9.9500e-003		239.4147
Total	**0.3468**	**7.3627**	**2.4188**	**0.0221**	**0.8083**	**0.0308**	**0.8391**	**0.2155**	**0.0294**	**0.2449**		**2,315.4828**	**2,315.4828**	**0.0988**		**2,317.9538**

3.3 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4932	13.7752	10.2034	0.0294		0.5689	0.5689		0.5266	0.5266		2,842.8938	2,842.8938	0.8847		2,865.0104
Total	**1.4932**	**13.7752**	**10.2034**	**0.0294**		**0.5689**	**0.5689**		**0.5266**	**0.5266**		**2,842.8938**	**2,842.8938**	**0.8847**		**2,865.0104**

3.3 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1956	6.6241	1.2817	0.0194	1.3609	0.0251	1.3860	0.3464	0.0240	0.3704		2,051.0865	2,051.0865	0.0883		2,053.2935
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1270	0.1133	0.9692	2.3300e-003	0.2432	1.9400e-003	0.2452	0.0645	1.7900e-003	0.0663		231.6745	231.6745	8.8900e-003		231.8967
Total	**0.3227**	**6.7374**	**2.2509**	**0.0218**	**1.6042**	**0.0270**	**1.6312**	**0.4109**	**0.0258**	**0.4367**		**2,282.7610**	**2,282.7610**	**0.0972**		**2,285.1902**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4932	13.7752	10.2034	0.0294		0.5689	0.5689		0.5266	0.5266	0.0000	2,842.8938	2,842.8938	0.8847		2,865.0104
Total	**1.4932**	**13.7752**	**10.2034**	**0.0294**		**0.5689**	**0.5689**		**0.5266**	**0.5266**	**0.0000**	**2,842.8938**	**2,842.8938**	**0.8847**		**2,865.0104**

3.3 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1956	6.6241	1.2817	0.0194	1.3609	0.0251	1.3860	0.3464	0.0240	0.3704		2,051.0865	2,051.0865	0.0883		2,053.2935
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1270	0.1133	0.9692	2.3300e-003	0.2432	1.9400e-003	0.2452	0.0645	1.7900e-003	0.0663		231.6745	231.6745	8.8900e-003		231.8967
Total	**0.3227**	**6.7374**	**2.2509**	**0.0218**	**1.6042**	**0.0270**	**1.6312**	**0.4109**	**0.0258**	**0.4367**		**2,282.7610**	**2,282.7610**	**0.0972**		**2,285.1902**

3.4 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	17.0607					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941		281.4481	281.4481	0.0193		281.9309
Total	**17.2796**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**		**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.4 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1270	0.1133	0.9692	2.3300e-003	0.2432	1.9400e-003	0.2452	0.0645	1.7900e-003	0.0663		231.6745	231.6745	8.8900e-003		231.8967
Total	**0.1270**	**0.1133**	**0.9692**	**2.3300e-003**	**0.2432**	**1.9400e-003**	**0.2452**	**0.0645**	**1.7900e-003**	**0.0663**		**231.6745**	**231.6745**	**8.8900e-003**		**231.8967**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	17.0607					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2189	1.5268	1.8176	2.9700e-003		0.0941	0.0941		0.0941	0.0941	0.0000	281.4481	281.4481	0.0193		281.9309
Total	**17.2796**	**1.5268**	**1.8176**	**2.9700e-003**		**0.0941**	**0.0941**		**0.0941**	**0.0941**	**0.0000**	**281.4481**	**281.4481**	**0.0193**		**281.9309**

3.4 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1270	0.1133	0.9692	2.3300e-003	0.2432	1.9400e-003	0.2452	0.0645	1.7900e-003	0.0663		231.6745	231.6745	8.8900e-003		231.8967
Total	**0.1270**	**0.1133**	**0.9692**	**2.3300e-003**	**0.2432**	**1.9400e-003**	**0.2452**	**0.0645**	**1.7900e-003**	**0.0663**		**231.6745**	**231.6745**	**8.8900e-003**		**231.8967**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0599	0.3265	0.7468	2.1400e-003	0.1690	2.1700e-003	0.1712	0.0453	2.0400e-003	0.0473		216.3536	216.3536	0.0116		216.6425
Unmitigated	0.0599	0.3265	0.7468	2.1400e-003	0.1690	2.1700e-003	0.1712	0.0453	2.0400e-003	0.0473		216.3536	216.3536	0.0116		216.6425

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Unrefrigerated Warehouse-No Rail	27.17	27.17	27.17	79,315	79,315
Total	27.17	27.17	27.17	79,315	79,315

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Unrefrigerated Warehouse-No	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Unrefrigerated Warehouse-No Rail	0.543525	0.028472	0.201539	0.126188	0.021864	0.005301	0.018669	0.039782	0.003072	0.002565	0.007028	0.001098	0.000897

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	6.6000e-004	6.0400e-003	5.0700e-003	4.0000e-005		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		7.2450	7.2450	1.4000e-004	1.3000e-004	7.2881
NaturalGas Unmitigated	6.6000e-004	6.0400e-003	5.0700e-003	4.0000e-005		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		7.2450	7.2450	1.4000e-004	1.3000e-004	7.2881

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Unrefrigerated Warehouse-No Rail	61.5827	6.6000e-004	6.0400e-003	5.0700e-003	4.0000e-005		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		7.2450	7.2450	1.4000e-004	1.3000e-004	7.2881
Total		**6.6000e-004**	**6.0400e-003**	**5.0700e-003**	**4.0000e-005**		**4.6000e-004**	**4.6000e-004**		**4.6000e-004**	**4.6000e-004**		**7.2450**	**7.2450**	**1.4000e-004**	**1.3000e-004**	**7.2881**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Unrefrigerated Warehouse-No Rail	0.0615827	6.6000e-004	6.0400e-003	5.0700e-003	4.0000e-005		4.6000e-004	4.6000e-004		4.6000e-004	4.6000e-004		7.2450	7.2450	1.4000e-004	1.3000e-004	7.2881
Total		**6.6000e-004**	**6.0400e-003**	**5.0700e-003**	**4.0000e-005**		**4.6000e-004**	**4.6000e-004**		**4.6000e-004**	**4.6000e-004**		**7.2450**	**7.2450**	**1.4000e-004**	**1.3000e-004**	**7.2881**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.4085	2.0000e-005	1.6500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5400e-003	3.5400e-003	1.0000e-005		3.7700e-003
Unmitigated	0.4085	2.0000e-005	1.6500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5400e-003	3.5400e-003	1.0000e-005		3.7700e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0623					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3461					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5000e-004	2.0000e-005	1.6500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5400e-003	3.5400e-003	1.0000e-005		3.7700e-003
Total	**0.4085**	**2.0000e-005**	**1.6500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.5400e-003**	**3.5400e-003**	**1.0000e-005**		**3.7700e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0623					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3461					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.5000e-004	2.0000e-005	1.6500e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.5400e-003	3.5400e-003	1.0000e-005		3.7700e-003
Total	**0.4085**	**2.0000e-005**	**1.6500e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.5400e-003**	**3.5400e-003**	**1.0000e-005**		**3.7700e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

GHWTP Tank Replacement

North Central Coast Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Unrefrigerated Warehouse-No Rail	16.17	1000sqft	1.32	16,171.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	53
Climate Zone	5			**Operational Year**	2022
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

GHWTP Tank Replacement - North Central Coast Air Basin, Annual

Project Characteristics -

Land Use - Adjusted lot acreage to equal distrubance area of 1.315 acre

Construction Phase - Based on working days provided by the city

Off-road Equipment - Construction fleet provided by city

Off-road Equipment -

Off-road Equipment - Fleet provided by the City

Demolition -

Grading - APE is 1.45 acre

Off-road Equipment -

Trips and VMT - Trips provided by the city

Architectural Coating - SF for tank coating provided by city

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	8,086.00	8,170.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	24,257.00	36,000.00
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	250.00
tblArchitecturalCoating	EF_Nonresidential_Interior	150.00	250.00
tblArchitecturalCoating	EF_Residential_Exterior	100.00	250.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	250.00
tblAreaCoating	Area_Nonresidential_Exterior	8086	8170
tblAreaCoating	Area_Nonresidential_Interior	24257	24510
tblConstructionPhase	NumDays	10.00	30.00
tblConstructionPhase	NumDays	200.00	370.00
tblConstructionPhase	NumDays	20.00	120.00
tblLandUse	LotAcreage	0.37	1.32
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Scrapers

GHWTP Tank Replacement - North Central Coast Air Basin, Annual

tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Pavers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentType		Other Material Handling Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Air Compressors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	6.00	4.00
tblOffRoadEquipment	UsageHours	6.00	3.00
tblOffRoadEquipment	UsageHours	8.00	3.00
tblSolidWaste	SolidWasteGenerationRate	15.20	15.36
tblTripsAndVMT	HaulingTripNumber	552.00	1,320.00
tblTripsAndVMT	HaulingTripNumber	0.00	9,120.00
tblTripsAndVMT	VendorTripNumber	3.00	0.00
tblTripsAndVMT	WorkerTripNumber	28.00	26.00
tblTripsAndVMT	WorkerTripNumber	7.00	26.00
tblTripsAndVMT	WorkerTripNumber	1.00	26.00
tblWater	IndoorWaterUseRate	3,739,312.50	3,778,625.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1750	1.9411	1.2823	3.5000e-003	0.1464	0.0726	0.2189	0.0309	0.0668	0.0978	0.0000	317.8427	317.8427	0.0790	0.0000	319.8163
2020	0.2573	3.0630	1.6927	6.7800e-003	0.1027	0.0913	0.1940	0.0275	0.0846	0.1121	0.0000	616.3252	616.3252	0.1165	0.0000	619.2366
2021	0.3473	1.0086	0.6340	2.5500e-003	0.0780	0.0300	0.1080	0.0200	0.0279	0.0480	0.0000	231.3926	231.3926	0.0429	0.0000	232.4662
Maximum	**0.3473**	**3.0630**	**1.6927**	**6.7800e-003**	**0.1464**	**0.0913**	**0.2189**	**0.0309**	**0.0846**	**0.1121**	**0.0000**	**616.3252**	**616.3252**	**0.1165**	**0.0000**	**619.2366**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1750	1.9411	1.2823	3.5000e-003	0.1464	0.0726	0.2189	0.0309	0.0668	0.0978	0.0000	317.8424	317.8424	0.0790	0.0000	319.8160
2020	0.2573	3.0630	1.6927	6.7800e-003	0.1027	0.0913	0.1940	0.0275	0.0846	0.1121	0.0000	616.3248	616.3248	0.1165	0.0000	619.2362
2021	0.3473	1.0086	0.6340	2.5500e-003	0.0780	0.0300	0.1080	0.0200	0.0279	0.0480	0.0000	231.3925	231.3925	0.0429	0.0000	232.4661
Maximum	**0.3473**	**3.0630**	**1.6927**	**6.7800e-003**	**0.1464**	**0.0913**	**0.2189**	**0.0309**	**0.0846**	**0.1121**	**0.0000**	**616.3248**	**616.3248**	**0.1165**	**0.0000**	**619.2362**

GHWTP Tank Replacement - North Central Coast Air Basin, Annual

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

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**5-1-2019**	**7-31-2019**	0.3814	0.3814
2	**8-1-2019**	**10-31-2019**	1.0647	1.0647
3	**11-1-2019**	**1-31-2020**	0.9613	0.9613
4	**2-1-2020**	**4-30-2020**	0.8138	0.8138
5	**5-1-2020**	**7-31-2020**	0.8279	0.8279
6	**8-1-2020**	**10-31-2020**	0.8299	0.8299
7	**11-1-2020**	**1-31-2021**	0.8001	0.8001
8	**2-1-2021**	**4-30-2021**	0.7080	0.7080
9	**5-1-2021**	**7-31-2021**	0.3960	0.3960
		Highest	1.0647	1.0647

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0745	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Energy	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	19.0289	19.0289	8.3000e-004	1.9000e-004	19.1059
Mobile	0.0109	0.0582	0.1287	3.9000e-004	0.0298	3.9000e-004	0.0302	8.0100e-003	3.7000e-004	8.3700e-003	0.0000	35.9874	35.9874	1.8500e-003	0.0000	36.0337
Waste						0.0000	0.0000		0.0000	0.0000	3.1179	0.0000	3.1179	0.1843	0.0000	7.7246
Water						0.0000	0.0000		0.0000	0.0000	1.1988	5.9480	7.1468	0.1234	2.9600e-003	11.1146
Total	**0.0855**	**0.0593**	**0.1298**	**4.0000e-004**	**0.0298**	**4.7000e-004**	**0.0303**	**8.0100e-003**	**4.5000e-004**	**8.4500e-003**	**4.3167**	**60.9646**	**65.2814**	**0.3104**	**3.1500e-003**	**73.9792**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0745	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Energy	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	19.0289	19.0289	8.3000e-004	1.9000e-004	19.1059
Mobile	0.0109	0.0582	0.1287	3.9000e-004	0.0298	3.9000e-004	0.0302	8.0100e-003	3.7000e-004	8.3700e-003	0.0000	35.9874	35.9874	1.8500e-003	0.0000	36.0337
Waste						0.0000	0.0000		0.0000	0.0000	3.1179	0.0000	3.1179	0.1843	0.0000	7.7246
Water						0.0000	0.0000		0.0000	0.0000	1.1988	5.9480	7.1468	0.1234	2.9600e-003	11.1146
Total	**0.0855**	**0.0593**	**0.1298**	**4.0000e-004**	**0.0298**	**4.7000e-004**	**0.0303**	**8.0100e-003**	**4.5000e-004**	**8.4500e-003**	**4.3167**	**60.9646**	**65.2814**	**0.3104**	**3.1500e-003**	**73.9792**

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

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	6/29/2019	12/13/2019	5	120	
2	Building Construction	Building Construction	12/14/2019	5/14/2021	5	370	
3	Architectural Coating	Architectural Coating	5/15/2021	6/25/2021	5	30	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 36,000; Non-Residential Outdoor: 8,170; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

GHWTP Tank Replacement - North Central Coast Air Basin, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Excavators	2	7.00	158	0.38
Demolition	Scrapers	1	2.00	367	0.48
Demolition	Graders	1	1.00	187	0.41
Demolition	Plate Compactors	1	2.00	8	0.43
Demolition	Off-Highway Trucks	2	6.50	402	0.38
Demolition	Cranes	1	4.00	231	0.29
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	3.00	97	0.37
Building Construction	Cement and Mortar Mixers	0	0.00	9	0.56
Building Construction	Cranes	1	4.00	231	0.29
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Generator Sets	0	8.00	84	0.74
Building Construction	Paving Equipment	0	0.00	132	0.36
Building Construction	Rollers	0	0.00	80	0.38
Building Construction	Tractors/Loaders/Backhoes	2	3.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Architectural Coating	Air Compressors	1	6.00	78	0.48
Building Construction	Plate Compactors	1	2.00	8	0.43
Building Construction	Pavers	1	1.00	130	0.42
Building Construction	Off-Highway Trucks	2	6.50	402	0.38
Building Construction	Other Material Handling Equipment	1	1.00	168	0.40
Building Construction	Pumps	1	1.00	84	0.74
Building Construction	Air Compressors	1	1.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	11	26.00	0.00	1,320.00	12.30	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	10	26.00	0.00	9,120.00	12.30	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	26.00	0.00	0.00	12.30	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0609	0.0000	0.0609	9.2200e-003	0.0000	9.2200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1477	1.5674	1.0944	2.5000e-003		0.0666	0.0666		0.0613	0.0613	0.0000	224.0873	224.0873	0.0708	0.0000	225.8573
Total	**0.1477**	**1.5674**	**1.0944**	**2.5000e-003**	**0.0609**	**0.0666**	**0.1275**	**9.2200e-003**	**0.0613**	**0.0705**	**0.0000**	**224.0873**	**224.0873**	**0.0708**	**0.0000**	**225.8573**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.2400e-003	0.2096	0.0371	5.4000e-004	0.0112	1.0400e-003	0.0123	3.0800e-003	9.9000e-004	4.0800e-003	0.0000	51.5581	51.5581	2.1500e-003	0.0000	51.6119
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.2100e-003	7.8400e-003	0.0694	1.5000e-004	0.0141	1.2000e-004	0.0143	3.7600e-003	1.1000e-004	3.8700e-003	0.0000	13.4864	13.4864	6.2000e-004	0.0000	13.5019
Total	**0.0145**	**0.2174**	**0.1065**	**6.9000e-004**	**0.0254**	**1.1600e-003**	**0.0265**	**6.8400e-003**	**1.1000e-003**	**7.9500e-003**	**0.0000**	**65.0445**	**65.0445**	**2.7700e-003**	**0.0000**	**65.1139**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0609	0.0000	0.0609	9.2200e-003	0.0000	9.2200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1477	1.5674	1.0944	2.5000e-003		0.0666	0.0666		0.0613	0.0613	0.0000	224.0871	224.0871	0.0708	0.0000	225.8571
Total	**0.1477**	**1.5674**	**1.0944**	**2.5000e-003**	**0.0609**	**0.0666**	**0.1275**	**9.2200e-003**	**0.0613**	**0.0705**	**0.0000**	**224.0871**	**224.0871**	**0.0708**	**0.0000**	**225.8571**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.2400e-003	0.2096	0.0371	5.4000e-004	0.0112	1.0400e-003	0.0123	3.0800e-003	9.9000e-004	4.0800e-003	0.0000	51.5581	51.5581	2.1500e-003	0.0000	51.6119
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.2100e-003	7.8400e-003	0.0694	1.5000e-004	0.0141	1.2000e-004	0.0143	3.7600e-003	1.1000e-004	3.8700e-003	0.0000	13.4864	13.4864	6.2000e-004	0.0000	13.5019
Total	**0.0145**	**0.2174**	**0.1065**	**6.9000e-004**	**0.0254**	**1.1600e-003**	**0.0265**	**6.8400e-003**	**1.1000e-003**	**7.9500e-003**	**0.0000**	**65.0445**	**65.0445**	**2.7700e-003**	**0.0000**	**65.1139**

3.3 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0106	0.1085	0.0662	1.8000e-004		4.5800e-003	4.5800e-003		4.2300e-003	4.2300e-003	0.0000	15.8092	15.8092	4.8300e-003	0.0000	15.9298
Total	**0.0106**	**0.1085**	**0.0662**	**1.8000e-004**		**4.5800e-003**	**4.5800e-003**		**4.2300e-003**	**4.2300e-003**	**0.0000**	**15.8092**	**15.8092**	**4.8300e-003**	**0.0000**	**15.9298**

3.3 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4000e-003	0.0470	8.3100e-003	1.2000e-004	0.0587	2.3000e-004	0.0590	0.0145	2.2000e-004	0.0147	0.0000	11.5531	11.5531	4.8000e-004	0.0000	11.5651
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.2000e-004	7.8000e-004	6.9400e-003	1.0000e-005	1.4100e-003	1.0000e-005	1.4300e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.3486	1.3486	6.0000e-005	0.0000	1.3502
Total	**2.2200e-003**	**0.0478**	**0.0153**	**1.3000e-004**	**0.0601**	**2.4000e-004**	**0.0604**	**0.0149**	**2.3000e-004**	**0.0151**	**0.0000**	**12.9017**	**12.9017**	**5.4000e-004**	**0.0000**	**12.9153**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0106	0.1085	0.0662	1.8000e-004		4.5800e-003	4.5800e-003		4.2300e-003	4.2300e-003	0.0000	15.8091	15.8091	4.8300e-003	0.0000	15.9298
Total	**0.0106**	**0.1085**	**0.0662**	**1.8000e-004**		**4.5800e-003**	**4.5800e-003**		**4.2300e-003**	**4.2300e-003**	**0.0000**	**15.8091**	**15.8091**	**4.8300e-003**	**0.0000**	**15.9298**

3.3 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4000e-003	0.0470	8.3100e-003	1.2000e-004	0.0587	2.3000e-004	0.0590	0.0145	2.2000e-004	0.0147	0.0000	11.5531	11.5531	4.8000e-004	0.0000	11.5651
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.2000e-004	7.8000e-004	6.9400e-003	1.0000e-005	1.4100e-003	1.0000e-005	1.4300e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.3486	1.3486	6.0000e-005	0.0000	1.3502
Total	**2.2200e-003**	**0.0478**	**0.0153**	**1.3000e-004**	**0.0601**	**2.4000e-004**	**0.0604**	**0.0149**	**2.3000e-004**	**0.0151**	**0.0000**	**12.9017**	**12.9017**	**5.4000e-004**	**0.0000**	**12.9153**

3.3 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2142	2.1007	1.3911	3.8500e-003		0.0873	0.0873		0.0808	0.0808	0.0000	337.8665	337.8665	0.1052	0.0000	340.4974
Total	**0.2142**	**2.1007**	**1.3911**	**3.8500e-003**		**0.0873**	**0.0873**		**0.0808**	**0.0808**	**0.0000**	**337.8665**	**337.8665**	**0.1052**	**0.0000**	**340.4974**

3.3 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0269	0.9472	0.1672	2.6100e-003	0.0718	3.7100e-003	0.0756	0.0193	3.5500e-003	0.0228	0.0000	249.9021	249.9021	0.0100	0.0000	250.1532
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0163	0.0151	0.1345	3.2000e-004	0.0309	2.6000e-004	0.0311	8.2000e-003	2.4000e-004	8.4500e-003	0.0000	28.5567	28.5567	1.1800e-003	0.0000	28.5861
Total	**0.0432**	**0.9624**	**0.3016**	**2.9300e-003**	**0.1027**	**3.9700e-003**	**0.1067**	**0.0275**	**3.7900e-003**	**0.0313**	**0.0000**	**278.4587**	**278.4587**	**0.0112**	**0.0000**	**278.7393**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2142	2.1007	1.3911	3.8500e-003		0.0873	0.0873		0.0808	0.0808	0.0000	337.8661	337.8661	0.1052	0.0000	340.4970
Total	**0.2142**	**2.1007**	**1.3911**	**3.8500e-003**		**0.0873**	**0.0873**		**0.0808**	**0.0808**	**0.0000**	**337.8661**	**337.8661**	**0.1052**	**0.0000**	**340.4970**

3.3 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0269	0.9472	0.1672	2.6100e-003	0.0718	3.7100e-003	0.0756	0.0193	3.5500e-003	0.0228	0.0000	249.9021	249.9021	0.0100	0.0000	250.1532
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0163	0.0151	0.1345	3.2000e-004	0.0309	2.6000e-004	0.0311	8.2000e-003	2.4000e-004	8.4500e-003	0.0000	28.5567	28.5567	1.1800e-003	0.0000	28.5861
Total	**0.0432**	**0.9624**	**0.3016**	**2.9300e-003**	**0.1027**	**3.9700e-003**	**0.1067**	**0.0275**	**3.7900e-003**	**0.0313**	**0.0000**	**278.4587**	**278.4587**	**0.0112**	**0.0000**	**278.7393**

3.3 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0717	0.6612	0.4898	1.4100e-003		0.0273	0.0273		0.0253	0.0253	0.0000	123.7934	123.7934	0.0385	0.0000	124.7565
Total	**0.0717**	**0.6612**	**0.4898**	**1.4100e-003**		**0.0273**	**0.0273**		**0.0253**	**0.0253**	**0.0000**	**123.7934**	**123.7934**	**0.0385**	**0.0000**	**124.7565**

3.3 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.2000e-003	0.3179	0.0580	9.4000e-004	0.0631	1.1900e-003	0.0643	0.0161	1.1300e-003	0.0172	0.0000	90.4661	90.4661	3.6500e-003	0.0000	90.5574
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.5100e-003	4.9500e-003	0.0449	1.1000e-004	0.0113	9.0000e-005	0.0114	3.0100e-003	9.0000e-005	3.0900e-003	0.0000	10.1358	10.1358	3.9000e-004	0.0000	10.1454
Total	**0.0147**	**0.3229**	**0.1029**	**1.0500e-003**	**0.0745**	**1.2800e-003**	**0.0757**	**0.0191**	**1.2200e-003**	**0.0203**	**0.0000**	**100.6019**	**100.6019**	**4.0400e-003**	**0.0000**	**100.7028**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0717	0.6612	0.4898	1.4100e-003		0.0273	0.0273		0.0253	0.0253	0.0000	123.7933	123.7933	0.0385	0.0000	124.7564
Total	**0.0717**	**0.6612**	**0.4898**	**1.4100e-003**		**0.0273**	**0.0273**		**0.0253**	**0.0253**	**0.0000**	**123.7933**	**123.7933**	**0.0385**	**0.0000**	**124.7564**

3.3 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.2000e-003	0.3179	0.0580	9.4000e-004	0.0631	1.1900e-003	0.0643	0.0161	1.1300e-003	0.0172	0.0000	90.4661	90.4661	3.6500e-003	0.0000	90.5574
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.5100e-003	4.9500e-003	0.0449	1.1000e-004	0.0113	9.0000e-005	0.0114	3.0100e-003	9.0000e-005	3.0900e-003	0.0000	10.1358	10.1358	3.9000e-004	0.0000	10.1454
Total	**0.0147**	**0.3229**	**0.1029**	**1.0500e-003**	**0.0745**	**1.2800e-003**	**0.0757**	**0.0191**	**1.2200e-003**	**0.0203**	**0.0000**	**100.6019**	**100.6019**	**4.0400e-003**	**0.0000**	**100.7028**

3.4 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2559					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.2800e-003	0.0229	0.0273	4.0000e-005		1.4100e-003	1.4100e-003		1.4100e-003	1.4100e-003	0.0000	3.8299	3.8299	2.6000e-004	0.0000	3.8365
Total	**0.2592**	**0.0229**	**0.0273**	**4.0000e-005**		**1.4100e-003**	**1.4100e-003**		**1.4100e-003**	**1.4100e-003**	**0.0000**	**3.8299**	**3.8299**	**2.6000e-004**	**0.0000**	**3.8365**

3.4 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7200e-003	1.5500e-003	0.0140	4.0000e-005	3.5300e-003	3.0000e-005	3.5600e-003	9.4000e-004	3.0000e-005	9.7000e-004	0.0000	3.1674	3.1674	1.2000e-004	0.0000	3.1705
Total	**1.7200e-003**	**1.5500e-003**	**0.0140**	**4.0000e-005**	**3.5300e-003**	**3.0000e-005**	**3.5600e-003**	**9.4000e-004**	**3.0000e-005**	**9.7000e-004**	**0.0000**	**3.1674**	**3.1674**	**1.2000e-004**	**0.0000**	**3.1705**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2559					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.2800e-003	0.0229	0.0273	4.0000e-005		1.4100e-003	1.4100e-003		1.4100e-003	1.4100e-003	0.0000	3.8299	3.8299	2.6000e-004	0.0000	3.8365
Total	**0.2592**	**0.0229**	**0.0273**	**4.0000e-005**		**1.4100e-003**	**1.4100e-003**		**1.4100e-003**	**1.4100e-003**	**0.0000**	**3.8299**	**3.8299**	**2.6000e-004**	**0.0000**	**3.8365**

3.4 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7200e-003	1.5500e-003	0.0140	4.0000e-005	3.5300e-003	3.0000e-005	3.5600e-003	9.4000e-004	3.0000e-005	9.7000e-004	0.0000	3.1674	3.1674	1.2000e-004	0.0000	3.1705
Total	**1.7200e-003**	**1.5500e-003**	**0.0140**	**4.0000e-005**	**3.5300e-003**	**3.0000e-005**	**3.5600e-003**	**9.4000e-004**	**3.0000e-005**	**9.7000e-004**	**0.0000**	**3.1674**	**3.1674**	**1.2000e-004**	**0.0000**	**3.1705**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0109	0.0582	0.1287	3.9000e-004	0.0298	3.9000e-004	0.0302	8.0100e-003	3.7000e-004	8.3700e-003	0.0000	35.9874	35.9874	1.8500e-003	0.0000	36.0337
Unmitigated	0.0109	0.0582	0.1287	3.9000e-004	0.0298	3.9000e-004	0.0302	8.0100e-003	3.7000e-004	8.3700e-003	0.0000	35.9874	35.9874	1.8500e-003	0.0000	36.0337

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Unrefrigerated Warehouse-No Rail	27.17	27.17	27.17	79,315	79,315
Total	27.17	27.17	27.17	79,315	79,315

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Unrefrigerated Warehouse-No	9.50	7.30	7.30	59.00	0.00	41.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Unrefrigerated Warehouse-No Rail	0.543525	0.028472	0.201539	0.126188	0.021864	0.005301	0.018669	0.039782	0.003072	0.002565	0.007028	0.001098	0.000897

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	17.8294	17.8294	8.1000e-004	1.7000e-004	17.8993
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	17.8294	17.8294	8.1000e-004	1.7000e-004	17.8993
NaturalGas Mitigated	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.1995	1.1995	2.0000e-005	2.0000e-005	1.2066
NaturalGas Unmitigated	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.1995	1.1995	2.0000e-005	2.0000e-005	1.2066

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Unrefrigerated Warehouse-No Rail	22477.7	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.1995	1.1995	2.0000e-005	2.0000e-005	1.2066
Total		**1.2000e-004**	**1.1000e-003**	**9.3000e-004**	**1.0000e-005**		**8.0000e-005**	**8.0000e-005**		**8.0000e-005**	**8.0000e-005**	**0.0000**	**1.1995**	**1.1995**	**2.0000e-005**	**2.0000e-005**	**1.2066**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Unrefrigerated Warehouse-No Rail	22477.7	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005	0.0000	1.1995	1.1995	2.0000e-005	2.0000e-005	1.2066
Total		**1.2000e-004**	**1.1000e-003**	**9.3000e-004**	**1.0000e-005**		**8.0000e-005**	**8.0000e-005**		**8.0000e-005**	**8.0000e-005**	**0.0000**	**1.1995**	**1.1995**	**2.0000e-005**	**2.0000e-005**	**1.2066**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Unrefrigerated Warehouse-No Rail	61288.1	17.8294	8.1000e-004	1.7000e-004	17.8993
Total		**17.8294**	**8.1000e-004**	**1.7000e-004**	**17.8993**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Unrefrigerated Warehouse-No Rail	61288.1	17.8294	8.1000e-004	1.7000e-004	17.8993
Total		**17.8294**	**8.1000e-004**	**1.7000e-004**	**17.8993**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0745	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Unmitigated	0.0745	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0114					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0632					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Total	**0.0745**	**0.0000**	**1.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.9000e-004**	**2.9000e-004**	**0.0000**	**0.0000**	**3.1000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0114					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0632					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.5000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.9000e-004	2.9000e-004	0.0000	0.0000	3.1000e-004
Total	**0.0745**	**0.0000**	**1.5000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.9000e-004**	**2.9000e-004**	**0.0000**	**0.0000**	**3.1000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	7.1468	0.1234	2.9600e-003	11.1146
Unmitigated	7.1468	0.1234	2.9600e-003	11.1146

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Unrefrigerated Warehouse-No Rail	3.77862 / 0	7.1468	0.1234	2.9600e-003	11.1146
Total		**7.1468**	**0.1234**	**2.9600e-003**	**11.1146**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Unrefrigerated Warehouse-No Rail	3.77862 / 0	7.1468	0.1234	2.9600e-003	11.1146
Total		**7.1468**	**0.1234**	**2.9600e-003**	**11.1146**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	3.1179	0.1843	0.0000	7.7246
Unmitigated	3.1179	0.1843	0.0000	7.7246

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Unrefrigerated Warehouse-No Rail	15.36	3.1179	0.1843	0.0000	7.7246
Total		**3.1179**	**0.1843**	**0.0000**	**7.7246**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Unrefrigerated Warehouse-No Rail	15.36	3.1179	0.1843	0.0000	7.7246
Total		**3.1179**	**0.1843**	**0.0000**	**7.7246**

9.0 Operational Offroad

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

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

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

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix C. Preliminary Geotechnical Report, Graham Hill Water Treatment Plant Tank Improvements

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PRELIMINARY GEOTECHNICAL REPORT
GRAMAH HILL WATER TREATMENT PLANT TANK IMPROVEMENTS
715 GRAHAM HILL ROAD
SANTA CRUZ, CALIFORNIA

Prepared for:

WEST YOST ASSOCIATES
2020 Research Park Drive, Suite 100
Davis, California 95618

Prepared by:

GROUP DELTA CONSULTANTS, INC.
255 Ygnacio Valley Road, Suite 200
Walnut Creek, California 94596
Tel. (510) 671-0010

Group Delta Project No. BA036
March 2, 2018

GROUP DELTA

March 2, 2018 Project No. BA036

West Yost Associates
2020 Research Park Drive, Suite 100
Davis, CA 95618

Attention: Jeff Wanlass, PE

Subject: Preliminary Geotechnical Report
Graham Hill Water Treatment Plant Tank Improvements
715 Graham Hill Road
Santa Cruz, California

Dear Mr. Wanlass:

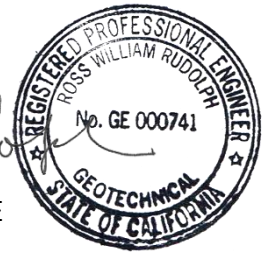
Group Delta is pleased to submit the enclosed preliminary geotechnical report in support of the Graham Hill Water Treatment Plant Tank Improvements project located at 715 Graham Hill Road in Santa Cruz, California. Our services were performed in accordance with our Task Order fully executed on May 26, 2017. The results of our exploration, analyses, and our recommendations are presented in the enclosed report.

If you have any questions regarding this report, please feel free to call us at (510) 671-0010.

Sincerely,

Group Delta Consultants, Inc.

Benjamin Serna, PE, GE
Associate Engineer



R. William Rudolph, PE, GE
Principal Engineer

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APPENDICES

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation in support of the Graham Hill Water Treatment Plant (GHWTP) Tank Improvements project located at 715 Graham Hill Road in Santa Cruz, California. A vicinity map and site location are shown on Figure 1. This preliminary report was prepared in support of the Basis of Design; a design level report will be prepared as part of the final design documentation.

1.1 Project Description

The GHWTP treats about 95 percent of the City of Santa Cruz's (City's) water supply. Of the four concrete tanks at the GHWTP, the three on the Lower Tank Pad including the Filtered Water Tank, Wash Water Reclamation Tank, and Sludge Storage Tank will be replaced to provide improved seismic performance and water treatment processes. The demolition of the existing tanks and construction of the new tanks and associated improvements will be phased so that the plant will remain in operation during construction. In support of evaluating improvement options, West Yost Associates (West Yost) developed several alternatives including various tank and improvement configurations. We understand the City has selected Alternative 5A.

The improvement plan for Alternative 5A includes new tanks, pump stations, and other facilities at the proposed locations shown on Figures 2A and 2B. The table below includes a summary of the proposed Alternative 5A plan improvements. In addition to the improvements summarized below, plans also include the widening of the existing road leading to the Lower Tank Pad, as shown on Figure 2B. We understand some details are still to be determined (TBD).

Table 1. Summary of Proposed Alternative 5A Improvements

Facility	Structure Type	Depth	Size	Location
Filtered Water Tank	Prestressed concrete tank with flat bottom	Buried about 10 ft.	Tank Diameter 70 to 75 feet	Lower Tank Pad
UV Disinfection System	CMU building	At grade	Single story (about 1,400 square feet)	Lower Tank Pad
Two Reclaim Tanks	Reinforced concrete tank with cone bottom	Buried 10 ft. at center and about 6 ft. at edge	Inside Tank Diameter 65 ft.	Lower Tank Pad and New Pad
Two Sludge EQ Tanks	Welded steel tanks with steel roofs	At grade	TBD	New Pad
Solids Dewatering Building	CMU building	At grade	Two stories (about 3,000	New Pad

Facility	Structure Type	Depth	Size	Location
Reclaim Pump Station	Concrete slab and pump cans	Slab at grade; cans buried 10 ft.	Two vertical turbine pumps	New Pad
Wash Water Supply Pump Station	Concrete slab and pump cans	Slab at grade; cans buried 10 ft.	Three vertical turbine pumps	Lower Tank Pad
Reclaim Tank Solids Transfer Pump Station	Concrete vault	Buried about 10 ft.	One pump	New Pad
Sludge Pump Station	Concrete vault	Buried about 10 ft.	Two pumps	New Pad
Sludge Dewatering Pump Station	Concrete slab	At grade	Two pumps	New Pad
Filtrate Wet Well and Pump Station	Concrete slab	Slab at grade; wet well 10 ft. max.	TBD	New Pad
Electrical Building	CMU building	At grade	Single story (about 400	New Pad

1.2 Objective and Scope of Services

The main geotechnical considerations for the proposed Alternative 5A improvements include an evaluation of the stability of existing slopes below the Lower Tank Pad and an evaluation of cut slopes and earth retention structures necessary for construction of the new pads adjacent to the Lower Tank Pad. Our scope of services for this phase of the project includes the following.

- Review of existing geotechnical data for the site and evaluation of data gaps.
- A geotechnical exploration including test borings and cores.
- Installation of piezometers for monitoring of groundwater levels.
- Geologic reconnaissance and mapping.
- Performance of laboratory tests including moisture content, density, grain-size distribution, Plasticity Index, strength, and corrosivity.
- Performance of engineering analyses to develop recommendations for project design and construction.
- Preparation of this report.

2.0 GEOTECHNICAL INVESTIGATION

2.1 Existing Data

Previous geotechnical investigations and evaluations have been completed at the GHWTP. The following reports prepared by others were provided to us for review.

- Geotechnical Investigation, Slide Areas at City Water Treatment Plant, 715 Graham Hill Road, Santa Cruz, California. Prepared by Pacific Crest Engineering Inc. July 24, 2006.

- Geotechnical Investigation, New Slide Area – Additional Borings, 715 Graham Hill Road Santa Cruz, California. Prepared by Pacific Crest Engineering Inc. November 6, 2006.

- Geotechnical Investigation, Lower Level Water Tanks, 715 Graham Hill Road, Santa Cruz, California. Prepared by Pacific Crest Engineering Inc. December 6, 2006.

- Report on GHWTP Concrete Tanks Assessment and Evaluation. Prepared by Kennedy/Jenks Consultants. October 30, 2015.

Based on our review, we understand Pacific Crest Engineering, Inc. (PCE) has evaluated the stability of the slopes below the Lower Tank Pad and identified potential seismic stability risks. The assessment performed by Kenney/Jenks Consultants (KJC) included a reconnaissance level geotechnical evaluation of the slopes performed by AMEC and concluded that these risks may have been overstated by PCE and additional evaluation would be required.

2.2 Geotechnical Data Gaps

Subsurface conditions at the site are generally well characterized by the previous explorations conducted by PCE. Our field exploration was directed at filling data gaps relative to the planned improvements. The most significant data gap is the lack of seasonal groundwater level information. Potential groundwater and seepage conditions during or following the wet winter months may have a significant impact on slope stability. The borings completed by PCE were drilled in the dry fall months during which time groundwater was not encountered. Another data gap includes the lack of continuous core borings, which allow for the evaluation of any past landslide planes and contact between the fill and underlying colluvium, which could affect slope stability.

2.3 Field Exploration Program

To supplement the existing geotechnical data, our field exploration included the performance of 14 test borings, 3 cores, installation of 2 piezometers, and a geologic reconnaissance of the site. The piezometer installation included dataloggers so that groundwater levels can be continuously monitored. Three of the 14 test borings were performed along the existing roadway north of the entrance to the plant in support of Alternative 5, which was superseded by Alternative 5A. The

exploration locations and mapping of site geology related to Alternative 5A are shown on Figure 2A. Figure 3 includes the locations of all explorations completed by Group Delta. Details regarding our exploration along with the logs of the borings and cores are presented in Appendix A.

2.4 Laboratory Testing Program

Laboratory tests were performed to characterize the soils and to evaluate corrosivity of the site soils. The tests performed consisted of the following.

- Moisture Content and Dry Density
- Atterberg Limits
- Particle-Size Distribution
- Rock Compression
- Soil Corrosivity Analysis

The results of the laboratory tests are provided in Appendix B.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The GHWTP includes a Lower Tank Pad housing the Existing Filtered Water Tank, Wash Water Reclamation Tank, Sludge Storage Tank, and associated improvements. The plant also includes an Upper Pad, which includes sedimentation basins, filter galleries, a Wash Water Tank, and other water treatment facilities. The Lower Tank Pad is in a cut/fill condition with an existing cut slope above the pad as steep as about 1 ½ to 1 (horizontal to vertical). Prior to site development, a swale traversed the Lower Tank Pad and was filled to create the existing Lower Tank Pad. Fill placed on the slope below the Lower Tank pad is as steep as about 1 ½ to 1. The existing tanks are about 75 feet in diameter and have storage capacities ranging from 0.5 to 1 MG. We understand the existing concrete tanks were constructed in 1960 and were subsequently retrofitted with wood and asphalt roofs.

3.2 Geology and Seismicity

The project is located in the Coast Range Geomorphic Province of California. Much of the Coast Range Province is composed of marine sedimentary deposits and volcanic rocks that form northwest trending mountain ridges and valleys running subparallel to the San Andreas Fault Zone.

Published regional geologic maps identify two rock units at the site. The oldest geologic unit mapped at the site is Mesozoic or Paleozoic schist bedrock (sch), which includes quartzite. This unit is a metasedimentary rock primarily comprised of schist mainly derived from fine-grained sedimentary rock. The other rock unit mapped at the site includes Santa Margarita Sandstone (Tsm), an upper Miocene sedimentary rock. This formation is generally friable with harder

cemented and conglomerate zones. These two rock units, where exposed, maintain fairly resistant and stable slopes. These units are shown on a regional geologic map compiled by Brabb (1989), which is included as Figure 4.

Other geologic units observed and encountered at the site during the geotechnical exploration include artificial fill (af), colluvium (Qc), and landslide deposits (Qls) underlain by bedrock of the Santa Margarita Sandstone formation (Tsm) and schist (sch). Figure 2A includes site geology mapped during our field exploration by a Certified Engineering Geologist.

According to the USGS, major seismic sources within 10 miles of the site include the Zayante Vergeles fault (Moment Magnitude M_w = 7.0) at a closest distance of about 6 ½ miles, Monterey Bay-Tularcitos fault (Moment Magnitude M_w = 7.3) at a closest distance of about 7 miles, and the San Andreas fault (Moment Magnitude M_w = 8.1) at a closest distance of about 9 ½ miles. These faults are capable of producing large earthquakes and strong ground motions at the site. A list of the closest major active faults is included in Section 4 of this report and Figure 5 shows the site location relative to these faults. Minor inactive older bedrock faults are present in the area as shown on Figure 4.

3.3 Geologic Units and Subsurface Conditions

A description of the geologic units encountered during our subsurface exploration and observed during our geologic reconnaissance mapping of the site are summarized below. A map of these units is included on the Site Plan (Figure 2A). Figures 6 through 9 depict our interpretation of the subsurface at various locations across the site.

3.3.1 Fill

We encountered fill in borings performed on the Lower Tank Pad, in the area of the New Pad north of the Lower Tank Pad, and adjacent to the Existing Wash Water Tank in the area of the proposed roadway widening. The fill encountered on the Lower Tank Pad was up to about 10 feet thick and was likely placed during original tank pad construction. The fill encountered north of the Lower Tank Pad and adjacent to the Existing Wash Water Tank was about 3 to 4 feet thick and appeared to be associated with grading performed during site development. In general, the fill appeared to be well compacted medium dense to very dense silty and clayey sands with fines contents ranging from about 15 to 45 percent. Rock fragments observed in the fill are indicative of material derived from bedrock cuts at the site.

3.3.2 Colluvium

We encountered colluvium in borings performed on the Lower Tank Pad and in areas upslope and downslope of the pad. In general, the colluvium encountered consisted of medium dense silty and clayey sands with fines contents ranging from about 18 to 44 percent.

3.3.3 Bedrock

We encountered variable rock conditions during our exploration. The Santa Margarita Sandstone (Tsm) encountered was generally decomposed, soft, and massive. In general, the schist rock (sch) encountered was intensely weathered, soft, and intensely fractured. However, we did encounter zones of moderately weathered, extremely hard, and moderately fractured schist.

3.3.4 Landslides

Landslides that appear to be relatively shallow were mapped at the site during our exploration. These landslides appear to be surficial deposits or debris flows over bedrock.

3.4 Groundwater

Groundwater was not encountered at the time of our exploration completed in April, May, and September of 2017. Groundwater was not encountered in previous borings completed by PCE at the Lower Tank Pad and adjacent slide areas in June, November, and December of 2006. We understand groundwater was encountered at depths of about 30 to 35 feet in previous borings performed by Dames & Moore at the Upper Pad in 1959.

Data recently collected from the piezometer installed at the Lower Tank Pad (at the location of GD-C-1) show groundwater at a depth of about 25 feet within the colluvium above the bedrock. The data collected from the piezometer installed above the Lower Tank Pad (at the location of GD-B-1) show no groundwater in the soil above the bedrock; however, groundwater may be present within the bedrock as perched water and seepage at this location. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, leaking utilities, and other factors.

4.0 CONCLUSIONS

We have evaluated the potential geologic and seismic hazards for the site including surface fault rupture, slope stability, subsidence, liquefaction, lateral spreading, seismic densification, tsunamis, and earthquake ground motions. Our evaluation includes an assessment of geotechnical considerations including compressible soils, excavatability, and soil corrosion potential. The primary geotechnical considerations for the site are seismic densification and compressible soils. Our conclusions are summarized below.

4.1 Potential Geologic and Seismic Hazards

Given the shallow bedrock conditions at the site, subsidence is not considered to be a potential hazard. In addition, the site is high in elevation and far enough from the coast to preclude the hazards of a tsunami. We provide a summary our conclusions regarding surface fault rupture, seismicity, liquefaction and lateral spreading, seismic densification, landslides, and slope stability below.

4.1.1 Surface Fault Rupture

Alquist-Priolo Fault Zone (active fault zone as defined by the State of California) maps have not been developed for the site at the time of preparation of this report. No known active or potentially active faults cross the site. The closest known active fault is the San Andreas Fault located at a distance about 9 ½ miles east of the site. Accordingly, the potential for future fault rupture at the site is considered low.

4.1.2 Seismicity

The site is located at approximately Latitude 37.00095 degrees north and Longitude 122.0333 degrees west. As is the case with most of Northern California, the site is located within an active seismic area. The site may experience strong seismic shaking in the future due to nearby fault rupture. A list of faults considered capable of producing significant shaking at the site, as published in the 2008 United States National Seismic Hazard Maps developed by the United States Geological Survey (USGS), is provided in the table below. Figure 5 shows the site location relative to the closest faults considered by the USGS in development of the 2008 US National Seismic Hazard Maps.

Table 2. List of Faults

Abbreviated Fault Name	Max. Magnitude (Mw)*	Approximate Closest Distance (Miles)
Zayante-Vergeles	7.0	6 ½
Monterey Bay-Tularcitos	7.3	7
N. San Andreas	8.1	9 ½
San Gregorio	7.5	10

*Based on Ellsworth/Hanks relation (USGS 2008).

4.1.3 Seismic Design Parameters

The seismic design parameters were developed in accordance with the 2016 California Building Code (CBC) and ASCE 7-10. The site can generally be classified as a Site Class C based on existing data collected at the site. We recommend the following seismic design parameters for the site, which were calculated using the USGS United States Seismic Design Maps Tool. These parameters can be used for evaluation of seismic design in accordance with AWWA D100-05 and AWWA D110-04 (referenced by ASCE 7-10).

Table 3. ASCE 7-10 Seismic Design Parameters

Latitude: 37.00095 Longitude: -122.0333	
Parameter	Value
Site Class	C
Mapped MCE Spectral Response Acceleration at Short Period (S_S)	1.50 g
Mapped MCE Spectral Response Acceleration at Period of 1 Second (S_1)	0.60g
Site Coefficient, F_a	1.0
Site Coefficient, F_v	1.3
Adjusted MCE Spectral Response Acceleration at Short Period (S_{MS})	1.50 g
Adjusted MCE Spectral Response Acceleration at Period of 1 Second (S_{M1})	0.78 g
Design Earthquake Spectral Response Acceleration at Short Period (S_{DS})	1.00 g
Design Earthquake Spectral Response Acceleration at Period of 1 Second (S_{D1})	0.52 g
MCE Geometric Mean Peak Ground Acceleration Adjusted for Site Class (PGA_M)	0.50 g
Long-Period Transition Period (T_L)	12 seconds

4.1.4 Liquefaction and Lateral Spreading

As discussed above, groundwater appears to be intermittently present within the soil on the Lower Tank Pad due to natural or manmade seepage conditions. Recently collected data from the piezometer installed at the Lower Tank Pad (at the location of GD-C-1) show groundwater at a depth of about 25 feet (elevation 243 feet) within the deepest portions of colluvium above the schist bedrock. The colluvium encountered at these depths generally consist of medium dense silty and clayey sands. Conservatively assuming a groundwater depth of 25 feet, we analyzed the SPT data to assess the liquefaction potential using procedures published by Youd et al. (2001) considering a groundwater depth of 25 feet, a moment magnitude (M_w) of 8.1, and an MCE peak ground acceleration (PGA_M) of 0.5g. Based on the results of our analysis, there is a low risk of liquefaction potential at the site. One sample collected at a depth of about 31 feet in Boring GD-B-2, which is a clayey sand with 42 percent fines content, has a theoretical factor of safety against liquefaction less than 1.0. In our opinion, a soil with this fines content and plasticity will exhibit behavior of a cohesive soil and is not susceptible to liquefaction.

Maps showing liquefaction potential of quaternary deposits in Santa Cruz County (Dupre, 1975) indicate the terrace deposits (Qt) on portions of the Upper Pad of the site have a low potential for liquefaction. In general, given the relatively shallow bedrock conditions encountered and relatively deep groundwater levels in the portions of the site explored, the potential for soil liquefaction and lateral spreading is low.

4.1.5 Seismic Densification

One of the primary geotechnical considerations for the site is seismic densification. Seismic densification is a phenomenon in which non-saturated cohesionless soil is compacted by

earthquake vibrations. Seismically-induced densification or cyclic densification of non-saturated sand (sand above the groundwater table) due to earthquake vibrations can result in settlement of the ground surface. In general, the risk of seismic densification is low in portions of the site where relatively shallow bedrock was encountered during our exploration. At the Lower Tank Pad, we encountered fill and colluvium up to depths of about 35 feet. The fill and colluvium encountered in borings performed on the Lower Tank Pad are susceptible to seismic densification. Conservatively assuming groundwater depths considered under an MCE are greater than 35 feet, we estimate total settlements of up to about ½ inch can be expected as a result of seismic densification. We used a PGA_M value of 0.50g and an earthquake moment magnitude, M_W, of 8.1 in our analyses. Considering the variability in bedrock depths across the Lower Tank Pad, differential settlements from seismic densification could approach the total settlement magnitude.

4.1.6 Landslides

The preliminary map of landslide deposits developed by Cooper-Clark & Associates for Santa Cruz County (Cooper-Clark & Associates, 1975) include large landslide deposits (greater than 500 feet in maximum dimension) and small landslide deposits and gullies (50 to 500 feet in maximum dimension). This map indicates there are no landslide deposits at the site. Landslide deposits at the site were identified and mapped by a Certified Engineering Geologist during our exploration. These landslides appear to be relatively shallow and related to strength loss resulting from saturation of near-surface soil.

The locations of the mapped landslides are shown on Figure 2A and include a landslide that occurred in 2006 north of the Lower Tank Pad and an older landslide that occurred on the slope below the Lower Tank Pad. These landslides are referred to as the New Slide Area and Old Slide Area in previous geotechnical investigations (PCE, July 2006). Based on previous investigations performed by PCE, it appears the landslides occurred because of instability caused by saturation of relatively loose fills. PCE suggests the saturation of soils causing the landslide below the Lower Tank Pad may have resulted from overflow of water from the existing Filtered Water Tank (PCE, July 2006). We understand repairs to portion of the 2006 landslide included minor grading as well as surface and subsurface drainage improvements; the grading limits as part of these repairs are shown on Figure 2A.

Considering the relatively shallow depth of the landslides mapped at the site, the risk of impact to the proposed improvements is low. The risk can be further reduced by incorporating additional drainage improvements. Recommendations for drainage are provided in a subsequent section of this report.

4.1.7 Slope Stability

We performed stability analyses of the slope below the Lower Tank Pad. The subsequent sections summarize the parameters used and results of our analyses.

4.1.7.1 Shear Strength

We estimated shear strengths of the soil and bedrock materials based on the data collected from our exploration with reference to previous exploration data. The fill and colluvium encountered in our exploration are primarily silty and clayey sands with varying amounts of fines. For our analyses, we assigned equivalent drained and undrained shear strength parameters to the fill and colluvium and conservative equivalent Mohr-Coloumb strength parameters for the schist bedrock. The strength parameters summarized below were used in our static and seismic slope stability analyses.

	Cohesion, psf	**Friction Angle, degrees**
Fill (af)	200	36
Colluvium (Qc)	200	34
Schist (sch)	200	38

4.1.7.2 Existing Lower Tank Pad Stability

The location of the cross section used in our analyses corresponds to Cross Section A-A', which is located at the portion of the Lower Tank Pad with the thickest soil deposits, or maximum depth to schist bedrock, as shown on Figure 2A. The existing site grades represented on Cross Section A-A' are based on the Water Treatment Plant Topographic Map prepared by Bowman & Williams revised in 2008.

We evaluated the factor of safety of the slope below the Lower Tank Pad using the strength parameters provided above. Stability analyses were performed using Spencer's method to locate the most critical surfaces. For these analyses, we used the program Slide by Rocscience. The calculated static factor of safety for the slope below the Lower Tank Pad is about 1.3 for a groundwater depth of 25 feet. The corresponding critical failure surface is relatively shallow extending from the top of slope about 5 feet into the Lower Tank Pad. Slope failure surfaces extending into the tank pad greater than 10 feet horizontally have static safety factors greater than 1.5. Given the conservative assumption regarding ground water depth and the shallow depth of the critical slide surface, we conclude that the static stability safety factors are acceptable.

Given uncertainties in long-term groundwater levels corresponding to the design earthquake, we considered a deep and a relatively shallow long-term groundwater level at the Lower Tank Pad for seismic stability analyses. This includes a groundwater depth greater than 35 feet and a groundwater depth of 25 feet. We selected a pseudo-static yield coefficient based on the guidelines in California Geological Survey (CGS) Special Publication 117A considering an earthquake magnitude of 8.1, maximum horizontal ground acceleration (PGA_M = 0.5g), and distance to the controlling fault (9 ½ miles) for a 15-cm (6-inch) displacement threshold. Using this approach, a factor (f_{eq}) is applied to the peak ground acceleration to estimate the seismic

loading for pseudo-static stability analyses such that $K_h = f_{eq}$ x PGA. This results in the following for $f_{eq} = 0.5$:

- $K_h = 0.5 \times 0.5g = 0.25g$

Using a seismic coefficient of 0.25g, the calculated pseudo-static factor of safety is about 1.1 for a groundwater depth greater than about 35 feet. Accordingly, the risk of permanent seismic displacements of the slope below the existing tank pad for the maximum considered earthquake is low for this case. The calculated pseudo-static factor of safety is less than 1.0 for a groundwater depth of about 25 feet. Accordingly, the risk of permanent seismic displacements of the slope below the existing tank pad for the maximum considered earthquake is moderate for this case.

The results summarized above are based on the most conservative conditions on the Lower Tank Pad – the area with the thickest soil deposits. The critical failure surfaces based on a groundwater at a depth of 25 feet are relatively shallow and do not extend more than about 5 feet from the top of slope into the Lower Tank Pad. Considering the relatively shallow depth of the surfaces, the risk of impact to the proposed improvements is low. In addition, there are several factors that have not been accounted for that will result in higher safety factors including three-dimensional effects and planned ground improvement underneath the tanks. The results of our preliminary analyses will be updated in support of final design and will consider additional groundwater level data. If elevated ground water levels are continued to be measured, installation of hydro-augers within the colluvium could be considered to mitigate the slope stability risk.

4.2 Tank Settlement Under Static Loading

One of the primary geotechnical considerations for the New Reclaim Tank and New Filtered Water Tank on the Lower Tank Pad is compressible soils and the total and differential settlements under static loading. The natural soils underlying the Lower Tank Pad vary in thickness and are generally medium dense sands, which are moderately compressible under the anticipated tank loads. The new pad for the New Sludge Tanks and New Reclaim Tank will be underlain by shallow schist and Santa Margarita Sandstone bedrock; accordingly, we do not anticipate settlement to be a significant consideration for these tanks. An evaluation of total and differential settlement should be performed based on actual loading conditions once the tank design details and loads are developed.

We performed a preliminary settlement evaluation of the New Filtered Water Tank, which we understand will be a prestressed concrete tank up to about 75 feet in diameter and buried about 10 feet with a water depth of up to about 27 feet. For preliminary analyses, we modeled the tank load using a uniform bearing pressure of 2,000 pounds per square foot (psf). We estimated Young's Modulus values for the fill, colluvium, and underlying schist bedrock based on data collected during our exploration.

We performed settlement analyses using the program Settle3D (Rocscience). Settle 3-D is a 3-dimensional program for the analysis of vertical settlement under foundations, embankments, and surface loads. We estimate total settlements of up to about 2 to 3 inches as a result of compression of the soil under loads from the New Filtered Water Tank. Considering the preliminary estimates of seismic settlement of up to about ½ inch as summarized above, the proposed tanks at the Lower Tank Pad could experience total settlements of up to about 2 ½ to 3 ½ inches. Given the variability in bedrock depths across the Lower Tank Pad, maximum static and seismic differential settlements could approach the total settlement magnitudes. Based on our experience, these magnitudes of differential settlement will require mitigation. We provide preliminary recommendations for ground improvement to mitigate settlement in a subsequent section of this report. An evaluation of total and differential settlement should be performed based on actual loading conditions once the tank design details and loads are developed.

4.3 Excavatability

Based on conditions encountered during our exploration, the quality of the bedrock is likely to vary across the site. The Santa Margarita Sandstone (Tsm) encountered was generally decomposed, soft, and massive. In general, the schist rock (sch) encountered was intensely weathered, soft, and intensely fractured. However, we did encounter zones of moderately weathered, extremely hard, and moderately fractured schist. Based on variable bedrock conditions encountered, the ease of excavation will vary. It may range from soil-like in its excavatability to hard enough that it may require a large excavator mounted with a rock ripper or hoe ram. We provide this excavatability information for planning purposes only.

4.4 Soil Corrosion Potential

Corrosion potential for metal and concrete was estimated by performing water soluble sulfate, chloride, pH, and electrical resistivity tests. Results of these tests for fill and colluvium material are included in Appendix B and summarized in the table below.

Table 4. Corrosivity Laboratory Test Results

Boring	Depth [feet]	Redox [mV]	pH	Resistivity (100% Saturation) [ohms-cm]	Chloride [mg/kg]	Sulfate [mg/kg]
GD-B-2	3 to 3 ½	450	6.81	4,100	None Detected	39
GD-B-3	2 ½ to 3	460	4.76	1,800	None Detected	140

The test results included in Appendix B include an evaluation of corrosivity, which indicates the soil can be classified as corrosive based on resistivity and pH measurements, and preliminary recommendations for addressing corrosive soil conditions. electrical resistivity measurement indicates that the near-surface fill materials are corrosive. A corrosion engineer should be consulted for specific corrosion control recommendations.

5.0 PRELIMINARY RECOMMENDATIONS

5.1 Earthwork

The earthwork anticipated at the site will consist of clearing and grubbing; excavation for tank, pump station, and roadway widening; and excavation for pipelines and underground utilities. Earthwork will also include over-excavation and replacement of poor soils beneath foundations and placement of fill as well as subgrade preparation for foundation, slabs, and pavements. We anticipate the earthwork will also include export of surplus excavation material.

5.1.1 Clearing and Grubbing

Prior to grading, the areas to receive structures should be stripped of any vegetation or existing improvements. All deleterious materials generated during the clearing operations should be removed from the site.

5.1.2 Permanent Excavation and Grading

Alternative 5A includes permanent excavations that will be required for the construction of the new tank pad for the New Reclaim Tank, New Sludge Tanks, New Solids Dewatering Building, and associated pump stations north of the Lower Tank pad; the New Electrical Building south of the Lower Tank Pad; and widening of the roadway extending from the Water Plant entrance to the Lower Tank Pad.

The Lower Tank Pad is at about elevation 270 feet. We understand the New Reclaim Tank, New Sludge Tanks, New Solids Dewatering Building, and associated pump stations north of the Lower Tank Pad will be constructed at roughly the same grade as the Lower Tank Pad. In addition, the New Electrical Building will be constructed near the same pad elevation. Since the existing ground elevations in the area of the New Reclaim Tank and New Solids Dewatering Building to the north of the Lower Tank Pad range from about 265 to 295 feet, the grading in this area will require cuts up to about 25 feet and fills. Considering existing ground elevations in the area of the New Electrical Building range from about 270 to 280 feet, grading in this area will require cuts up to about 10 feet. We anticipate retaining walls will be required to support permanent cuts and fills. Preliminary recommendations for site retaining walls are provide in a subsequent section of this report.

For planning purposes, we assume that permanent cut slopes will be no steeper than 2 to 1 (horizontal to vertical). For cut slopes higher than about 25 feet, a drainage bench should be incorporated at about mid-slope. To reduce the risk of surface erosion, drainage facilities should be constructed at the tops of cuts to prevent runoff from flowing onto the slope. Additional recommendations for drainage are provided in a subsequent section of this report.

In general, we anticipate the existing bedrock can be excavated with conventional grading and excavation equipment. Localized zones of strong bedrock may be encountered. Based on variable

bedrock conditions encountered during our exploration, the ease of excavation will vary. It may range from soil-like in its excavatability to hard enough that it may require a large excavator mounted with a rock ripper or hoe ram. We provide this excavatability information for planning purposes only. Excavated bedrock will be suitable for use as general fill provided oversized materials greater than 3 inches in diameter have been removed.

Groundwater was not encountered at the time of our exploration. However, a potential seepage zone was encountered at a depth of about 16 feet in Boring GD-B-2 at the Lower Tank Pad. Localized perched groundwater and seepage could be encountered during excavation.

5.1.3 Temporary Excavations and Shoring

Temporary excavations for tank burial and tank subgrade over-excavation, new vertical turbine pumps, the UV disinfection building, new pipelines and utility trenches, or other construction should be properly sloped, if sufficient space, or shored. According to Cal/OSHA, the soils at the site are considered "Type C." If there is sufficient space, the temporary cut can be an open cut excavation with temporary slopes no steeper than 1 ½ to 1 (horizontal to vertical). Temporary cuts within bedrock can be made at slopes not steeper than ¾:1. The contractor should establish appropriate setback distances from the tops of excavations for vehicles, equipment, and spoil piles and should establish appropriate protective measures for exposed slope faces. The design of appropriate cut slopes is the sole responsibility of the contractor and should be in conformance with applicable Cal/OSHA Excavation and Trench Safety Standards.

Although not anticipated, any temporary excavations with adverse bedrock bedding inclinations should be constructed at 2:1 or flatter or properly shored. All temporary cut slopes should be mapped by a Group Delta Engineering Geologist to evaluate the impact of any adverse bedding, clay seams, or other adverse geologic conditions present. The slopes may need to be flattened or other appropriate measures recommended if unanticipated adverse conditions are encountered in the field.

Exposed slope faces should be kept moist (but not saturated) during construction to reduce local sloughing. All slopes will be subject to erosion and surficial sloughing during the rainy season. Appropriate measures should be taken to protect the slopes and/or provide maintenance of the slopes. No surcharge loads should be permitted within a horizontal distance equal to the height of the cut or within 5 feet, whichever is greater, from the top of the slopes unless the cut is shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of an existing structure foundation should be properly shored to maintain support of the adjacent structure. All excavation and shoring systems should meet the minimum requirements of the Cal/OSHA Excavation and Trench Safety Standards.

5.1.3.1 Temporary Shoring

Given the sequencing of tank construction on the Lower Tank Pad, shoring will be required for temporary excavations required for tank and structure burial where space does not allow for

temporary cuts. We anticipate shoring will consist of temporary walls consisting of soldier piles with tiebacks and/or secant piles. The piles would be installed in drilled shafts extending into schist bedrock. Special equipment may be needed to excavate holes for pile installation within harder zones of bedrock. Shoring design should consider lateral earth pressures, surcharge loads due to adjacent tanks, vehicle loads, and construction-related activities.

Temporary shoring walls can be designed for an active pressure using an equivalent fluid pressure of 40 pound per cubic foot (pcf). The passive resistance on the embedded portion of the soldier pile drilled pier holes can be estimated using an equivalent fluid pressure of 400 pcf. The top 1 foot of soil material should be neglected in passive resistance calculations. Passive resistance can be applied over 2 pier diameters. These values include a factor of safety of at least 2.

Soldier pile spacing can vary to avoid existing pipes and other obstructions. Construction of the temporary shoring walls should be top-down. The soldier piles should be installed first with the lagging added and any tiebacks installed as the excavation deepens. Gaps between lagging boards should be sufficient to allow for drainage of water behind the wall.

5.1.4 Fill Placement

Prior to placing new fill, the subgrade should be prepared by scarifying the exposed subgrade to a depth of 6 to 8 inches, moisture conditioning to optimum water content, and compacting the soil to at least 90 percent of maximum dry density determined in accordance with ASTM D1557. In general, compacted backfill should be placed in horizontal lifts, moisture-conditioned to at least optimum water content, and mechanically compacted to at least 90 percent of maximum dry density determined in accordance with ASTM D1557. The maximum lift thickness (before compaction) should not be greater than 12 inches. The moisture content of the fill materials should be between optimum and 2 percentage points over optimum to readily achieve the required degree of compaction.

For planning purposes, permanent cut and fill slopes should be constructed at a maximum inclination of 2 to 1 (horizontal to vertical). Slopes are expected to be globally stable at this inclination, but may experience surficial erosion and shallow sloughing. Any fill slopes should be properly keyed at the toe and benched into competent bedrock. The minimum key width should be 10 feet and the minimum depth of the key should be 3 feet. Benches should be limited to 2 feet in height. Fill slopes should be overbuilt 3 feet outside finish surface and trimmed back to the compacted core to achieve adequate compaction at the slope face. Native vegetation should be encouraged to grow as soon as possible on slopes to reduce the risk of erosion from wind and surface water. Pad drainage should be directed away from slopes and not allowed to flow over any slope face.

Any fill imported to the site should meet the following requirements for select fill. Select fill should consist of soil that is free of organic matter, contain no rocks or lumps larger than 3 inches in greatest dimension, have a liquid limit less than 40, and a plasticity index less than 12. This

material should be evaluated for conformance with these requirements by the Geotechnical Engineer. The Geotechnical Engineer should approve all sources of imported fill at least 3 days before use at the site. The grading subcontractor should provide analytical test results or other suitable environmental documentation indicating the imported fill is free of hazardous materials.

Heavy compaction equipment operating adjacent to subsurface tank walls can create excessive lateral pressures on the wall. We recommend that all fill within 5 feet of walls be compacted with hand-operated compactors. Tank wall backfill material, and material placed beneath tank foundations, should consist of select fill. Some of the excavated soil and bedrock may meet these criteria after removal of any oversized material. The optimum lift thickness will depend on the compaction equipment used and can best be evaluated in the field.

5.1.5 Drainage

Positive surface gradients should be provided adjacent to all structures to direct surface water runoff and drainage away from foundations and slabs toward suitable discharge facilities. Long-term ponding of surface water should not be allowed on pavements or near proposed structures. To reduce the risk of surface erosion and slope instability, drainage facilities should be constructed at the tops of slopes to prevent runoff from flowing onto slopes. A 10-foot-wide drainage bench should be incorporated at about mid-slope for cut slopes higher than about 25 feet.

An assessment of improvements of the existing surface and subsurface drainage facilities on site should be evaluated for conformance with these recommendations as part of the proposed improvements design.

5.2 Ground Improvement at Lower Tank Pad

We understand the New Reclaim Tanks and New Filtered Water Tank will be partially buried. Ground improvement will be required on the Lower Tank Pad underneath the New Reclaim Tank and New Filtered Water Tank in areas where excavations for tank burial will not extend to competent schist bedrock. Ground improvement will allow for the design and construction of a shallow foundation for tank support. For the New Reclaim Tank, we anticipate temporary excavations of about 15 feet, extending to about elevation 255 feet, will be required for tank burial. For the New Filtered Water Tank, we anticipate temporary excavations of about 15 feet, extending to about elevation 255 feet, will be required for tank burial. These approximate depths include anticipated sub-excavation below the tank floor elevations that will be needed for subgrade preparation and tank foundation construction.

Some of the poor soils will be removed because of the excavations required for burial of the New Reclaim Tank and New Filtered Water Tank while some of the poor soils will be left in place in areas where the excavations do not extend to schist bedrock. We estimate poor soils up to about 10 feet thick would be left in place underneath the New Reclaim Tank. In the area of the New

Filtered Water Tank, poor soils up to over 10 feet thick would be left in place. The portions of poor soils that remain in place underneath the tank footprint, and 10 feet beyond the tank outside diameter, will need to be improved. Ground improvement methods appropriate for this site include removal of poor soils or the improvement of poor soils in place. In addition to the New Reclaim Tank and New Filtered Water Tank, ground improvement be considered on the Lower Tank Pad in the areas of the pump stations, UV Building, and pipelines where poor soils are not completely removed by temporary excavations.

As discussed above, temporary shoring will be required to protect improvements and tanks adjacent to excavations required for tank burial. Removal of the soils by excavating to schist bedrock will require additional shoring to allow for deeper excavations. The table below summarizes the approximate maximum temporary shoring wall heights that would be associated with in-place ground improvement or removal and replacement. We provide preliminary recommendations for both methods below.

Table 5. Temporary Shoring and Ground Improvement

Alternative	Temporary Shoring Walls (Approximate Heights)		Ground Improvement Method
	New Reclaim Tank	New Filtered Water Tank	
5A	15 to 25 feet	15 to 25 feet	Removal and Replacement
5A	15 feet	15 feet	In-Place Ground Improvement

5.2.1 Removal and Replacement

The most efficient method for removal of the poor soils would include excavations to competent schist bedrock, extending below depths required for tank burial, and replacement of the poor soils with Controlled Low Strength Material (CLSM). This would require deeper temporary excavations and shoring walls that would allow for excavations to the top of schist bedrock as shown in the table above. CLSM would be placed underneath the tank footprint and 10 feet beyond as part of tank subgrade preparation. From a cost perspective, the advantage of this ground improvement method over in-place soil improvement is that it allows for more conventional earthwork-type ground improvement, which would be less expensive than in-place improvement. The disadvantage over in-place improvement is that this ground improvement method would require more expensive temporary shoring walls.

5.2.2 In-Place Ground Improvement

As an alternative to removal, in-place ground improvement, such as aggregate piers or stone columns, jet grouting, wet soil mixing, or rigid inclusions, can be installed in areas where the poor soils remain in place below depths required for tank burial. Pre-drilling holes through dense and

hard soil layers on the Lower Tank Pad introduce challenges and added cost for methods like aggregate piers or stone columns that rely on penetration of a mandrel or down-hole vibrator less attractive. Jet grouting requires a minimum amount of soil overburden that is not practical considering the anticipated site conditions. Wet soil mixing would be a more feasible method than jet grouting, but would be more expensive than rigid inclusions, which is likely the most appropriate and cost effective in-place ground improvement method for the site. Rigid inclusions are stiff columns that transfer loads through poor soils to underlying competent schist bedrock. The columns generally consist of aggregate mixed with cement or grout and can also include elements made of plain concrete. Some methods include the displacement of soils and pumping of grout, which can provide additional ground improvement through the densification of granular soils.

The design of the ground improvement should be performed by a design-build ground improvement contractor. Group Delta will develop specific criteria to support design-build procurement of the ground improvement including allowable settlement and bearing capacity. The ground improvement contractor will provide a design-build submittal including the layout and depths of the proposed in-place ground improvement method based on the loads and improvement required to achieve the settlement and bearing capacity. If a rigid inclusion ground improvement system is installed, we anticipate that columns spaced 6 to 8 feet on center will be required. In addition, construction of a 3-foot-layer of select fill reinforced with geogrid underneath the tank foundation will be required to allow for a more uniform distribution of tank loads to the ground improvement elements. The ground improvement elements could be installed from the rough tank pad subgrade, following temporary shoring and excavation for tank pad preparation, and would extend into the underlying schist bedrock improving the poor soils left in place.

5.3 Tank Foundations and Walls

The primary consideration from a geotechnical perspective includes settlement of poor soils on the Lower Tank Pad. Ground improvement will allow for the construction of a shallow foundation for the New Reclaim Tank and New Filtered Water Tank. The New Reclaim Tank and the New Sludge Tanks north of the Lower Tank Pad will be constructed almost entirely in a cut condition with schist bedrock exposed at or near the tank pad elevation. All tanks except the New Sludge Tanks will be buried and accordingly, constructed of concrete. The New Sludge Tanks will be steel tanks constructed at grade. We provide preliminary recommendations for tank subgrade preparation and design for tank foundation and subsurface walls below.

5.3.1 Tank Subgrade Preparation

We recommend that the foundations be underlain by a 3-foot layer of select fill, compacted to 95 percent relative compaction, extending to a horizontal distance at least 3 feet outside the tank foundation footprint to provide a uniform support to the foundation. Prior to placement of select fill in areas where excavations are not backfilled with CLSM, we recommend the exposed

subgrade be scarified to a depth of 6 to 8 inches, moisture conditioned to optimum water content, and compacted to at least 95 percent of maximum dry density determined in accordance with ASTM D1557. Subgrade preparation in areas to receive CLSM will not be needed. If a rigid inclusion ground improvement system is installed, we recommend the 3-foot-thick layer of select fill be reinforced with geogrid to allow for a more uniform distribution of tank loads to ground improvement elements.

5.3.2 Foundations and Allowable Bearing Pressures

The schist bedrock materials encountered at the site are of low compressibility and provide adequate foundation support for the proposed tanks. At the Lower Tank Pad, the New Reclaim Tank and New Filtered Water Tank can be supported on a shallow foundation underlain by CLSM or ground improvement extending to schist bedrock. The New Reclaim Tank and Sludge Storage Tanks north of the Lower Tank Pad can be supported on a shallow foundation underlain by schist bedrock. We provide our recommendations for foundation design and construction below.

The proposed tanks can be supported on a perimeter ringwall footing with a slab and internal footings for column support as needed (internal footings not required for a dome roof). The widths of footings should not be less than 24 inches. All footings should have a minimum embedment of 24 inches below the lowest adjacent grade bearing on aggregate base. An allowable bearing pressure of 4,000 psf (net value) may be used. Higher bearing pressures may be allowed for specific conditions, if required. For temporary loads, such as wind and seismic, the maximum allowable bearing pressure may be increased by one-third. Footings located adjacent to an existing slope should have a minimum set back of 10 feet from the bottom of the footing to the slope face.

5.3.3 Estimated Settlements

In general, the unloading due to excavation comprises a fraction of the tank loads and the tank loads will ultimately be transferred to the underlying schist bedrock where rock is shallow or through ground improvement extending to schist bedrock. Settlements will occur due to loads from the weight of the tank, roof, and storage contents. Differential settlement is typically more significant for tanks with flat roofs supported by interior columns with the maximum total settlement occurring at the interior columns and maximum differential settlement occurring between the slab and columns. An evaluation of total and differential settlement should be performed based on actual loading conditions once the tank sizes and other design information is finalized.

5.3.4 Lateral Load Resistance

Resistance to lateral loads may be provided by frictional resistance between the bottom of tank and the underlying soils and by passive soil pressure against the sides of the footings and subsurface tank walls for buried concrete tanks. We anticipate aggregate base will be placed underneath the tank foundation. The coefficient of friction between cast-in-place concrete

footings/slab and underlying compacted aggregate base may be taken as 0.4. The coefficient of friction between a steel tank bottom and underlying compacted aggregate base may be taken as 0.3. The passive pressure available in compacted fill may be taken as equivalent to the pressure exerted by a fluid weighing 400 pounds per cubic foot (pcf). The passive earth pressure should be limited to 1,500 psf.

The above-recommended values include a factor of safety of at least 1.5; therefore, frictional and passive pressure resistance may be used in combination without reduction. Passive resistance assumes that minimum setback from top of slope is maintained in accordance with recommendations provided above and that the perimeter footing is confined by pavement.

5.3.5 Subsurface Wall Recommendations

5.3.5.1 Lateral Earth Pressures

The following recommendations are provided for the design of buried portions of the tanks. Subsurface tank walls should be designed to withstand lateral earth pressures. The at-rest earth pressure can be assumed as an equivalent fluid pressure of 55 pounds per cubic foot (pcf) for level backfill and drained conditions. Additional lateral pressure to account for seismic earth pressure may be considered as an equivalent fluid pressure of 15 pcf, considering 2016 California Building Code design earthquake ground motions, can be used for seismic design.

Walls subject to surcharge loads (such as vehicle loads) should be designed for an additional uniform lateral pressure equal ½ of the surcharge pressure. The additional pressure from surcharge loads can be reduced to negligible levels if the loading is maintained beyond a distance equal to the height of the wall.

5.3.5.2 Wall Drainage

The buried portions of tank walls should be constructed with a properly designed drainage system behind the wall to prevent the buildup of hydrostatic pressures. This may consist of a geocomposite drain board or 12 inches of clean crushed rock encapsulated in filter fabric and discharging to drain pipes. If drainage is not incorporated, the walls should be designed for hydrostatic pressures.

5.4 Ancillary Structures

Ancillary structures include the New Pump Stations, New Solids Dewatering Building, New UV Disinfection Building, and New Electrical Building. Preliminary recommendations for the design of these ancillary structure foundation and subsurface walls are provided below.

5.4.1 Foundations

The New Solids Dewatering Building, New Reclaim Pump Station, New Sludge Pump Station, New Sludge Dewatering Pump Station, New Filtrate Wet Well and Pump Station, and New Electrical

Building are underlain by relatively shallow bedrock. We anticipate the New Solids Dewatering and Electrical Buildings will be supported on a shallow foundation. In addition, we anticipate the canned vertical turbine pumps at the New Reclaim and Wash Water Supply Pump Stations and the wet well at the New Filtrate and Wet Well Pump Station will be supported on a mat foundation.

Schist bedrock in the area of the UV Disinfection Building, Wash Water Supply Pump Station, and Reclaim Solids Transfer Pump Station is up to about 20 feet below existing pad grade. Ground improvement in these areas should be anticipated to mitigate settlement to the extent necessary for shallow foundation support. Alternatively, structural mitigation solutions such as a mat foundation or drilled piers extending to schist bedrock can be considered.

The temporary excavations required for canned vertical turbine pumps and wet wells should extend to the edge of the pump station slab such that the pump station slab constructed near existing grades will be supported on a uniformly thick layer of moisture-conditioned and compacted fill.

5.4.2 Subsurface Walls

5.4.2.1 Lateral Earth Pressures

The following recommendations are provided for the design of buried portions of the tanks. Subsurface tank walls should be designed to withstand lateral earth pressures. The at-rest earth pressure can be assumed as an equivalent fluid pressure of 55 pounds per cubic foot (pcf) for level backfill and drained conditions. Additional lateral pressure to account for seismic earth pressure may be considered as an equivalent fluid pressure of 15 pcf, considering 2016 California Building Code design earthquake ground motions, can be used for seismic design.

Walls subject to surcharge loads (such as vehicle loads) should be designed for an additional uniform lateral pressure equal ½ of the surcharge pressure. The additional pressure from surcharge loads can be reduced to negligible levels if the loading is maintained beyond a distance equal to the height of the wall.

5.4.2.2 Lateral Load Resistance

Resistance to lateral loads may be provided by passive soil pressure against the sides of the buried portions of the walls for the canned vertical turbine pumps. The passive pressure available in compacted fill may be taken as equivalent to the pressure exerted by a fluid weighing 400 pounds per cubic foot (pcf). Passive resistance assumes that minimum setback from top of slope is maintained in accordance with recommendations provided above and that the perimeter footing is confined by pavement.

5.4.2.3 Wall Drainage

The walls should be constructed with a properly designed drainage system behind the wall to prevent the buildup of hydrostatic pressures. This may consist of a geocomposite drain board or 12 inches of clean crushed rock encapsulated in filter fabric and discharging to drain pipes. If drainage is not incorporated, the walls should be designed for hydrostatic pressures.

5.5 Site Retaining Walls

We anticipate retaining walls will be required to support permanent cuts for the construction of the new pad north of the Lower Tank Pad as well as for the construction of the New Electrical Building pad. A combination of permanent cut slopes and retaining walls may be considered for the roadway widening. We provide preliminary recommendations for site retaining walls below.

5.5.1 Soil Nail Walls

Soil nail walls may be considered for vertical support of permanent cuts. A soil nail wall is a reinforced soil gravity structure in which steep cuts may be stabilized by drilling, installing, and grouting closely-spaced linear steel reinforcing elements laterally into the earth. Unlike tiebacks, soil nails are not post tensioned. Construction is performed incrementally in vertical steps (typically 5 feet) starting at the top of the excavation and proceeding downward. Permanent facings for the soil nail walls will consist of reinforced shotcrete. Soil nailing is well suited to retaining cuts because no excavation is required behind the wall. Soil nail walls typically displace laterally 0.1 to 0.3 percent of the wall height during construction, but this could be less in competent bedrock and for walls constructed with a batter rather than a vertical face. Based on these guidelines and a 30-foot-high wall, the maximum permanent lateral displacement of the top of the wall is likely to be on the order of ¾ inch. A load-testing program is generally performed during installation of production soil nails, with about 5 percent of the nails installed being load tested.

Soil nail walls have been constructed on Federal Highway projects up to heights of about 40 feet. We anticipate that the length of soil nails will be on the order of 80 to 100 percent of the retained height. We recommend that the walls be designed in general accordance with the FHWA guidelines (Report No. FHWA0-IF-03-017) and other applicable standards.

Internal stability for the soil nail walls can be analyzed using the Caltrans computer program SNAILZ. Geotechnical parameters for the internal stability design of the soil nail walls will be required. Global stability analyses of the permanent cuts including the soil nail walls will need to be performed once final tank size and location have been determined.

The walls should be constructed with a properly designed drainage system behind the wall to prevent the buildup of hydrostatic pressures. This may consist of a geocomposite drain board discharging to weep holes or drain pipes. If drainage is not incorporated, the walls should be designed for hydrostatic pressures.

Global and internal slope stability of a typical soil nail wall should be performed once grading plans are developed. Detailed design of the soil nail walls should be performed by an experienced design-build contractor using the recommended parameters provided by Group Delta. Group Delta should review and approve the shop drawing submittals prior to construction. Alternately, Group Delta can provide the services for design and preparation of plans for the soil nail walls.

5.5.2 Cantilever Retaining Walls

Cantilever retaining walls including soldier pile and tieback walls may be considered for vertical support of permanent cuts. We anticipate soldier piles would be installed in drilled shafts extending into schist bedrock. Coring may be needed to excavate holes for pile installation within harder zones of schist bedrock. Shoring design should consider lateral earth pressures, surcharge loads due to adjacent structures, vehicle loads, and construction-related activities.

Cantilever walls can be designed for an active pressure using an equivalent fluid pressure of 40 pound per cubic foot (pcf). The passive resistance on the embedded portion of the soldier pile drilled pier holes can be estimated using an equivalent fluid pressure of 400 pcf. The top 1 foot of soil material should be neglected in passive resistance calculations. Passive resistance can be applied over 2 pier diameters. These values include a factor of safety of at least 2.

Soldier pile spacing can vary to avoid existing pipes and other obstructions. Construction of the temporary shoring walls should be top-down. The soldier piles should be installed first with the lagging added and any tiebacks installed as the excavation deepens.

The retaining walls should be constructed with a properly designed drainage system behind the wall to prevent the buildup of hydrostatic pressures. This may consist of a geocomposite drain board or 12 inches of clean crushed rock encapsulated in filter fabric and discharging to weep holes or drain pipes. If drainage is not incorporated, the walls should be designed for hydrostatic pressures.

Precast and cast-in-place concrete retaining walls supported on drilled piers extending to rock or shallow foundations bearing on rock can be considered for walls to support fills. An evaluation of other wall types for fill conditions, such as mechanically stabilized earth walls, can be performed once grading plans are developed.

5.6 Pipeline and Utility Trenches

If ground movements are unacceptable, ground improvement may be considered in the areas of the New Pipelines and underground utilities. We provide preliminary recommendations for New Pipelines and underground utilities below.

5.6.1 Excavation and Shoring

Excavations for utility trenches within the bedrock material should be achievable with conventional excavating equipment. Based on variable bedrock conditions encountered, the ease of excavation will vary. It may range from soil-like in its excavatability to hard enough that it may require a large excavator mounted with a rock ripper or hoe ram. We provide this excavatability information for planning purposes only. All shoring and excavation should comply with current Cal/OSHA regulations and be observed by the designated competent person on site.

5.6.2 Bedding and Backfill

At a minimum, the bedding and backfill shall satisfy the requirements of Standard Specifications for Public Works Construction and City requirements. An evaluation of the use of on-site excavated materials as backfill can be performed based on the project requirements. We anticipate that if any on-site material is used as backfill, boulders or cobbles larger than 3 inches in any dimensions should be removed before backfilling. We recommend that all backfill should be placed in lifts not exceeding 6 to 8 inches in thickness and be compacted to at least 90 percent of maximum dry density as determined by the ASTM D1557. The upper 12 inches below pavement should be compacted to at least 95 percent of maximum dry density. Mechanical compaction will be required to accomplish compaction above the bedding along the entire pipeline alignments. Jetting is not an acceptable means of compaction.

In backfill areas, where mechanical compaction of soil backfill is impractical due to space constraints, sand-cement slurry may be substituted for compacted backfill. The slurry should contain one sack of cement per cubic yard and have a maximum slump of 5 inches. When set, such a mix typically has the consistency of hard compacted soil and allows for future excavation.

5.7 Preliminary Pavement Design

Based on the variability of the soils/bedrock at the surface, sections for new pavements are based on an average R-Value of 10. Pavement sections have been calculated using Caltrans pavement design guidelines (R-Value of 78 assumed for Class 2 Aggregate Base). The upper 12 inches of pavement subgrade and aggregate base material should be moisture conditioned to at least optimum moisture content and compacted to at least 95 percent relative compaction. Various calculations using different Traffic Index (TI) values were performed to obtain the design pavement section for the site. We recommend the pavement thicknesses shown in the following table for various TI values using an R-Value of 10 for the subgrade.

Table 6. Preliminary Pavement Design

T.I.	5	6	7	8	9	10
AC (inches)	3	3	4	5	6	6
AB (inches)	9	13	15	16	18	22

6.0 POST-REPORT GEOTECHNICAL INPUT

Geotechnical services will be required in support of final design and during construction. It is recommended that Group Delta review the project plans and specifications prior to finalization to verify that our recommendations are properly interpreted and incorporated into the construction documents. During construction, the site grading should be performed under the observation and testing of the project geotechnical engineer. This includes the evaluation of the proposed tank excavation, any landslide removal, excavated bottoms, construction and load testing of soil nails, and placement of compacted fill and backfill. This will allow for Group Delta to recommend appropriate changes if conditions differ from those described herein.

7.0 LIMITATIONS

The report, exploration logs, and other materials resulting from Group Delta's efforts were prepared exclusively for use by West Yost Associates and their consultants in support of project design. The report is not intended to be suitable for reuse on extensions or modifications of the project or for use on any project other than the currently proposed development. This report may not contain sufficient or appropriate information for such uses. If this report or portions of this report are provided to contractors or included in specifications, it should be understood that they are provided for information only.

This report presents recommendations pertaining to the subject site based on the assumptions that the subsurface conditions do not deviate appreciably from those disclosed by Group Delta's subsurface exploration. In view of the general geology of the area, the possibility of different conditions cannot be discounted. It is the responsibility of the owner to bring any deviations or unexpected conditions observed during construction to the attention of the Geotechnical Engineer. This will allow for any required supplemental recommendations to be made with minimum delays.

This investigation was performed in accordance with generally accepted geotechnical engineering principles and practice. The professional engineering work and judgments presented in this report meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made.

8.0 REFERENCES

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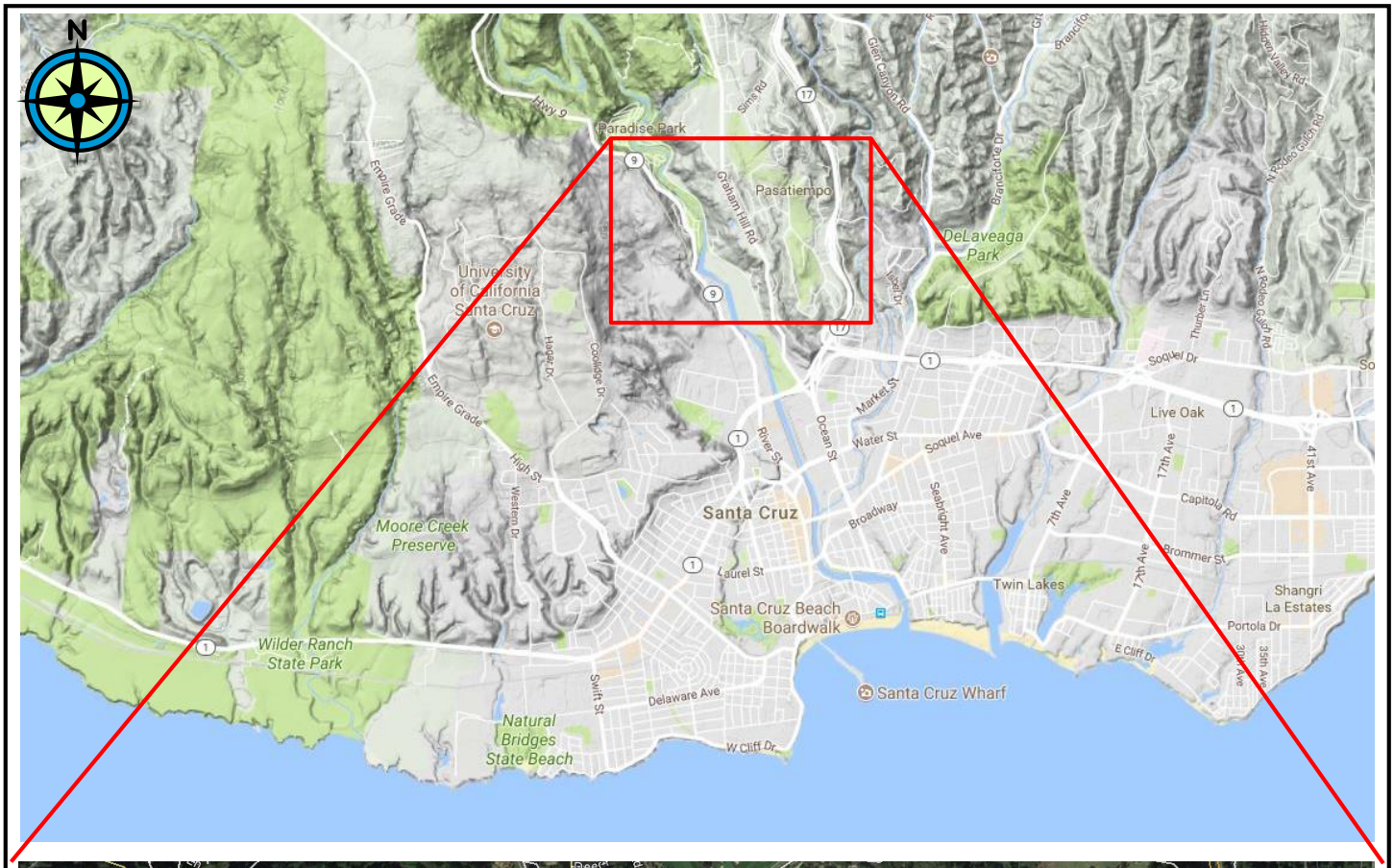
Pacific Crest Engineering, Inc. (November 2006). Geotechnical Investigation, New Slide Area – Additional Borings, 715 Graham Hill Road Santa Cruz, California. November 6, 2006.

Pacific Crest Engineering, Inc. (December 2006). Geotechnical Investigation, Lower Level Water Tanks, 715 Graham Hill Road, Santa Cruz, California. December 6, 2006.

Figures



Reference: Images taken from Google Maps and Google Earth.

Project Location

GROUP DELTA

Project No. BA036

Graham Hill Water Treatment Plant
Tank Improvements
Santa Cruz, California

Figure 1 – Vicinity Map

FACILITY:

1. FILTERED WATER TANK
2. UV DISINFECTION SYSTEM
3. RECLAIM TANK
4. SLUDGE EQ TANK
5. SOLIDS DEWATERING BUILDING
6. RECLAIM PUMP STATION
7. WASH WATER SUPPLY PUMP STATION
8. RECLAIM TANK SOLIDS TRANSFER PUMP STATION
9. SLUDGE PUMP STATION
10. SLUDGE DEWATERING PUMP STATION
11. FILTRATE WET WELL AND PUMP STATION
12. ELECTRICAL BUILDING

LEGEND:

- A A' — CROSS SECTION
- APPROXIMATE SCHIST BEDROCK ELEVATION CONTOURS
- APPROXIMATE GEOLOGIC CONTACT
- B-14 — APPROXIMATE LOCATIONS OF PREVIOUS BORINGS (PCE)
- 2 — APPROXIMATE LOCATIONS OF PREVIOUS BORINGS (D&M)
- APPROXIMATE LOCATIONS OF BORINGS
- GD-B-14 — APPROXIMATE LOCATIONS OF BORINGS
- GD-C-1 — APPROXIMATE LOCATIONS OF CORES

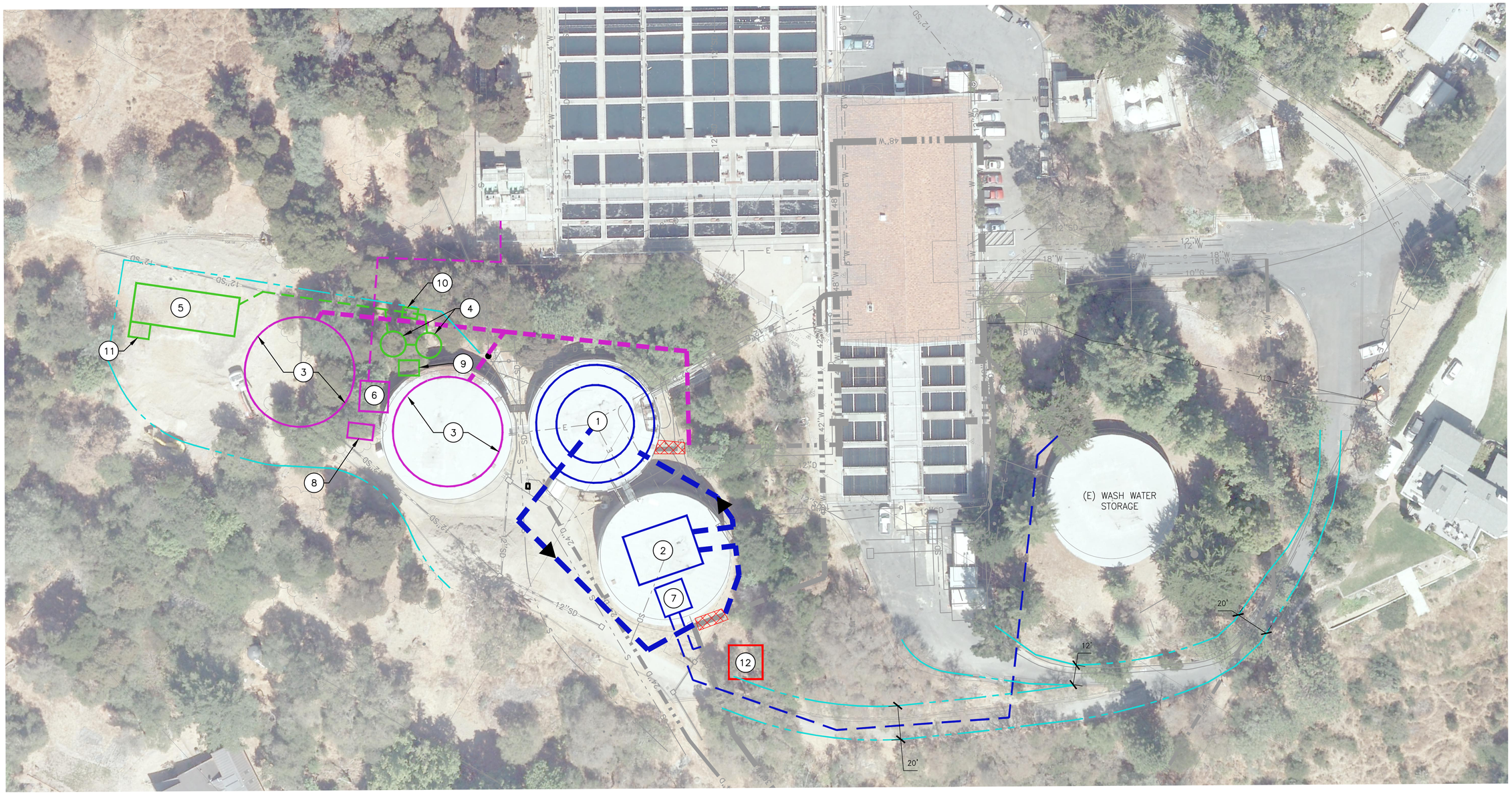
af	Artificial fill
Qls	Landslide deposit
Qc	Colluvium
Qt	Terrace deposits (Pleistocene)
Tsm	Santa Margarita Sandstone (Miocene)
sch	Schist (Mesozoic or Paleozoic)

Notes:

1. Piezometer installed at GD-B-1and GD-C-2 - see boring logs for detail.
2. Existing borings from Pacific Crest Engineering (2006 and 2009) and Dames and Moore (1959). Location are approximate.
3. Proposed structure locations from West Yost Associates, Graham Hill Water Treatment Plant Tank Improvements Alternative 5A.
4. Grading limits for 2007 slide repairs taken from Sheet C1.0 (Grading Plan at New Slide) prepared by Mesiti-Miller Engineering, Inc. latest revision date 06/30/2008.

0 50' 100'

DATE: 8/8/17	DRAWN BY: KM/JMT	GROUP DELTA CONSULTANTS, INC 255 YGNACIO VALLEY RD., SUITE 200 WALNUT CREEK, CA. 94596	SITE PLAN GRAHAM HILL WATER TREATMENT PLANT TANK IMPROVEMENTS SANTA CRUZ, CALIFORNIA
REVISION: 02/21/2018	APPROVED BY: BS		PROJECT NUMBER: BA-036
REVISION: --			SCALE: AS SHOWN
			FIGURE NUMBER: 2A



NOTES:

NOT ALL PIPING CONNECTIONS AND PROPOSED SYSTEMS SHOWN FOR CLARITY.

0 30 60
SCALE IN FEET

FIGURE 2B

QA/QC REVIEW: _____ DATE: _____

THIS LINE IS 1 INCH AT FULL SCALE IF NOT SCALE ACCORDINGLY

SCALE : AS SHOWN
DRAWN BY : DAP
DESIGNED BY : CMT
PROJ. MGR. : JLW

No.	ZONE	REVISIONS	BY	DATE

WEST YOST ASSOCIATES
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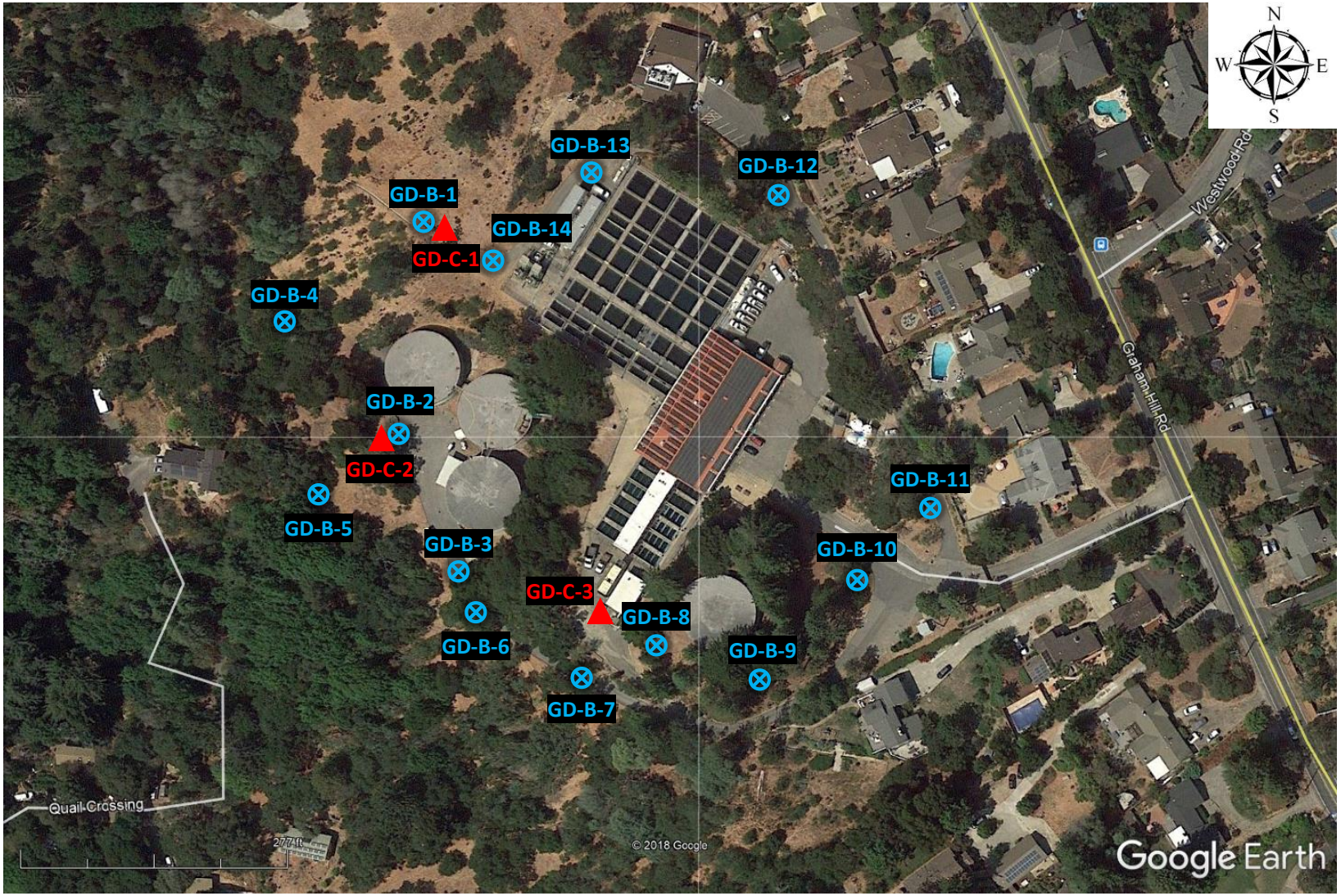
CITY OF SANTA CRUZ

GRAHAM HILL WATER TREATMENT PLANT TANK IMPROVEMENTS

ALTERNATIVE 5A

JOB NUMBER 698-14-16-01
DRAWING NUMBER **C06**
SHEET NUMBER X OF XX
REVISION -

N:\Clients\698 City of Santa Cruz\14-16-01 GHWTP Tank Imprvmts\CAD\Figures\Alternative Layouts-5A.dwg 1/2/2018 12:01 PM dpezzini



EXPLANATION

GD-B-14 APPROXIMATE LOCATION OF BORING

GD-C-3 APPROXIMATE LOCATION OF CORE

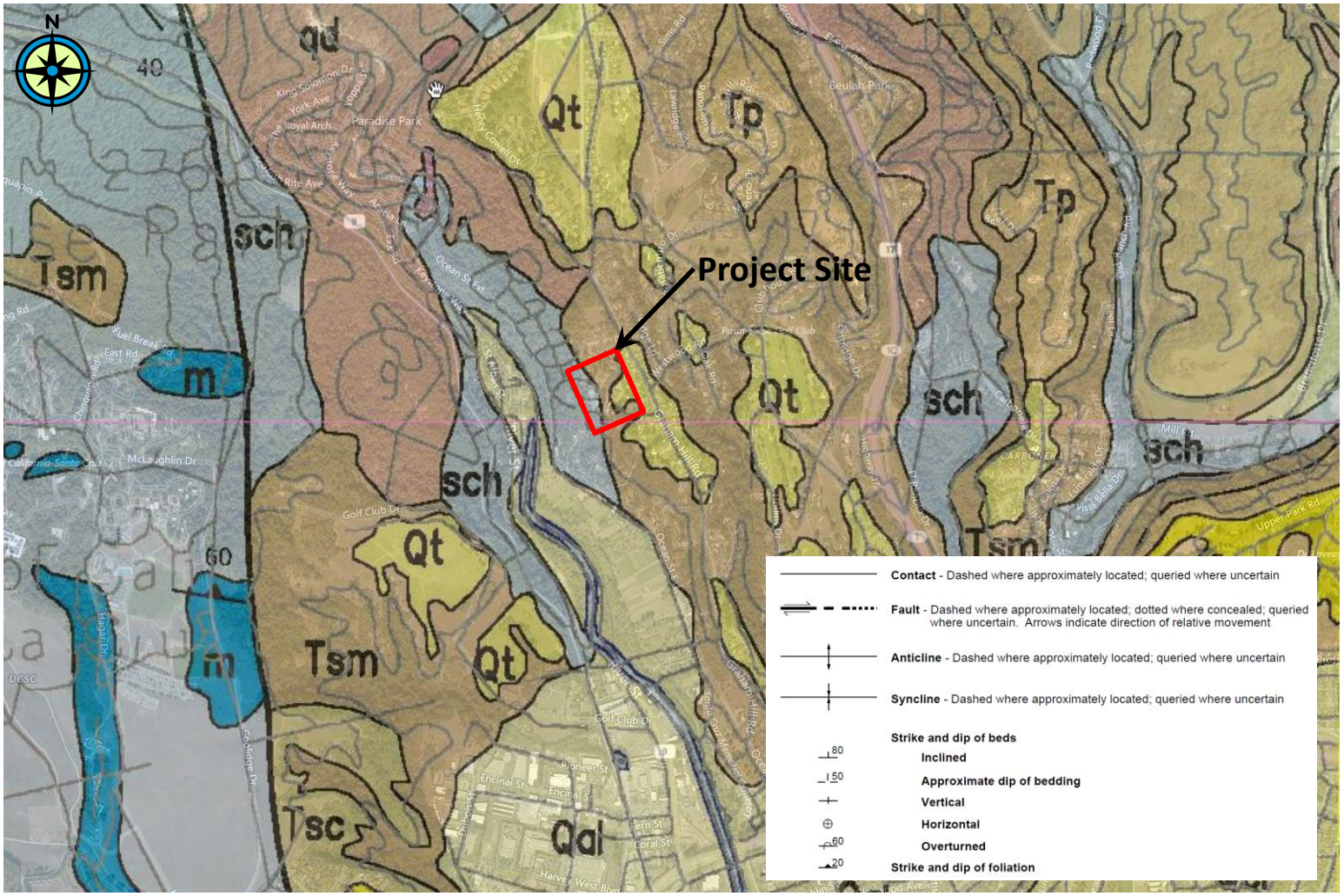
GROUP DELTA

Project No. BA036

Graham Hill Water Treatment Plant
Tank Improvements
Santa Cruz, California

Figure 3 – Current Exploration Plan

Reference: Google Earth (2018)



EXPLANATION

Qal	Alluvial deposits, undifferentiated (Holocene)	Tp	Purisima Formation (Pliocene and upper Miocene)
Qt	Terrace deposits, undifferentiated	sch	Metasedimentary rocks (Mesozoic or Paleozoic)
Tsm	Santa Margarita Sandstone (upper Miocene)	qd	Quartz diorite (Cretaceous)
Tsc	Santa Cruz Mudstone (upper Miocene)		

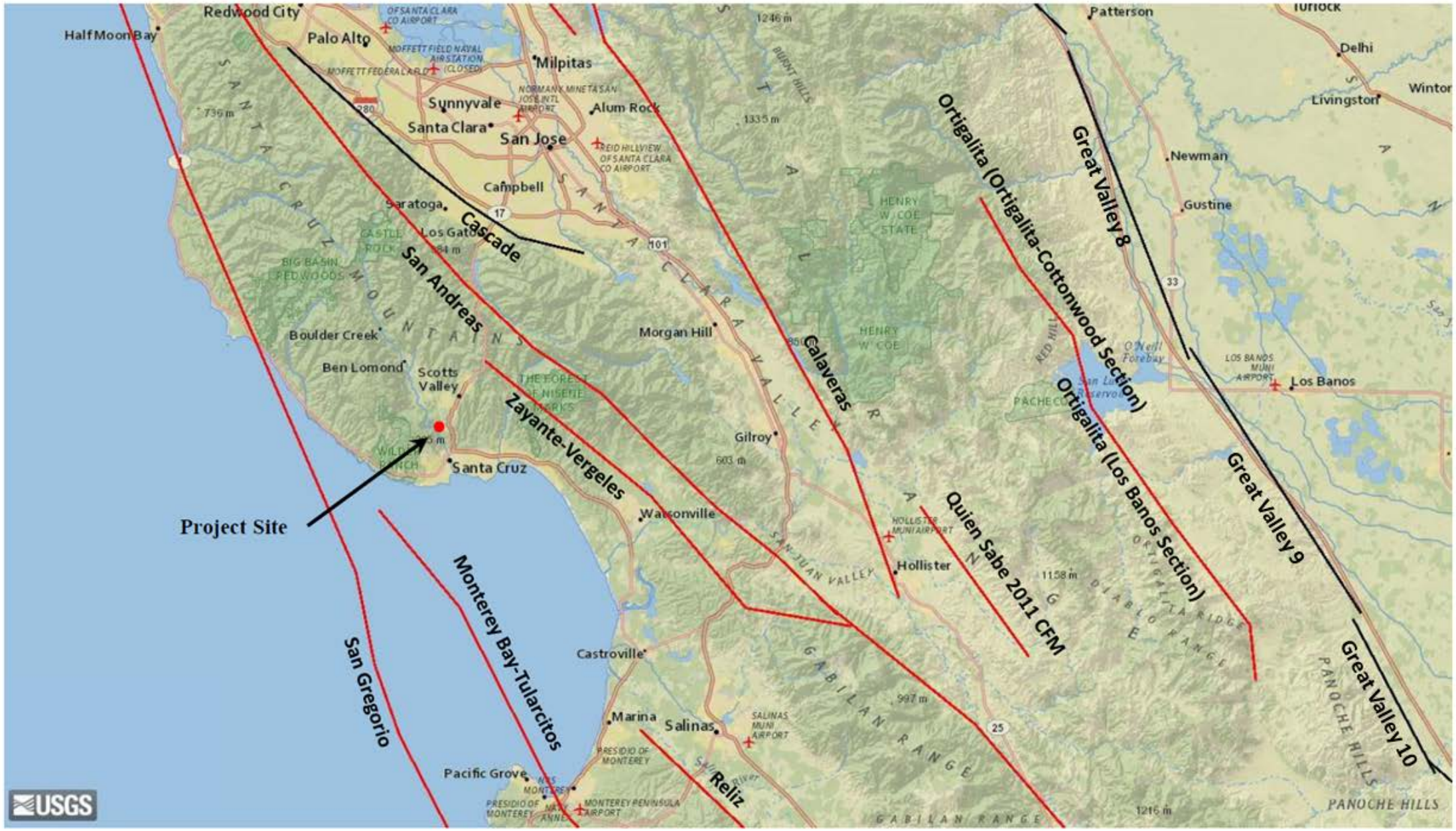
GROUP DELTA

Project No. BA036

Graham Hill Water Treatment Plant
Tank Improvements
Santa Cruz, California

Figure 4 – Geologic Map

Geologic Map of Santa Cruz County, California. USGS. Compiled by Earl E. Brabb (1989).
Digital Database Prepared by S. Graham, C. Wentworth, D. Knifong, R. Graymer, and J. Blissenback (1997). USGS Open-File Report 97-489.



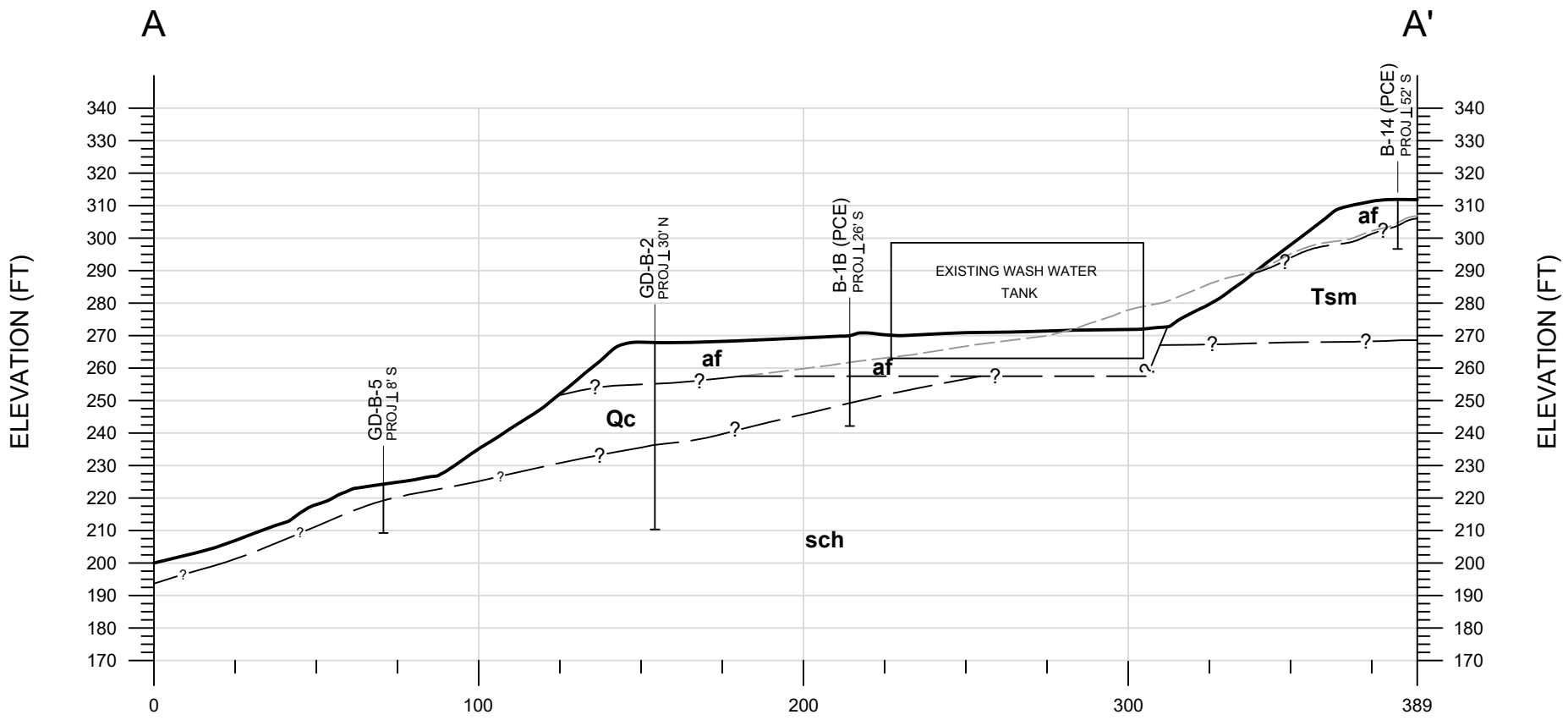
REFERENCE: USGS 2008 UNITED STATES NATIONAL SEISMIC HAZARD MAPS

GROUP DELTA

Project No. BA036

Graham Hill Water Treatment Plant
Tank Improvements
Santa Cruz, California

Figure 5 – Regional Fault Map



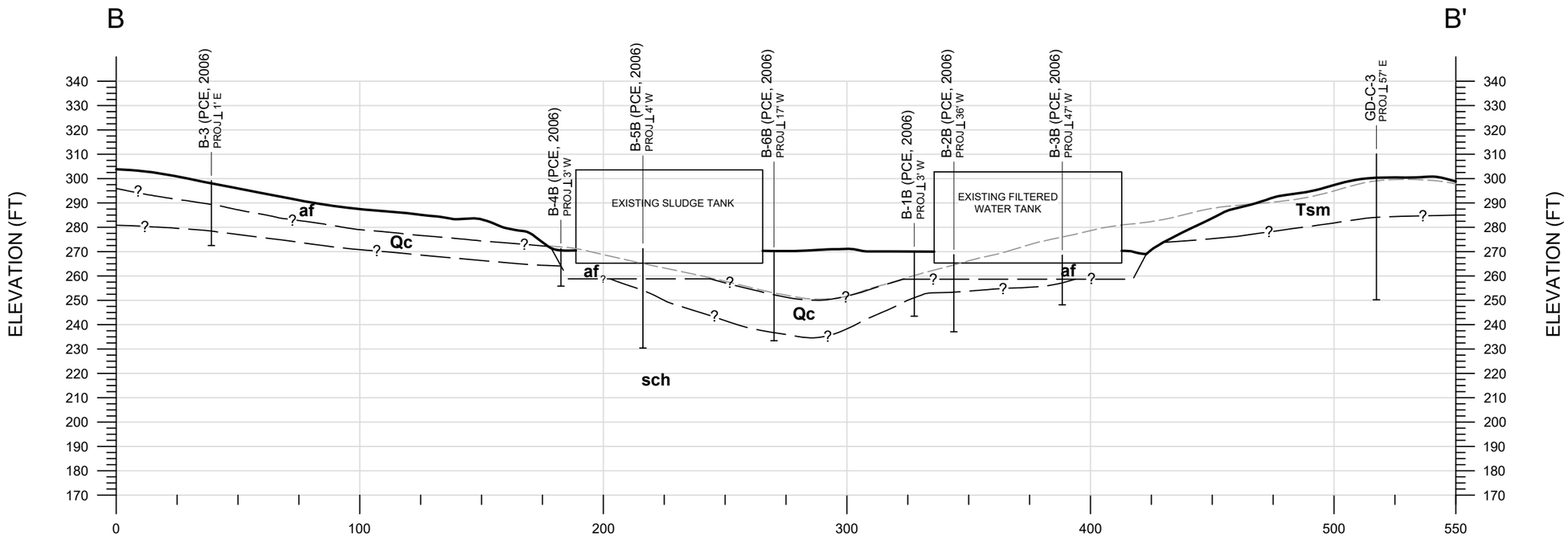
Legend

af	Artificial Fill	———	Existing grade
Qc	Colluvium	– – – –	Original grade
Tsm	Santa Margarita Formation	——?——	Approximate geologic contact; queried where uncertain
sch	Schist		

Notes:

1. Original grade referenced from Grading and Drainage Plan (Drawing G-6, dated October 1959).
2. Existing grade referenced from AutoCAD file provided by City of Santa Cruz.
3. Some borings are projected. Distance and direction to actual location shown, where applicable.

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 255 YGNACIO VALLEY RD., SUITE 200 WALNUT CREEK, CA. (510) 671-0010	FIGURE NUMBER: 6
PREPARED BY: KM	PROJECT NAME: GRAHAM HILL WATER TREATMENT PLANT TANK IMPROVEMENTS SANTA CRUZ, CALIFORNIA	PROJECT NUMBER: BA036
REVISION BY: -	CROSS SECTION A-A'	



Legend

af	Artificial Fill	———	Existing grade
Qc	Colluvium	– – – –	Original grade
Tsm	Santa Margarita Formation	——?——	Approximate geologic contact; queried where uncertain
sch	Schist		

Notes:
1. Original grade referenced from Grading and Drainage Plan (Drawing G-6, dated October 1959).
2. Existing grade referenced from AutoCAD file provided by City of Santa Cruz.
3. Some borings are projected. Distance and direction to actual location shown, where applicable.

GROUP DELTA

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FIGURE NUMBER: 7

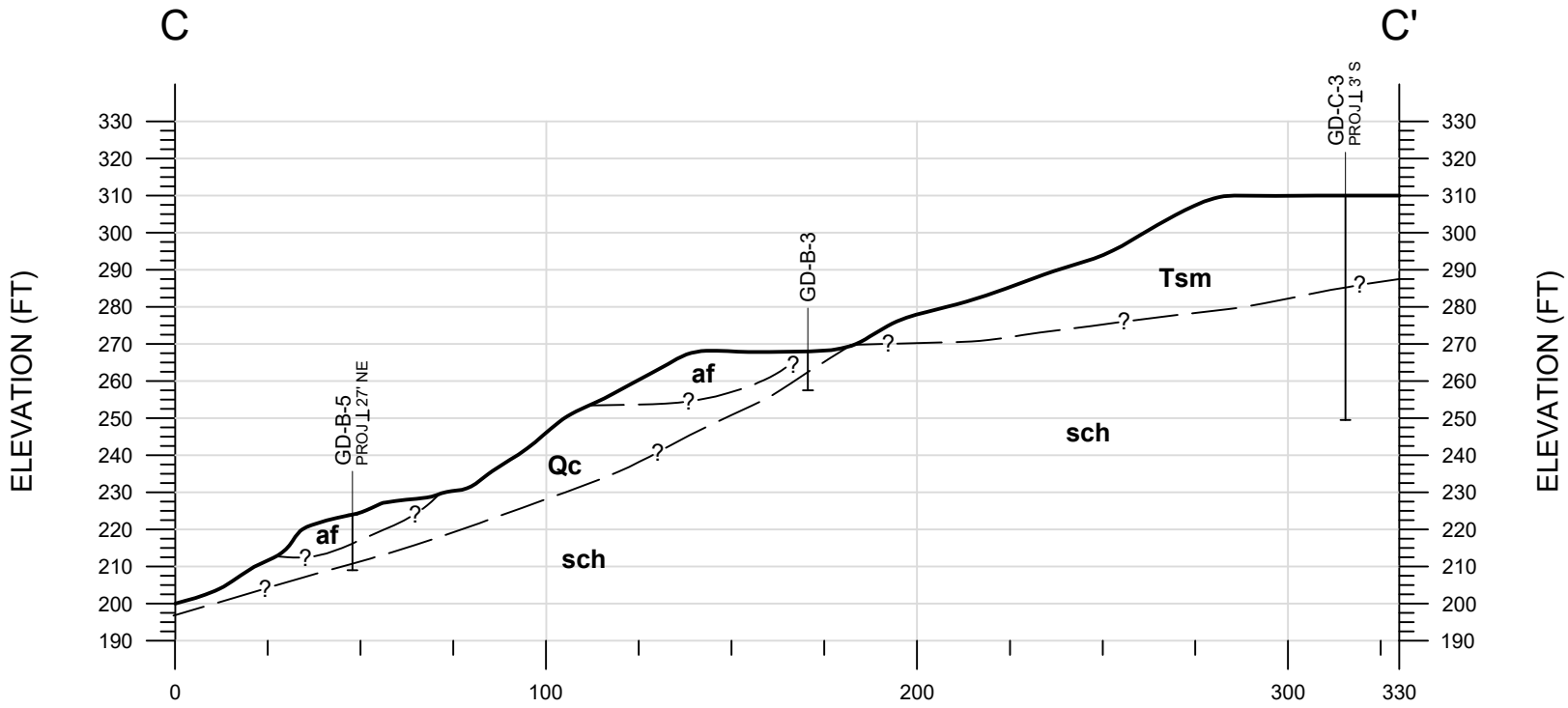
PREPARED BY: KM

PROJECT NAME:
GRAHAM HILL WATER TREATMENT PLANT
TANK IMPROVEMENTS
SANTA CRUZ, CALIFORNIA

PROJECT NUMBER: BA036

REVISION BY: -

CROSS SECTION B-B'



Legend

af	Artificial Fill	———	Existing grade
Qc	Colluvium	——?——	Approximate geologic contact; queried where uncertain
Tsm	Santa Margarita Formation		
sch	Schist		

Notes:

1. Original grade referenced from Grading and Drainage Plan (Drawing G-6, dated October 1959).
2. Existing grade referenced from AutoCAD file provided by City of Santa Cruz.
3. Some borings are projected. Distance and direction to actual location shown, where applicable.

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
255 YGNACIO VALLEY RD., SUITE 200
WALNUT CREEK, CA. (510) 671-0010

FIGURE NUMBER: 8

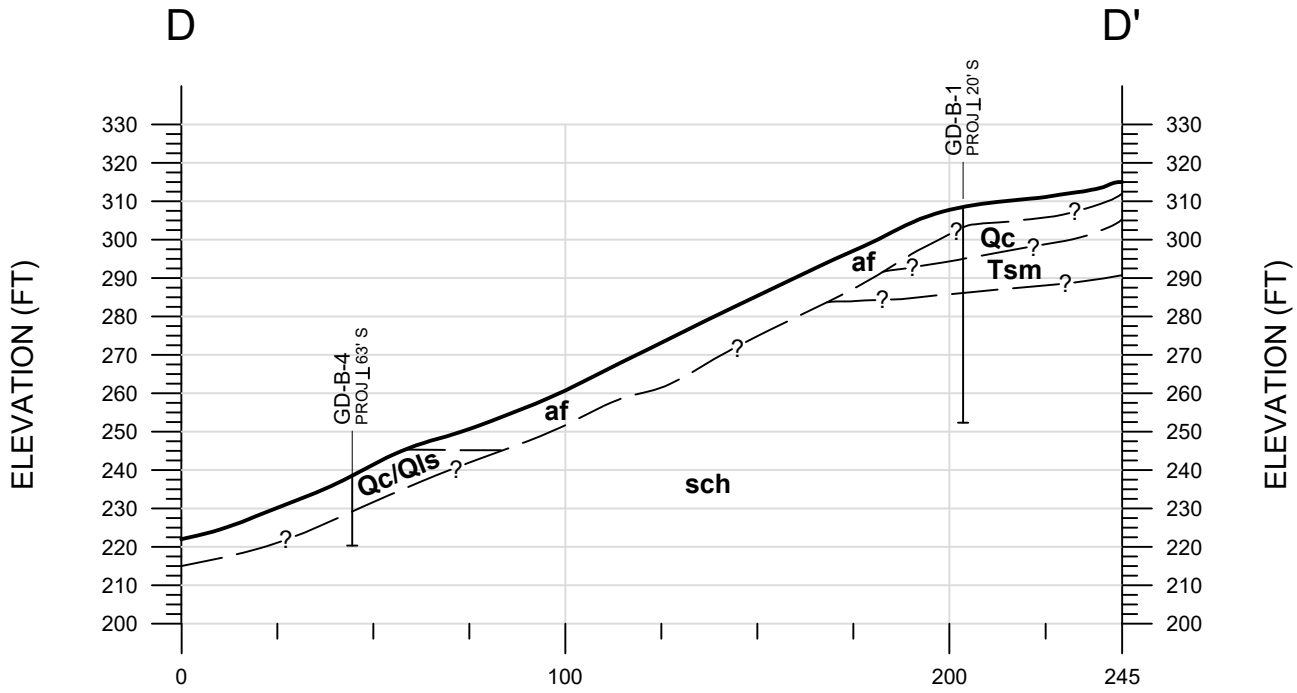
PREPARED BY: JMT

PROJECT NAME: GRAHAM HILL WATER TREATMENT PLANT TANK IMPROVEMENTS SANTA CRUZ, CALIFORNIA

PROJECT NUMBER: BA036

REVISION BY: -

CROSS SECTION C-C'



Legend

af	Artificial Fill
Qc	Colluvium
Qls	Landslide
Tsm	Santa Margarita Formation
sch	Schist

——— Existing grade

——?—— Approximate geologic contact; queried where uncertain

Notes:

1. Original grade referenced from Grading and Drainage Plan (Drawing G-6, dated October 1959).
2. Existing grade referenced from AutoCAD file provided by City of Santa Cruz.
3. Some borings are projected. Distance and direction to actual location shown, where applicable.

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FIGURE NUMBER: 9

PREPARED BY: KM

PROJECT NAME: GRAHAM HILL WATER TREATMENT PLANT TANK IMPROVEMENTS SANTA CRUZ, CALIFORNIA

PROJECT NUMBER: BA036

REVISION BY: -

CROSS SECTION D-D'

Appendix A – Field Exploration

APPENDIX A
FIELD EXPLORATION

A.1 Introduction

Group Delta's subsurface exploration program for the GHWTP Tank Improvements included 14 test borings, 3 cores, and installation of 2 piezometers on April 2, 3, 4, 5, 17; May 4; and September 6, 2017. The locations of the field explorations are presented on Figure 2A and Figure 3 of the report. The locations of our exploration points are approximate and were estimated by pacing from features shown on the site plan; these should be considered accurate only to the degree implied by the method used.

Prior to beginning the field exploration program, access permission was obtained from the City and required permits were obtained from the City. Underground Service Alert (USA) was notified of the exploration locations for checking subsurface utilities. Detailed field explorations are described in the following sections.

A.2 Drilling and Sampling

Drilling and Logging

Auger borings, dry cores, and mud rotary coring were performed by Group Delta's subcontractors, Britton Exploration and Central Coast Drilling, under the direction of a Group Delta field representative. We visually inspected the samples, maintained detailed records of the borings, and visually/manually classified the soil/bedrock. A Key for Soil Classification and Boring Record Legends are attached.

Sampling

Standard Penetration Test (SPT) drive samples were obtained using a 2-inch outside diameter and 1.375-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in small plastic bags to preserve the natural moisture content. Modified California (Mod Cal) drive samples were collected with a 3-inch outside diameter, 2.5-inch inside diameter split barrel sampler with a 2.42-inch inside diameter cutting shoe. The sampler barrel is lined with 18-inches of brass/steel liners for sample collection and has an additional length of waste barrel. The liners 6 inches long with a 2.42-inch inside diameter and 2.5-inch outside diameter. Modified California sample liners were removed from the sampler and sealed with plastic caps to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto the sampling rod, lowered to the bottom of the boring, and driven 18 inches or to refusal (50 blows in less than 6 inches) with a 140-pound hammer free-falling a height of 30-inches using an automatic hammer or a rope-and-cathead safety hammer. The number of hammer blows required to penetrate the samplers each 6-inch increment is presented on the boring records.

Coring

An engineering geologist supervised the drilling/coring and logged the subsurface conditions. We retained a track-mounted CME 55 drill rig equipped with hollow stem augers to continuously dry core soil and soft rock and to continuously core harder rock using an HQ diamond bit and core barrel sampler with mud rotary. We logged the length of the core sampling runs, the amount of recovered sample, the drilling rate, and the Rock Quality Designation (RQD) for cores in rock.

Piezometer Installation and Borehole Abandonment

Piezometers were installed in the boreholes at GD-B-1 and GD-C-2, which were backfilled with a cement-bentonite grout using a mixture of Portland cement and bentonite. The piezometer dataloggers were mounted to a wooden post at these locations.

The borings were abandoned by backfilling the. The paved surfaces were patched with cold mix asphalt concrete to match the existing condition. The site was restored as closely as practical to its original condition at the completion of our field work.

A.3 List of Attachments

The following are attached and complete this appendix.

List of Figures

Key for Soil Classification
Boring Record Legends
Boring Records

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)				
PRIMARY DIVISIONS			***GROUP SYMBOL***	***SECONDARY DIVISIONS***
COARSE GRAINED SOILS (less than 50% fines passing the No. 200 Sieve)	GRAVEL (% GRAVEL > % SAND)	CLEAN GRAVEL (Less than 5% fines)	GW	Well-graded gravel, gravel with sand, little or no fines
			GP	Poorly-graded gravel, gravel with sand, little or no fines
		"DIRTY" GRAVEL (More than 12% fines)	GM	Silty gravel, silty gravel with sand, silty or non-plastic fines
			GC	Clayey gravel, clayey gravel with sand, clayey or plastic fines
	SAND (% SAND ≥ % GRAVEL)	CLEAN SAND (Less than 5% fines)	SW	Well-graded sand, sand with gravel, little or no fines
			SP	Poorly-graded sand, sand with gravel, little or no fines
		"DIRTY" SAND (More than 12% fines)	SM	Silty sand, silty sand with gravel, silty or non-plastic fines
			SC	Clayey sand, clayey sand with gravel, clayey or plastic fines
FINE GRAINED SOILS (50% or more fines passing the No. 200 Sieve)	SILTS AND CLAYS (Liquid Limit less than 50)		ML	Inorganic silt, sandy silt, gravelly silt, or clayey silt with low plasticity
			CL	Inorganic clay of low to medium plasticity, sandy clay, gravelly clay, silty clay, Lean Clay
			OL	Low to medium plasticity Silt or Clay with significant organic content (vegetative matter)
	SILTS AND CLAYS (Liquid Limit 50 or more)		MH	Inorganic elastic silt, sandy silt, gravelly silt, or clayey silt of medium to high plasticity
			CH	Inorganic clay of high plasticity, Fat Clay
			OH	Medium to high plasticity Silt or Clay with significant organic content (vegetative matter)
HIGHLY ORGANIC SOILS			PT	Peat or other highly organic soils

Note: Dual symbols are used for coarse grained soils with 5 to 12% fines (ex: SP-SM), and for soils with Atterberg Limits falling in the CL-ML band in the Plasticity Chart. Borderline classifications between groups may be indicated by two symbols separated by a slash (ex: CL/CH, SW/GW).

CONSISTENCY CLASSIFICATION				
COARSE GRAINED SOILS		***FINE GRAINED SOILS***		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strenth[3], S_u (ksf)
0-4 (0-6)	Very Loose	<2 (<3)	Very Soft	< 0.25
		2-4 (3-6)	Soft	0.25 -0.50
5-10 (7-15)	Loose	5-8 (7-12)	Medium Stiff	0.50 - 1.0
11-30 (16-45)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
31-50 (46-75)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
>50 (>75)	Very Dense	>31 (>45)	Hard	> 4.0

MOISTURE CLASSIFICATION
DRY - Absence of moisture, dusty, dry to the touch **MOIST-** Damp but no visible water **WET-** Visible free water, usually soil is below water table

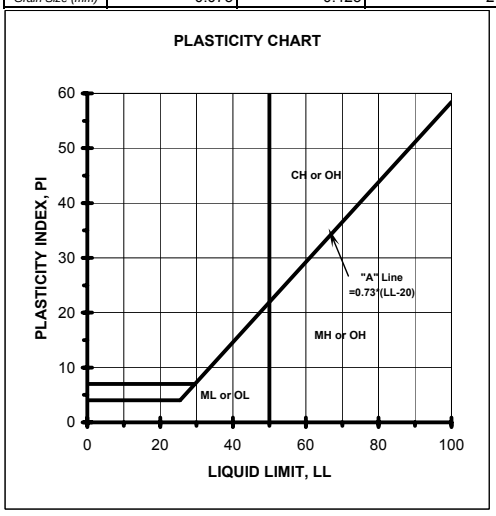
CONSISTENCY NOTES:

1. Number of blows of a 140-lb. hammer falling 30-inches to drive a 2-inch OD (1.375-inch ID) **SPT Sampler** [ASTM D-1585] the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch OD (2.42-inch ID) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

CLAY AND SILT	SAND			GRAVEL		COBBLES		BOULDERS	
	Fine	Medium	Coarse	Fine	Coarse				
US Std Sieve	**No. 200**	**No. 40**	**No. 10**	**No. 4**	**3/4"**	**3"**		**12"**		
Grain Size (mm)	0.075	0.425	2	4.75	19.1	76.2		304.8		



Classification of earth materials shown on the logs is based on field inspection and should not be construed to imply laboratory analysis unless so stated.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60} / D_{10}$

Coefficient of Curvature: $C_C = (D_{30})^2 / (D_{10} \times D_{60})$

D_{10}= 10% of the soil is finer than this diameter

D_{30}= 30% of the soil is finer than this diameter

D_{30}= 60% of the soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	C_u>6 and C_c between 1 and 3
GW	C_u>4 and C_c between 1 and 3
GP or SP	Clean gravel or sand not meeting requirement for GW or SW
GM or SM	Plots below "A" Line on Plasticity Chart or PI < 4
GC or SC	Plots above "A" Line on Plasticity Chart and PI > 7

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names	Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND	CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND	CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND	ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		
GM	SILTY GRAVEL SILTY GRAVEL with SAND	OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND		
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND	OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL		
SP	Poorly graded SAND Poorly graded SAND with GRAVEL	CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL		
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL		
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
SM	SILTY SAND SILTY SAND with GRAVEL		
SC	CLAYEY SAND CLAYEY SAND with GRAVEL	OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL		
PT	PEAT	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND
	COBBLES COBBLES and BOULDERS BOULDERS		

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 5333)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643; CTM 417; CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 422)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler (2.4" ID, 3" OD)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

Auger Drilling | Rotary Drilling | Dynamic Cone or Hand Driven | Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	———
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	- - - - -
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	~~~

REFERENCE: USCS

GROUP DELTA

Project No. BA036

GHWTP Tank Improvements
Santa Cruz, CA

BORING RECORD LEGEND #1

CONSISTENCY OF COHESIVE SOILS				
Description	**Shear Strength (tsf)**	**Pocket Penetrometer, PP, Measurement (tsf)**	**Torvane, TV, Measurement (tsf)**	**Vane Shear, VS, Measurement (tsf)**
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	**SPT N_{60} (blows / 12 inches)**
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE	
Description	**Criteria**
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Description	**Criteria**
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE		
Description		**Size (in)**
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

CEMENTATION	
Description	**Criteria**
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

Description	**Criteria**
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CONSISTENCY OF COHESIVE SOILS	
Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	Greater than 30

Ref: Peck, Hansen, and Thornburn, 1974, "Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

GROUP DELTA

Project No. BA036

GHWTP Tank Improvements
Santa Cruz, CA

BORING RECORD LEGEND #2

LEGEND OF ROCK MATERIALS


IGNEOUS ROCK


SEDIMENTARY ROCK


METAMORPHIC ROCK

BEDDING SPACING

Description	Thickness/Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in - 1 ft
Thinly Bedded	1 in - 4 in
Very Thinly Bedded	1/4 in - 1 in
Laminated	Less than 1/4 in

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Leaching		
Description	Body of Rock	Fracture Surfaces		Texture	Leaching	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, grain boundary conditions	All fracture surfaces are discolored or oxidized; surfaces friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Texture altered by chemical disintegration (hydration, argillation)	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

PERCENT CORE RECOVERY (REC)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

ROCK QUALITY DESIGNATION (RQD)

$$\frac{\Sigma \text{ Length of intact core pieces} \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100$$

RQD* indicates soundness criteria not met.

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

GROUP DELTA

Project No. BA036

GHWTP Tank Improvements
Santa Cruz, CA

BORING RECORD LEGEND #3

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-1
LOGGED BY TPO	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME Britton Exploration	**DRILL RIG** CME 55 Track
DRILLING METHOD SOLID FLIGHT / DIAMOND CORE	**SAMPLING METHOD(S)** SPT / MOD CAL AND CORE

BORING DIAMETER 6"	**HAMMER TYPE** Auto Trip Hammer	**HAMMER EFFICIENCY** 84%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: 7:00 AM FINISH backfill: 5:00 PM DOWNTIME:

BACKFILL METHOD

Portland Cement bentonite grout

DATE April 5, 2017	**SURFACE ELEVATION** 310 feet	**SURFACE CONDITION** Grass

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG
											0	
											1	
											2	SC
											3	
											4	
											5	
	MC	1	5 5								6	
		2	9	14							7	SC
											8	
											9	
											10	

MATERIAL DESCRIPTION

FILL (af):

Clayey SAND (SC); dark grayish brown (10YR 4/2); moist to wet; mostly fine to medium sand; some fines; few fine to coarse gravels; trace asphalt fragments.

COLLUVIUM (Qc):

CLAYEY SAND with GRAVEL (SC); medium dense; olive brown (2.5 YR 4/3); moist; fine to coarse sand; fine gravels (schist fragments).
PA: 55% SAND, 29% FINES, 16% GRAVEL

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4-5-17	GD-B-1

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X			13								10		***COLLUVIUM (Qc), CONTINUED***
X	MC	3	13								11		*(CLAYEY SAND with GRAVEL (SC), continued)* Mottled gray (10YR 5/1), olive brown (2.5YR 4/3) and brownish yellow (10YR 6/8); fine to coarse GRAVEL, angular to subrounded (schist fragments); trace COBBLES. PA: 46% SAND, 36% GRAVEL, 18% FINES
X		4	17	30							12	SC	
											13		Strong drill rig chatter at about 12 feet.
											14		Drill rig chatter stopped.
											15		**SANTA MARGARITA FORMATION (Tsm)** SEDIMENTARY ROCK (SANDSTONE); very soft, yellowish brown, weakly cemented, fine- to medium-grained sand, trace carbon flecks up to about 1 cm long.
X	S	5	3								16		
X			4	8							17		becomes dark yellowish brown (10yr 4/4); decomposed schist fragments, reddish brown due to iron oxide staining within the sandstone matrix; black manganese oxide staining along fractured surfaces.
											18		
											19		
											20		
X	S	6	6								21		
X			17	28							22		strong drill rig chatter at about 22 feet
											23		**SCHIST (sch)** METAMORPHIC ROCK (SCHIST): Grayish brown (10YR 5/2), highly fractured; intensely weathered to decomposed; fracture spaces appear to be infilled with clayey sand; less weathered schist fragments intermixed with decomposed fragments; reddish brown iron oxide and dark gray manganese oxide staining along fracture surfaces.
											24		
											25		Sandy Claystone lense from about 25 to 25 1/2 feet: light gray to gray (10YR 6/1), with iron oxide staning along fracture surfaces; no apparent sign of remolding. Pocket penetrometer test taken on the claystone layer.
X	S	7	10						0.5		26		
X			16	32							27		at about 27 feet: Mottled yellowish brown (10YR 5/4), reddish brown (5YR 4/4), light gray, (5YR 6/1), and dark gray (5YR 4/1); intensely fractured; weathered to decomposed; with some slightly weathered, fine to coarse gravel size schist fragments; iron oxide staining along gravel surfaces and observed within fracture surfaces, trace amount of black manganese oxide staining observed along fracture surfaces. Thin, approximately 1 to 2 inch thick fine sandy clay observed within sample (possibly infilling of fractures).
X	S	8	13								28		
X			16										
X			15	31							29		from about 28 to 29 feet: very hard drilling, lots of drill rig chatter
											30		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/5/17	GD-B-1

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	S	9	12 33								30 31		***SCHIST (sch), CONTINUED*** solid stem drilling refusal at about 31 feet, switched to diamond coring
X			30	63							32		METAMORPHIC ROCK (SCHIST): moderately weathered; hard; intensely fractured; iron oxide staining along fracture surfaces.
	C				1	1	5"	9.3%			33 34 35 36		
	C				1	2	0"	0%			37 38 39 40 41		very intensely fractured
	C				1	3	0"	0%			42 43 44 45 46		
	C				1	4	0"	0%			47 48 49 50		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/5/17	GD-B-1

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
	C				1	4	0"	0%			50		***SCHIST (sch), CONTINUED***
											51		METAMORPHIC ROCK (SCHIST): moderately weathered; hard; intensely fractured.
											52		
											53		
	C				2	5	37"	62%			54		
											55		
											56		
											57		Total depth explored about 56 feet. No groundwater encountered. Piezometer set at about 20 feet below ground surface in borehole backfilled with Portland cement-bentonite grout.
											58		
											59		
											60		Piezometer Serial No. VW42449 Datalogger Serial No. DT12748 Initial Piezometer Reading: 8788.5 at 25 degrees Celcius.
											61		
											62		
											63		
											64		
											65		
											66		
											67		
											68		
											69		
											70		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-2
LOGGED BY TPO	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME Britton Exploration	**DRILL RIG** CME 55 Track
DRILLING METHOD HOLLOW STEM AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** Auto Trip Hammer	**HAMMER EFFICIENCY** 84%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

SPT O.D.: 2" Mod Cal O.D.: 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: 3:40 AM FINISH backfill: 10:30 AM on 4/3 DOWNTIME:

BACKFILL METHOD

Portland Cement bentonite grout

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
4/2/17	268 feet	Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	**MATERIAL DESCRIPTION**
											0		Asphalt: About 3" thick
											1		Base: About 8" thick
											2		**FILL (af):** SILTY SAND (SM); medium dense to very dense; olive brown (2.5Y 4/3); moist; fine- to medium-grained; fine GRAVEL; some nodules of CLAYEY SAND.
X	MC	1	6 9								3		PA: 73% SAND, 26% FINES, 1% GRAVEL
X		2	11	20							4		
											5	SM	
X	MC	3	5 10								6		
X		4	14	24							7		
X	MC	5	10 20								8		PA: 54% SAND, 45% FINES, 1% GRAVEL
X		6	43	63							9	SC	CLAYEY SAND (SC); very dense; dark brown (10YR 3/3); moist; fine- to coarse-grained; trace GRAVEL.
											10	SM	SILTY SAND (SM); very dense; olive brown (2.5Y 4/3); moist; fine-grained; some CLAY nodules.

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/2/2017	GD-B-2

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	MC	7	11								10		***FILL (af), CONTINUED***
X			18										SILTY SAND (SM), *(CONTINUED)*
X		8	17	35							11		
													COLLUVIUM (Qc)
											12		CLAYEY SAND with GRAVEL (SC); dense; dark brown (10YR 3/3); moist; fine- to coarse-grained; fine to coarse GRAVEL.
													PA: 48% SAND, 29% GRAVEL, 23% FINES
											13		
												SC	
											14		
											15		
X	S	9	4										
X			4								16		
X			5	9									SILTY SAND (SM); medium dense; very dark gray (10YR 3/1); moist to wet; slight organic odor.
											17		(Possible seepage)
											18		
											19		
											20		
X	S	10	6										PA: 71% SAND, 25% FINES, 4% GRAVEL
X			7								21		
X			6	13									
											22		
											23	SM	
											24		
											25		
X	S	11	8										
X			10								26		
X			11	21									
											27		
											28		
											29		
											30		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/2/2017	GD-B-2

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	S	12	11 8								30 31	SC	***COLLUVIUM, (Qc) CONTINUED*** CLAYEY SAND (SC); medium dense; olive brown (2.5Y 4/3); moist; fine- to coarse-grained; fine GRAVEL. PA: 49% SAND, 42% FINES, 9% GRAVEL
X			9	17							32		
											33		
											34		
											35		
X	S	13	12 13								36		
X			29	42							37		**SCHIST (sch)** METAMORPHIC ROCK (SCHIST): very soft; reddish brown (5YR 4/4), mottled with strong brown (7.5YR 5/6), and gray (7.5YR 6/0); intensely weathered to decomposed; intensely fractured; iron oxide staining along fracture surfaces.
											38		
											39		
											40		
X	S	14	7 13								41		
X			11	24							42		
											43		
											44		
											45		becomes light gray (5YR 6/1) with reddish brown (5YR 4/4), iron oxide staining along fracture surfaces.
X	S	15	26 16								46		
X			18	34							47		
											48		
											49		
											50		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/3/2017	GD-B-2

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											50		***SCHIST, (sch) CONTINUED***
	S	16	8 5								51		METAMORPHIC ROCK (SCHIST): very soft; light gray (5YR 6/1) with reddish brown (5YR 4/4), iron oxide staining along fracture surfaces; very Intensely fractured; intensely weathered to decomposed.
			4	9							52		
											53		
											54		
											55		
	S	17	9 9								56		
			4	13							57		
											58		
											59		
											60		
	S	18	17 22								61		
			31	53							62		Total depth explored about 61.5 feet. No groundwater encountered. Wet soil observed at about 16 feet (potential seepage?).
											63		
											64		
											65		
											66		
											67		
											68		
											69		
											70		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-3
LOGGED BY TPO	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME Britton Exploration	**DRILL RIG** CME 55 Track
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** Auto Trip Hammer	**HAMMER EFFICIENCY** 84%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: 9:00 AM FINISH backfill: 11:00 AM DOWNTIME:

BACKFILL METHOD

Soil Cuttings

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
April 3, 2017	269 feet	Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		Asphalt: About 3" thick
											1		Base Rock: About 8" thick
											2		**COLLUVIUM (Qc):**
X	MC	1	8 8								3	SC	CLAYEY SAND (SC); medium dense; olive brown (2.5Y 4/4); mottled with orange brown and light olive brown; fine- to medium-grained; fine to coarse GRAVEL (schist fragments).
X		2	17	25							4		PA: 63% SAND, 31% FINES, 6% GRAVEL UW: 122 pcf (dry) M: 11.5%
											5		**SCHIST (sch)**
X	MC	3	22 18								6		METAMORPHIC ROCK (SCHIST): very soft; reddish brown (5YR 4/4); moist with free water along fractured surfaces; intensely weathered to decomposed; intensely fractured.
X		4	31	49							7		
X	S		14								8		becomes orangish brown
X		5	28 39	67							9		
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/3/2017	GD-B-3

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
	S	6	25 38								10 11		**SCHIST (sch), CONTINUED**
			50/6	88							12		Total depth explored about 11.5 feet. No groundwater encountered.
											13		
											14		
											15		
											16		
											17		
											18		
											19		
											20		
											21		
											22		
											23		
											24		
											25		
											26		
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-4
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** JOHN DEERE TRACTOR (CUSTOM)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY HAMMER	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: FINISH backfill: DOWNTIME:

BACKFILL METHOD

SPOILS

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
May 4, 2017	237 ft	Grass

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		**COLLUVIUM (Qc)**
											1		
X	S	1	10 15								2		SILTY SAND (SM); dense; dark brown; moist; trace subrounded GRAVEL (siltstone, cherts, schists); micaceous. PA: 55% SAND; 44% FINES; 1% GRAVEL
X			30	45							3	SM	
											4		
X	MC	2	3 5								5		SANDY SILT (ML); medium dense; dark brown; moist to wet; trace fine GRAVEL (schist fragments). PA: 51% FINES; 48% SAND; 1% GRAVEL PI: LL=18, PL=16, PI=2
X			5	10							6	ML	
											7		
X	MC	3	5 7								8	SC	CLAYEY SAND (SC); medium dense; rust brown mixed with grey; damp to moist; micaceous. PA: 68% SAND; 32% FINES
X			9	16							9		
											10		**SCHIST (sch)** Top of weathered schist

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	5-4-17	GD-B-4 cont.

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											10		***SCHIST (sch), CONTINUED***
	MC	4	16 15								11		METAMORPHIC ROCK (SCHIST): very soft; reddish brown; intensely weathered to decomposed; micaceous.
											12		hard drilling
											13		rocky drilling
											14		
											15		becomes soft; grayish brown; intensely weathered; intensely fractured
	S	5	14 17								16		
			25	42							17		Auger refusal at about 17 feet.
											18		Total depth explored about 17 feet. No groundwater encountered
											19		
											20		
											21		
											22		
											23		
											24		
											25		
											26		
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-5
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** JOHN DEERE TRACTOR (CUSTOM)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY HAMMER	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: FINISH backfill: DOWNTIME:

BACKFILL METHOD

SPOILS

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
May 4, 2017	223 ft	Grass

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		**COLLUVIUM (Qc)**
											1		
X	S	1	3 4								2		SILTY SAND (SM); medium dense; brown; moist; fine GRAVEL (schist fragments). PA: 65% SAND; 30% FINES; 5% GRAVEL
X			7	11							3	SM	
													becomes light brown
X	MC	2	4 6								4 5		PA: 52% SAND; 38% FINES; 10% GRAVEL
X			10	16							6		**SCHIST (sch)**
											7		METAMORPHIC ROCK (SCHIST); very soft, reddish brown, decomposed.
X	S	3	3 4								8		
X			5	9							9		
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	5-4-17	GD-B-5

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
	S	4	6 18								10 11		***SCHIST (sch), CONTINUED*** METAMORPHIC ROCK (SCHIST): very soft to soft; reddish brown; decomposed to intensely weathered.
			22	40							12		harder drilling
											13		
											14		moderately soft; intensely weathered; very intensely fractured.
											15		
	S	5	18 50/2"								16		Drilling refusal.
											17		Total depth explored about 15.7 feet. No groundwater encountered.
											18		
											19		
											20		
											21		
											22		
											23		
											24		
											25		
											26		
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-C-1
LOGGED BY TPO	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME BRITTON EXPLORATION	**DRILL RIG** CME-55 TRACK
DRILLING METHOD DRY CORE / HOLLOW STEM	**SAMPLING METHOD(S)** CORE AND SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** N/A	**HAMMER EFFICIENCY** 84%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: 12:00PM 4/3/17 FINISH backfill: 10:00AM 4/4/17 DOWNTIME:

BACKFILL METHOD

SOIL CUTTINGS

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
April 4, 2017	310 FEET	GRASS

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		Grass at surface
											1		
	C				1	1	2 1/2				2	SC	**FILL (af)** CLAYEY SAND (SC): dark yellowish brown (10YR 4/4); moist; mostly fine to medium SAND; some FINES; few fine GRAVEL; trace coarse GRAVEL; trace COBBLES; few chunks of asphalt
											3		**COLLUVIUM (Qc)**
	C				1	2	2 1/2				4		CLAYEY SAND (SC); light olive brown (2.5Y 4/4); moist; mostly fine to medium SAND; some FINES; few fine to coarse GRAVELS; trace COBBLES (gravels and cobbles mainly schist).
											5		CLAY content increases at 4 feet; color is mottled dark gray (5 YR 4/1); yellowish brown (10YR 4/4) ; and dark brown (10YR 3/3)
											6	SC	
	C				1	3	2 1/2				7		
											8		
	C				1	4	0				9		schist cobble stuck in sample shoe
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4-4-17	GD-C-1

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											10		**COLLUVIUM (Qc), CONTINUED**
											11		(CLAYEY SAND (SC), CONTINUED)
	C				1	5	1/2				12		
											13	SC	
	C				1	6	2				14		
											15		
					2	7	2 1/2				16		
	C										17		**SANTA MARGARITA FORMATION (Tsm)** SEDIMENTARY ROCK (SANDSTONE): very soft; yellowish brown (10YR 5/4); moist; decomposed.
					2	8	2 1/2				18		
	C										19		
											20		cobble in shoe at 20 feet
	C				2	9	0				21		
											22		coring refusal at 22 feet, switch to drive sampling
			15								23		**SCHIST (sch)** Schist cobble in sample shoe, no recovery.
	MC	1	16	60							24		
			44										
	S	2	35								25		No recovery.
			37										Drilling refusal at about 25.5 feet.
			36	73									
											26		Total depth explored about 25.5 feet. No groundwater encountered.
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-C-2
LOGGED BY TPO	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME BRITTON EXPLORATION	**DRILL RIG** CME 55 TRACK
DRILLING METHOD HOLLOW STEM / DRY CORE	**SAMPLING METHOD(S)** CORE

BORING DIAMETER	**HAMMER TYPE**	**HAMMER EFFICIENCY**
6"	N/A	84%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

SPT O.D.: 2" Mod Cal O.D.: 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME FINISH drilling:

START: 11:00 FINISH backfill: 3:15 DOWNTIME:

BACKFILL METHOD

SOIL CUTTINGS

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
April 2, 2017	268 FT	Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	**MATERIAL DESCRIPTION**
											0		Asphalt: About 3" thick
											1		Base: About 8" thick
	C				1	1	2 1/2				2		**FILL (af)** SILTY SAND (SM): brownish yellow (10 YR 6/6); mostly fine SAND, some SILT.
											3		
	C				1	2	2 1/2				4	SM	Yellowish brown (10YR 5/6) with dark yellowish brown (10YR 1/4) mottling, some FINES; mostly fine SAND; few medium and coarse SAND; trace fine GRAVEL; scattered nodules of light gray CLAY approximately 1 inch in diameter.
											5		
	C				1	3	2 1/2				6		
											7	ML	SANDY SILT (ML): brownish yellow (10YR 6/6); mostly FINES, some fine SAND.
	C				1	4	2 1/2				8	SM	SILTY SAND (SM): brownish yellow (10 YR 6/6); mostly fine SAND, some fines.
											9		**COLLUVIUM (Qc)**
											10		Clayey SAND (SC): dark grayish brown; moist; mostly fine to medium SAND; some FINES; few coarse SAND; trace GRAVEL.

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	April 2, 2017	GD-C-2

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											10		**COLLUVIUM (Qc), CONTINUED**
											11		CLAYEY SAND (SC), *(continued)* Mottled with brownish orange and dark gray; trace fine to coarse GRAVEL and cobble size schist fragments; angular to sub rounded.
	C				2	5	2 1/2				12		
	S	1	33										- hard drilling, no penetration with augers. Attempted SPT sample, recovered a schist cobble approximately 4 inches in diameter.
			15								13		
			12	27									
	C				2	6	2 1/2				14		
											15		
											16		
	C				2	7	1 1/2					SC	- moist to wet (possible seepage).
											17		- moist; schist gravel and cobble content increasing.
											18		
	C				2	8	2 1/2				19		Dark gray (2.5YR 4/0), moist; mostly fine SAND; some FINES; trace coarse SAND and coarse GRAVEL (mainly schist); trace sub-rounded basalt clast, sub-rounded approximately 1-inch diameter. Trace organics (decomposed rootlets); trace carbon flecks.
											20		
											21		
	C				3	9	2 1/2				22		Dark gray (2.5YR 5/4) concentrated layer of decomposed plant matter, roots and rootlets; trace schist cobbles.
											23		
	C				3	10	2 1/2				24	SM	SILTY SAND (SM): Gray (5YR 5/1); moist; mostly fine SAND; some FINES; trace fine GRAVEL.
											25		
											26		CLAYEY SAND (SC): mottled light olive brown (2.5YR 5/4) light gray (5YR 6/1) and dark gray (5YR 4/1); moist; mostly fine SAND; few fine to coarse GRAVEL; some FINES.
	C				3	11	2 1/2						- dark gray (2.5YR 5/4)
											27		
											28	SC	- olive brown (2.5YR 4/3) - dark gray (5YR 4/1)
	C				3	12	2 1/2				29		- wet (possible seepage).
											30		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/2/17	GD-C-2

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											30		***COLLUVIUM (Qc), CONTINUED***
											31		*CLAYEY SAND (SC), CONTINUED* - few fine to coarse GRAVEL, few cobbles at 31 feet (mainly schist angular to sub-rounded)
	C				4	13	2				32	SC	
											33		
											34		**SCHIST (sch)** METAMORPHIC ROCK (SCHIST); very soft to soft; reddish brown; moist; intensely weathered to decomposed; highly fractured.
											35		
											36		Total depth explored about 35 feet. No groundwater encountered. Piezometer set at about 33.7 feet below ground surface in borehole backfilled with Portland cement and bentonite grout.
											37		Piezometer Serial No. VW42448. Datalogger Serial No. DT12747. Initial Piezometer Reading: 8819.5 at 17.7 degrees Celsius.
											38		
											39		
											40		
											41		
											42		
											43		
											44		
											45		
											46		
											47		
											48		
											49		
											50		

BORING LOG

MAP OF BORING LOCATION

SEE SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-C-3
LOGGED BY BM	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME BRITTON EXPLORATION	**DRILL RIG** CME 55 Track
DRILLING METHOD SOLID FLIGHT AND DIAMOND CORE	**SAMPLING METHOD(S)** SPT / MOD CAL AND CORE

BORING DIAMETER 6"	**HAMMER TYPE** Auto Trip Hammer	**HAMMER EFFICIENCY** 84%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 8:50 AM FINISH drilling: 3:00 PM FINISH backfill: 3:45 PM DOWNTIME:

BACKFILL METHOD

Portland Cement bentonite grout, cuttings

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
April 17, 2017	310 feet	Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Length	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		Asphalt: About 2-1/2" thick Base: About 5" thick
											1		**FILL (af)**
	S	1	18 25								2	SM	SILTY SAND (SM): very dense; light brown; dry; fine- to medium-grained; trace fine GRAVEL (rock fragments). PA: 70% SAND, 28% FINES, 2% GRAVEL
			35	60							3		
											4		**SANTA MARGARITA FORMATION (Tsm)**
	S	2	6 9								5		SEDIMENTARY ROCK (SANDSTONE): very soft; light brown with some orange-brown mottling; decomposed. PA: 85% SAND, 15% FINES
			10	19							6		
											7		
	S	3	7 8								8		
			10	18							9		
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4-17-17	GD-C-3

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	S	4	7, 10								10		***SANTA MARGARITA FORMATION (Tsm), CONTINUED***
X			12	22							11		*SEDIMENTARY ROCK (SANDSTONE), CONTINUED*
											12		
											13		
											14		
											15		
X	S	5	9, 10								16		PA: 88% SAND, 12% FINES
X			13	23							17		
											18		
											19		
											20		
X	S	6	11, 14								21		trace charcoal
X			18	32							22		
											23		
											24		
											25		
X	S	7	50/6	REF									
	C	1			1	1	100%	45%			26		**SCHIST (sch)**
											27		METAMORPHIC ROCK (SCHIST): soft; orangish brown; moist; some quartz fragments (<2mm diameter); intensely weathered; massive; friable.
											28		
											29		
											30		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/17/17	GD-C-3

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											30		
											31		METAMORPHIC ROCK (SCHIST): very to extremely hard; blue gray; partly metamorphosed; moderately weathered; moderately to intensely fractured; thinly laminated; orange-brown coating on fracture sites; some white mottling.
											32		
	C	2			1	2	63%	33%			33		
											34		
											35		
											36		
	C	3			2	3	60%	18%			37		
											38		
											39		
											40		
											41		
											42		becomes olive-brown, decomposed, very soft from about 40 to 43 feet
	C	4			2	4	48%	8%			43		
											44		
											45		
											46		
	C	5			2/3	5	100%	92%			47		
											48		
											49		
											50		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	4/17/17	GD-C-3

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
	C	6			3	6	25%	0%			50		METAMORPHIC ROCK (SCHIST): very to extremely hard; blue-gray; partly metamorphosed; moderately weathered; moderately to intensely fractured; thinly laminated; orangish brown coating on fracture sites; some white mottling.
											51		
											52		
											53		
											54		
											55		
	C	7			3	7	100%	73%			56		
											57		
											58		
											59		
											60		Total depth explored about 60 feet. No groundwater encountered.
											61		
											62		
											63		
											64		
											65		
											66		
											67		
											68		
											69		
											70		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-06
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** Truck (B-53)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER TYPE

SPT O.D.: 2" Mod Cal O.D. : 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 07:00 AM FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Drill spoils

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
09/06/2017	278 feet	Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	**MATERIAL DESCRIPTION**
											0		Asphalt: About 2 1/2" thick
											1		Base Rock: About 9" thick
													SANTA MARGARITA FORMATION (Tsm)
X			6								2		
X	S	6-1	9	18									SEDIMENTARY ROCK (SANDSTONE); very soft, tan orangish brown, decomposed.
X			9								3		grades to light brown
													PA: 5% GRAVEL, 76% SAND, 19% FINES
											4		
X			7										
X	S	6-2	7	15							5		
X			8										
											6		
											7		
X			11										
X	S	6-3	12	25							8		
X			13										
											9		
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
BA036	09/07/2017	GD-B-06

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
			8								10		***SANTA MARGARITA FORMATION, CONTINUED***
	S	6-4	10	20							11		
			10										
											12		Total depth explored about 11.5 feet No groundwater encountered
											13		
											14		
											15		
											16		
											17		
											18		
											19		
											20		
											21		
											22		
											23		
											24		
											25		
											26		
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-07
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** Truck (B-53)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 07:00 AM FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Spoils with Asphalt

DATE 09/06/2017	**SURFACE ELEVATION** 291 feet	**SURFACE CONDITION** Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		Asphalt: About 2 1/2" thick
											1		Base Rock: About 13" thick
											2		**SANTA MARGARITA FORMATION (Tsm)**
X			24										SEDIMENTARY ROCK (SANDSTONE); very soft, brown, decomposed.
X	S	1	24	44							3		PA: 2% GRAVEL, 65% SAND, 33% FINES
X			20										
											4		-grades to soft.
													-turns to orangish brown.
											5		
X			8										
X	S	2	10	22							6		
X			12										
											7		
											8		
											9		
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
BA036	09/07/2017	GD-B-07

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
			10								10		***SANTA MARGARITA FORMATION, CONTINUED***
	S	3	10	30							11		-turns to light brown.
			10										
											12		Total depth explored about 11.5 feet. No groundwater encountered.
											13		
											14		
											15		
											16		
											17		
											18		
											19		
											20		
											21		
											22		
											23		
											24		
											25		
											26		
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-08
LOGGED BY MM	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** JOHN DEERE TRACTOR (CUSTOM)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER	**HAMMER TYPE**	**HAMMER EFFICIENCY**
6"	SAFETY	60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

SPT O.D.: 2" Mod Cal O.D.: 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 08:00 AM FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Spoils

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
09/06/2017	326 feet	Surface Soil

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		**FILL (af)**
											1		
X	S	8-1	10 12	26							2	SC	CLAYEY SAND (SC); medium dense, brown, moist, few fine gravel. PI: LL=41, PL=17, PI=24
X			14								3		
											4		
X	S	8-2	8 11	23							5		**SANTA MARGARITA FORMATION (Tsm)** SEDIMENTARY ROCK (SANDSTONE); very soft, light brown, decomposed.
X			12								6		PA: 5% GRAVEL, 67% SAND, 27% FINES
											7		
											8		- becomes brown
X	S	8-3	7 10	30		18"	18"				9		
X			20								10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	09/06/2017	GD-B-08

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											10		***SANTA MARGARITA FORMATION (Tsm), CONTINUED***
											11		
											12		
X	MC	8-4	5 9	20							13		
X			11								14		
											15		
											16		
X	MC	8-5	11 25	59							17		
X			34								18		becomes yellow, very fine-grained
											19		
											20		
X	MC	8-6	11 25	75							21		
X			50								22		
											23		
											24		
X	8-7	MC	12 25	62							25		
X			37								26		Total depth explored about 25.5 feet. No groundwater encountered.
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-09
LOGGED BY MM	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** JOHN DEERE TRACTOR (CUSTOM)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

SPT O.D.: 2" Mod Cal O.D.: 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 09:15 AM FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Spoils

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
09/06/2017	323 feet	Vegetation/organics

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		Vegetation and organic matter.
											1		**FILL (af)**
X	S	9-1	7 7	15							2		CLAYEY SAND (SC); medium dense, dark brown, dry, few fine gravel, traces of tree roots. PI: LL=46, PL=20, PI=26
X			8								3	SC	
											4		**SANTAMARGARITA FORMATION (Tsm)**
X	MC	9-2	12 15	23							5		SEDIMENTARY ROCK (SANDSTONE); very soft, brown, decomposed.
X			18								6		
											7		
											8		- traces of white calcium nodules
X	MC	9-3	17 25	75							9		PA: 11% GRAVEL, 48% SAND, 41% FINES
X			50								10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	09/06/2017	GD-B-09

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											10		***SANTA MARGARITA FORMATION*, continued**
											11		
											12		
X	MC	9-4		>50							13		- color grades to light yellowish brown
X											14		
											15		
											16		
X	MC		17 50								17		- density increases, color fades into brownish grey, weakly cemented
											18		
											19		
											20		
X	MC		19 25	75		18"	18"			B	21		light yellowish brown, very fine-grained
X			50								22		
											23		
											24		
X	MC		7 19	52		18"	18"				25		
X			33								26		
											27		
											28		
X	MC		12 18	53		18"	18"				29		
X			35								30		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	09/06/2017	GD-B-09

SAMPLE DEPTH	SAMPLE TYPE (S=SPT, MC=Modified California)	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Inches Driven	Inches Recovered	RQD	POCKET PEN. (tsf)	Sample Condition (B=bagged, T=in tube, R=in ring)	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											30		***SANTA MARGARITA FORMATION*, continued**
											31		
											32		
X	MC	9-9	15 27	75							33		
X			48								34		
X	S	9-10	15 16	37							35		
X			21								36		Total depth explored about 35.5 feet. No groundwater encountered.
											37		
											38		
											39		
											40		
											41		
											42		
											43		
											44		
											45		
											46		
											47		
											48		
											49		
											50		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-10
LOGGED BY MM	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** JOHN DEERE TRACTOR (CUSTOM)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT, MC

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

INCHES

SPT O.D.: 2" Mod Cal O.D.: 3" DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 12:45 PM FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Spoils

DATE 09/06/2017	**SURFACE ELEVATION** 318 feet	**SURFACE CONDITION** Surface Soil

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG
											0	
											1	
	S	10-1	6 6	10							2	SC
			4								3	
											4	
	MC	10-2	10 12	27							5	
			15								6	
											7	
	MC	10-3	6 9	26							8	
			17								9	
											10	

MATERIAL DESCRIPTION

FILL (af)

CLAYEY SAND (SC): medium dense, gray, moist.

PI: LL=32. PL=17, PI=15

SANTA MARGARITA FORMATION (Tsm)

SEDIMENTARY ROCK (SANDSTONE): very soft, grayish brown, decomposed.

PA: 3% GRAVEL, 55% SAND, 42% FINES

PI: LL=22, PL=15, PI=7

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	09/06/2017	GD-B-10

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	MC	10-4	7 8	28							10 11		**SANTA MARGARITA FORMATION (Tsm)** SEDIMENTARY ROCK (SANDSTONE): very soft, brownish grey, decomposed, moist, massive
X			20								12		
											13		
											14		
											15		
X	MC	10-5	15 22	49							16		- color chages to greyish brown, with pink fine gravels
X			27								17		
											18		
											19		
											20		
X	MC	10-6	15 30	80							21		- plasticity increases to low
X			50/5.5"								22		
											23		
											24		
											25		
X	S	10-7	12 15	20							26		- with few fine gravels
X			5								27		
											28		
											29		
											30		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	09/06/2017	GD-B-10

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	S	10-8	18	70							30		***SANTA MARGARITA FORMATION*, continued**
X			30								31		
X			40								32		
											33		
											34		
X	S	10-9	15	42							35		
X			27										
											36		Total depth explored about 35 feet. No groundwater encountered.
											37		
											38		
											39		
											40		
											41		
											42		
											43		
											44		
											45		
											46		
											47		
											48		
											49		
											50		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-11
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** Truck (B-53)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER TYPE

SPT O.D.: 2" Mod Cal O.D. : 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT
METHOD: N/A
WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME
START: FINISH drilling:
FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD
Spoils

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
09/06/2017		Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	**MATERIAL DESCRIPTION**
											0		2 1/2" Asphalt, 7" Base Rock
											1	SM	**FILL (af)** SILTY SAND (SM); medium dense, brown, moist, angular fine gravels
X	S	11-1	3 5								2		**TERRACE DEPOSITS (Qt)**
X			5	10								CL-ML	SILTY CLAY (CL-ML); stiff, brown, moist, medium plasticity PI: LL=61, PL=19, PI=42
											3		
											4	ML	SANDY SILT (ML); loose, light brown, moist
											5		**SANTA MARGARITA FORMATION (Tsm)**
X	S	11-2	3 4								6		SEDIMENTARY ROCK (SANDSTONE); very soft, grayish brown, decomposed.
X			7	11									
											7		Total depth explored about 6.5 feet. No groundwater encountered.
											8		
											9		
											10		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-12
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** JOHN DEERE TRACTOR (CUSTOM)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY**

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER

SPT O.D.: 2" Mod Cal O.D.: 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT
METHOD: N/A
WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME
START: FINISH drilling:
FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD
Spoils with asphalt patch

DATE 09/06/2017	**SURFACE ELEVATION**	**SURFACE CONDITION** Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		4" Asphalt, 14" Base Rock
											1		
											2		**TERRACE DEPOSITS (Qt)**
	S	12-1	4										
			7	17									LEAN CLAY (CL); very stiff, light brown, moist.
			10								3	CL	PI: LL=39, PL=22, PI=17
											4		
			3										**SANTA MARGARITA FORMATION (Tsm)**
	S	12-2	4	12							5		SEDIMENTARY ROCK (SANDSTONE): very soft, light brown, decomposed.
			8										
											6		Total depth explored about 5.5 feet. No groundwater encountered.
											7		
											8		
											9		
											10		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-13
LOGGED BY MM	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** Truck (B-53)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER TYPE

SPT O.D.: 2" Mod Cal O.D. : 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: 02:45 PM FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Spoils

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
09/06/2017		Soil

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
											0		
											1		**FILL (af)**
	S	13-1	6 6	12							2		SILTY SAND with GRAVEL (SM); medium dense, dark grayish brown, moist.
			6										PA: 37% GRAVEL, 47% SAND, 16% FINES
											3	SM	
											4		
	S		15 50/4"	REF							5		PA: 40% GRAVEL, 47% SAND, 13% FINES
											6		
													SANTA MARGARITA FORMATION (Tsm)
											7		SEDIMENTARY ROCK (SANDSTONE); very soft, light grayish brown, decomposed.
	S		10 30	80							8		PA: 24% GRAVEL, 65% SAND, 11% FINES
			50								9		
											10		

BORING LOG (continued)

PROJECT NAME/NUMBER	DATE	BORING NO.
GHWTP Tank Improvements / BA036	09/06/2017	GD-B-13

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	MATERIAL DESCRIPTION
X	S	13-4	18 27	REF							10 11		***SANTA MARGARITA FORMATION (Tsm)*** **, *continued*** - color changes to yellowish brown
X			50/5.5"								12		
											13		
											14		
											15		
X	S	13-5	50/2"	REF									- color changes to orangish brown
											16		Total depth explored about 15 1/4 feet. No groundwater encountered.
											17		
											18		
											19		
											20		
											21		
											22		
											23		
											24		
											25		
											26		
											27		
											28		
											29		
											30		

BORING LOG

MAP OF BORING LOCATION

SEE ATTACHED SITE PLAN

PROJECT NAME/NUMBER GHWTP Tank Improvements / BA036	**BORING NUMBER** GD-B-14
LOGGED BY CL	**PROJECT MANAGER** BEN SERNA
DRILLING CONTRACTOR / DRILLER NAME CENTRAL COAST DRILLING	**DRILL RIG** Truck (B-53)
DRILLING METHOD SOLID FLIGHT AUGER	**SAMPLING METHOD(S)** SPT / MOD CAL

BORING DIAMETER 6"	**HAMMER TYPE** SAFETY	**HAMMER EFFICIENCY** 60%

DRIVING HAMMER

WEIGHT: 140 lbs DROP HEIGHT: 30"

DRIVE SAMPLER TYPE

SPT O.D.: 2" Mod Cal O.D. : 3" INCHES DRIVEN: 18

GROUNDWATER MEASUREMENT

METHOD: N/A

WATER DEPTH / TIME: Groundwater not encountered

DRILL TIME

START: FINISH drilling:

FINISH backfill: DOWNTIME: Zero

BACKFILL METHOD

Spoils

DATE	**SURFACE ELEVATION**	**SURFACE CONDITION**
09/06/2017	312 feet	Asphalt

SAMPLE DEPTH	SAMPLE TYPE B=Bulk, S=SPT, MC=Mod Cal, C=Core	SAMPLE NUMBER	BLOWS/6 in	BLOWS/FT "N"	Box Number	Run Number	Recovery Length (in) > 2X Core Diameter	RQD	POCKET PEN. (tsf)	Sample Condition	DEPTH (FEET)	USCS SYMBOL/ GRAPHIC LOG	**MATERIAL DESCRIPTION**
											0		2 1/2" Asphalt, No Base Rock
											1		**FILL (af)**
X	S	14-1	9 10	21							2	SC	CLAYEY SAND with GRAVEL (SC); medium dense, mixed light and dark brown, moist.
X			11								3		PA: 17% GRAVEL, 59% SAND, 24% FINES
											4		Auger refusal (cobble or concrete?).
											5		Total depth explored about 4 feet. No groundwater encountered.
											6		
											7		
											8		
											9		
											10		

#N/A

Appendix B – Laboratory Testing

B. HILLEBRANDT SOILS TESTING, INC.

29 Sugarloaf Terrace, Alamo, CA 94507 - Tel: (510) 409-2916 - Fax: (925) 891-9267 - Email: soiltesting@aol.com

LAB RESULTS SUMMARY FORM

Project Number: BA036 **Project Name:** GHWTP - Santa Cruz **Results Due By:**
Requested By: BS **Request Date:** 4/25/17 **Throw Samples Out On:**

Boring #	Sample Depth (feet)	Dry Density (pcf)	Moisture Content (%)	Unconfined Compressive (ksf)	Atterberg			-200			Compaction		Pocket Penetrometer (tsf)	Torvane (tsf)	Remarks
					Liquid Limit	Plastic Limit	Plasicity Index	Passing #4 Sieve (%)	Passing #40 sieve (%)	Passing #200 sieve (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)			
GD-B-1	5.5 - 6.0							84	57	29					
GD-B-1	10.5 - 11.0							64	40	18					
GD-B-2	2.5 - 3.0							99	92	26					
GD-B-2	7.5 - 8.0							99	81	45					
GD-B-2	11.0 - 11.5							71	48	23					
GD-B-2	20.0 - 21.5							96	77	25					
GD-B-2	30.0 - 31.5							91	73	42					
GD-B-3	3.0 - 3.5	122	11.5					94	72	31					
GD-C-3	1.0 - 2.5							98	85	28					
GD-C-3	4.0 - 5.5							100	96	15					
GD-C-3	15.0 - 16.5							100	90	12					

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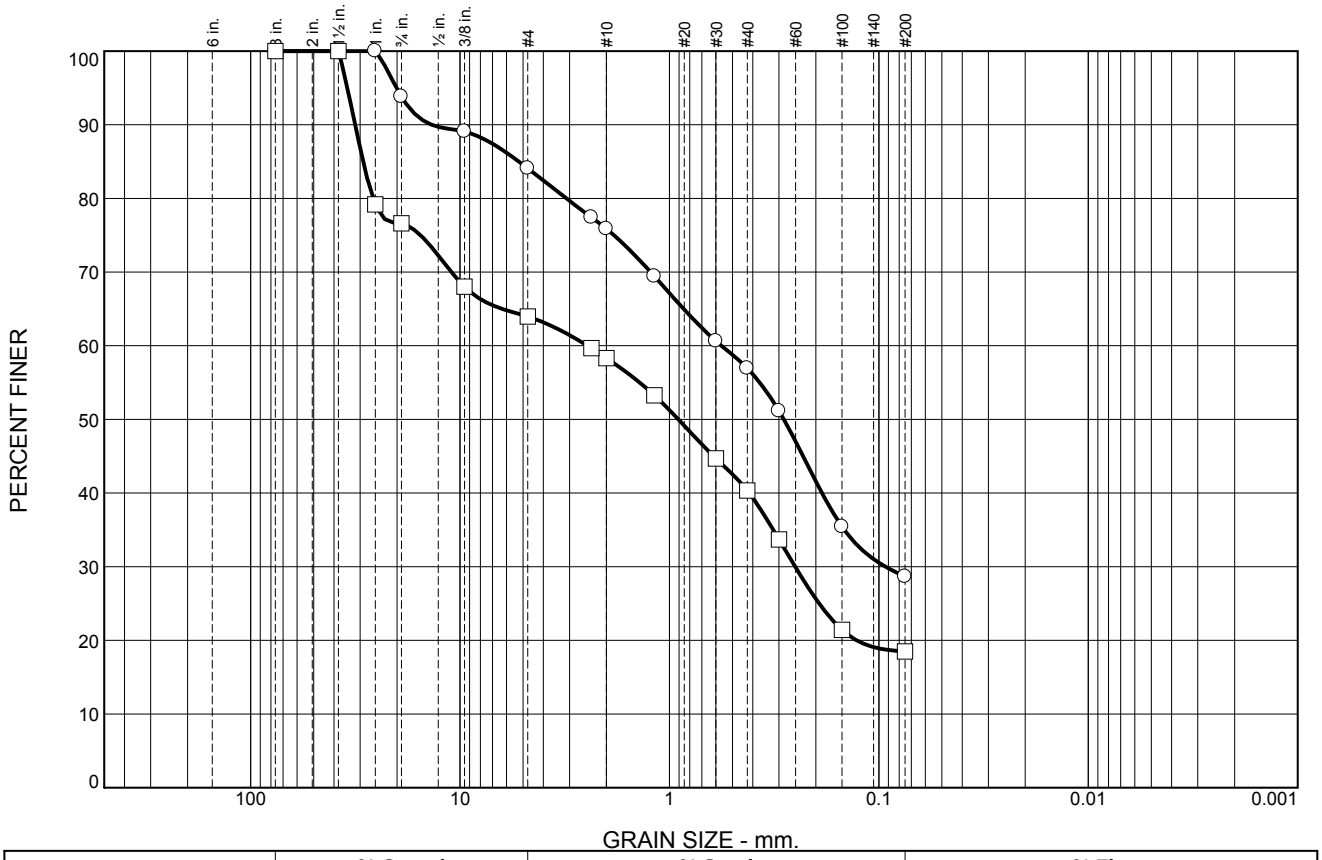
MOISTURE CONTENT/DRY DENSITY

Job #: BA036
Job Name: GHWTP - Santa Cruz
Date: 4/25/17
Tested by: Brad Hillebrandt

Additional Tests:	FS					
Boring #:	GD-B-3					
Depth:	3.0 - 3.5					
Sample Description:	Olive brown clayey SAND with gravel					
Can #:	B-30					
Wet Sample + can	959.9					
Dry Sample + can	888.2					
Weight can	265.6					
Weight water	71.7					
Weight Dry Sample	622.6					
WATER CONTENT (%)	**11.5%**					
Weight Sample + Liner	1213.9					
Weight Liner	254.8					
Sample Length	6.0					
Sample Diameter	2.39					
DRY DENSITY (pcf)	**121.7**					

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

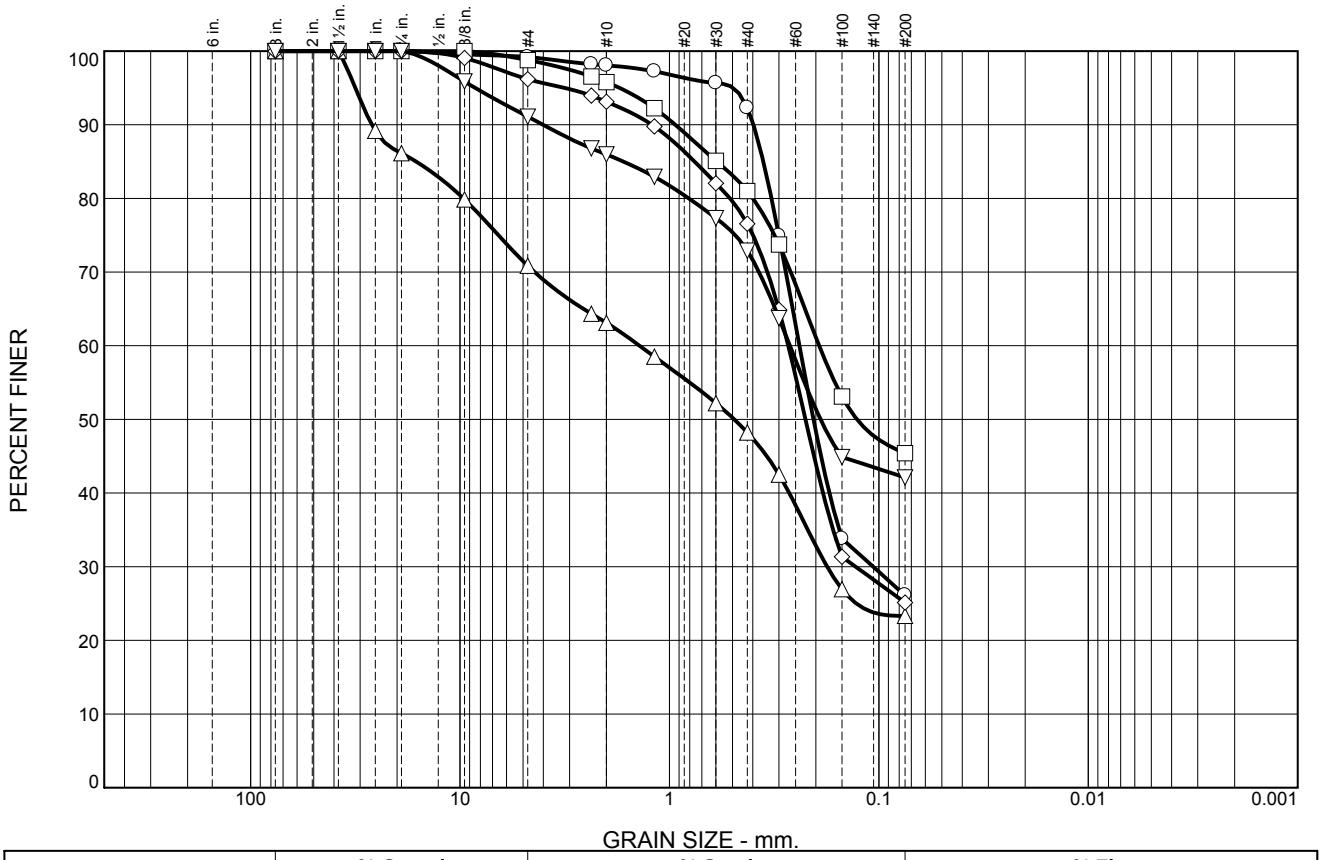
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-B-1		5.5 - 6.0'	Olive brown clayey SAND with gravel	
□	GD-B-1		10.5 - 11.0'	Light olive brown and yellowish brown clayey SAND with gravel	

B. HILLEBRANDT SOILS TESTING, INC.
+1 510-409-2816
SoilTesting@aol.com

Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-B-2		2.5 - 3.0'	Brownish yellow clayey SAND	
□	GD-B-2		7.5 - 8.0'	Light olive brown and brown clayey SAND	
△	GD-B-2		11.0 - 11.5'	Dark yellowish brown clayey SAND with gravel	
◇	GD-B-2		20.0 - 21.5'	Olive gray clayey SAND	
▽	GD-B-2		30.0 - 31.5'	Olive brown clayey SAND	

B. HILLEBRANDT SOILS TESTING, INC.
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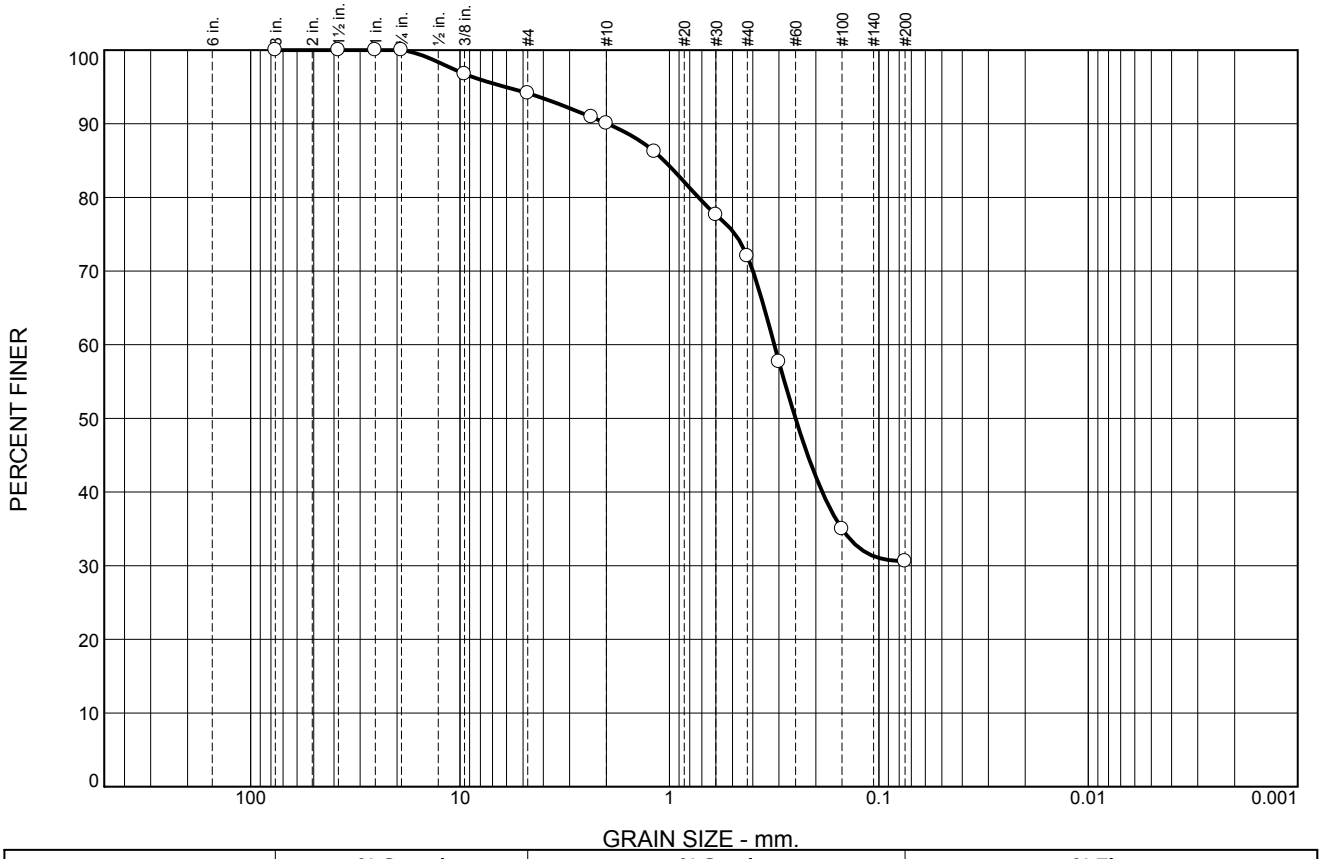
Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-B-3		3.0 - 3.5'	Olive brown clayey SAND	

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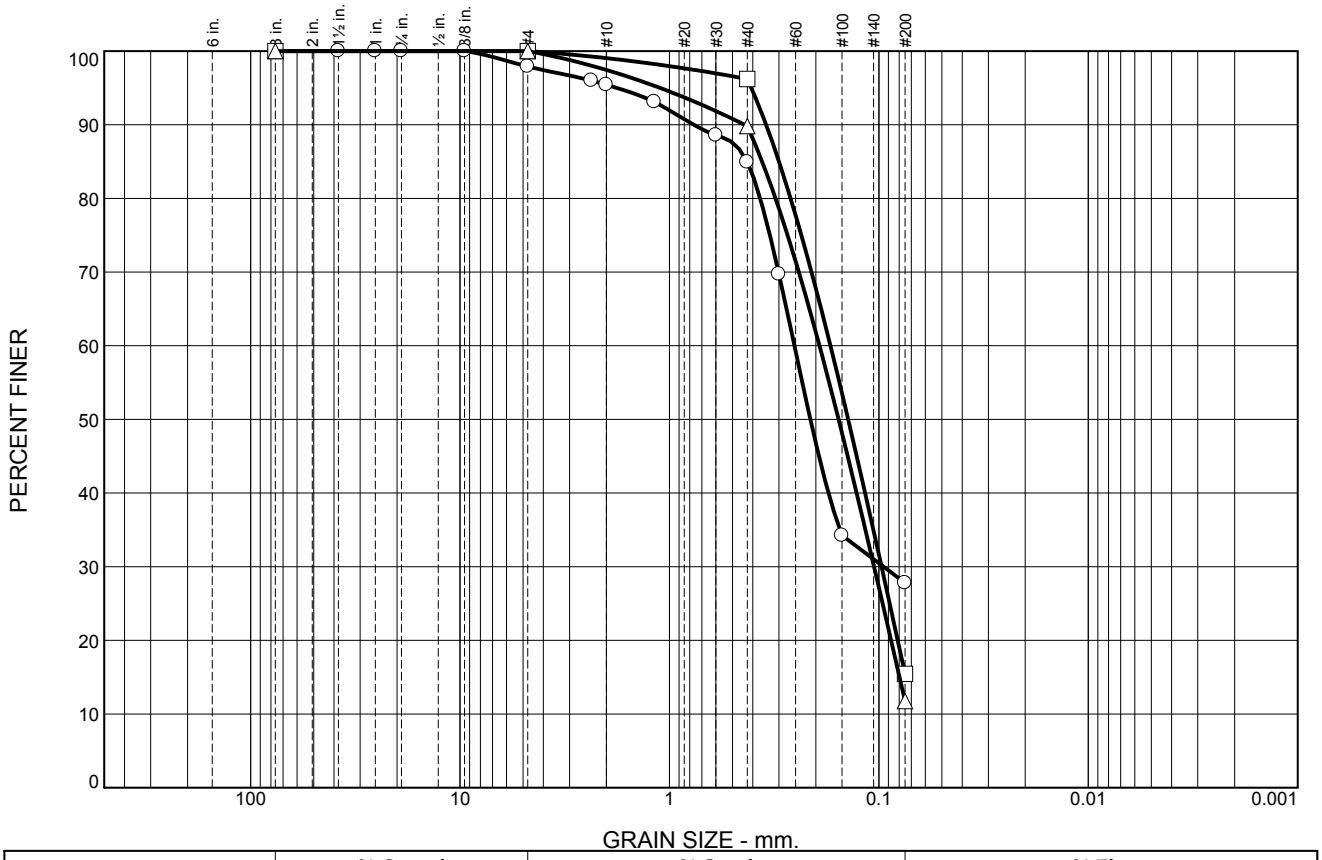
Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-C-3		1.0 - 2.5	Brownish yellow clayey SAND	
□	GD-C-3		4.0 - 5.5'	Brownish yellow clayey SAND	
△	GD-C-3		15.0 - 16.5'	Yellow	

B. HILLEBRANDT SOILS TESTING, INC.
+1 510-409-2816
SoilTesting@aol.com

Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-1
Depth: 5.5 - 6.0'
Material Description: Olive brown clayey SAND with gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
722.10	276.80	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	27.53	94
			3/8"	48.65	89
			#4	70.91	84
			#8	100.53	77
			#10	107.44	76
			#16	136.12	69
			#30	175.29	61
			#40	191.74	57
			#50	217.54	51
			#100	287.49	35
			#200	317.66	29

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	6	10	16	8	19	28	55			29

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0930	0.1869	0.2844	0.5646	3.1045	5.2423	13.6537	20.1040

Fineness Modulus
2.39

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-1
Depth: 10.5 - 11.0'
Material Description: Light olive brown and yellowish brown clayey SAND with gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
816.60	264.50	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	114.92	79
			3/4"	129.12	77
			3/8"	176.54	68
			#4	198.99	64
			#8	222.67	60
			#10	230.13	58
			#16	258.00	53
			#30	305.35	45
			#40	329.41	40
			#50	366.05	34
			#100	433.81	21
			#200	449.97	18

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	23	13	36	6	18	22	46			18

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.1276	0.2510	0.4161	0.9066	2.4623	26.0331	29.0226	31.6742	34.5094

Fineness Modulus
3.79

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-2
Depth: 2.5 - 3.0'
Material Description: Brownish yellow clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
370.40	34.00	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	1.51	100
			#4	2.74	99
			#8	5.98	98
			#10	6.51	98
			#16	9.25	97
			#30	14.61	96
			#40	25.90	92
			#50	84.38	75
			#100	222.67	34
			#200	248.58	26

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	1	1	1	6	66	73			26

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1065	0.1724	0.2053	0.2395	0.3257	0.3560	0.3970	0.4951

Fineness Modulus
1.01

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-2
Depth: 7.5 - 8.0'
Material Description: Light olive brown and brown clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
383.60	38.70	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	0.00	100
			#4	4.21	99
			#8	11.89	97
			#10	14.55	96
			#16	26.74	92
			#30	51.40	85
			#40	65.53	81
			#50	90.57	74
			#100	161.74	53
			#200	188.27	45

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	1	1	3	15	36	54			45

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1272	0.1927	0.3994	0.5945	0.9382	1.7301

Fineness Modulus
1.00

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-2
Depth: 11.0 - 11.5'
Material Description: Dark yellowish brown clayey SAND with gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
971.20	293.20	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	73.39	89
			3/4"	94.01	86
			3/8"	136.52	80
			#4	197.57	71
			#8	241.74	64
			#10	250.07	63
			#16	281.31	59
			#30	324.07	52
			#40	351.05	48
			#50	389.82	43
			#100	495.36	27
			#200	519.88	23

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	14	15	29	8	15	25	48			23

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1766	0.2679	0.4903	1.3896	9.6348	16.2153	26.3976	31.6142

Fineness Modulus
3.19

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-2
Depth: 20.0 - 21.5'
Material Description: Olive gray clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
377.40	37.90	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	3.17	99
			#4	12.95	96
			#8	20.53	94
			#10	23.35	93
			#16	34.72	90
			#30	60.94	82
			#40	79.58	77
			#50	119.19	65
			#100	233.08	31
			#200	254.18	25

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	4	4	3	16	52	71			25

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1291	0.1848	0.2241	0.2708	0.5140	0.7587	1.2121	3.1695

Fineness Modulus
1.43

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-2
Depth: 30.0 - 31.5'
Material Description: Olive brown clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
366.90	37.60	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	13.59	96
			#4	29.32	91
			#8	43.50	87
			#10	46.21	86
			#16	56.20	83
			#30	74.69	77
			#40	89.25	73
			#50	119.36	64
			#100	181.48	45
			#200	190.60	42

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	9	9	5	13	31	49			42

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1899	0.2660	0.8080	1.6586	4.0218	8.4610

Fineness Modulus
1.57

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-3
Depth: 3.0 - 3.5'
Material Description: Olive brown clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
888.20	265.60	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	20.11	97
			#4	36.46	94
			#8	56.56	91
			#10	61.93	90
			#16	85.88	86
			#30	139.25	78
			#40	174.05	72
			#50	263.50	58
			#100	404.70	35
			#200	432.03	31

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	6	6	4	18	41	63			31

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1863	0.2501	0.3157	0.7270	1.0611	1.9803	6.0739

Fineness Modulus
1.62

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-C-3
Depth: 1.0 - 2.5
Material Description: Brownish yellow clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
342.40	38.50	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	0.00	100
			#4	6.36	98
			#8	12.19	96
			#10	13.95	95
			#16	21.02	93
			#30	34.72	89
			#40	45.81	85
			#50	92.05	70
			#100	199.83	34
			#200	219.41	28

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	2	2	3	10	57	70			28

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.0950	0.1741	0.2123	0.2531	0.3686	0.4262	0.7659	1.7857

Fineness Modulus
1.20

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-C-3
Depth: 4.0 - 5.5'
Material Description: Brownish yellow clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
249.20	33.80	0.00	3"	0.00	100
			#4	0.00	100
			#40	8.16	96
			#200	182.11	15

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	1	3	81	85			15

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.0813	0.0971	0.1163	0.1401	0.1703	0.2639	0.2999	0.3455	0.4066

Fineness Modulus
0.67

GRAIN SIZE DISTRIBUTION TEST DATA

5/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-C-3
Depth: 15.0 - 16.5'
Material Description: Yellow
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
337.80	33.50	0.00	3"	0.00	100
			#4	0.00	100
			#40	30.98	90
			#200	268.54	12

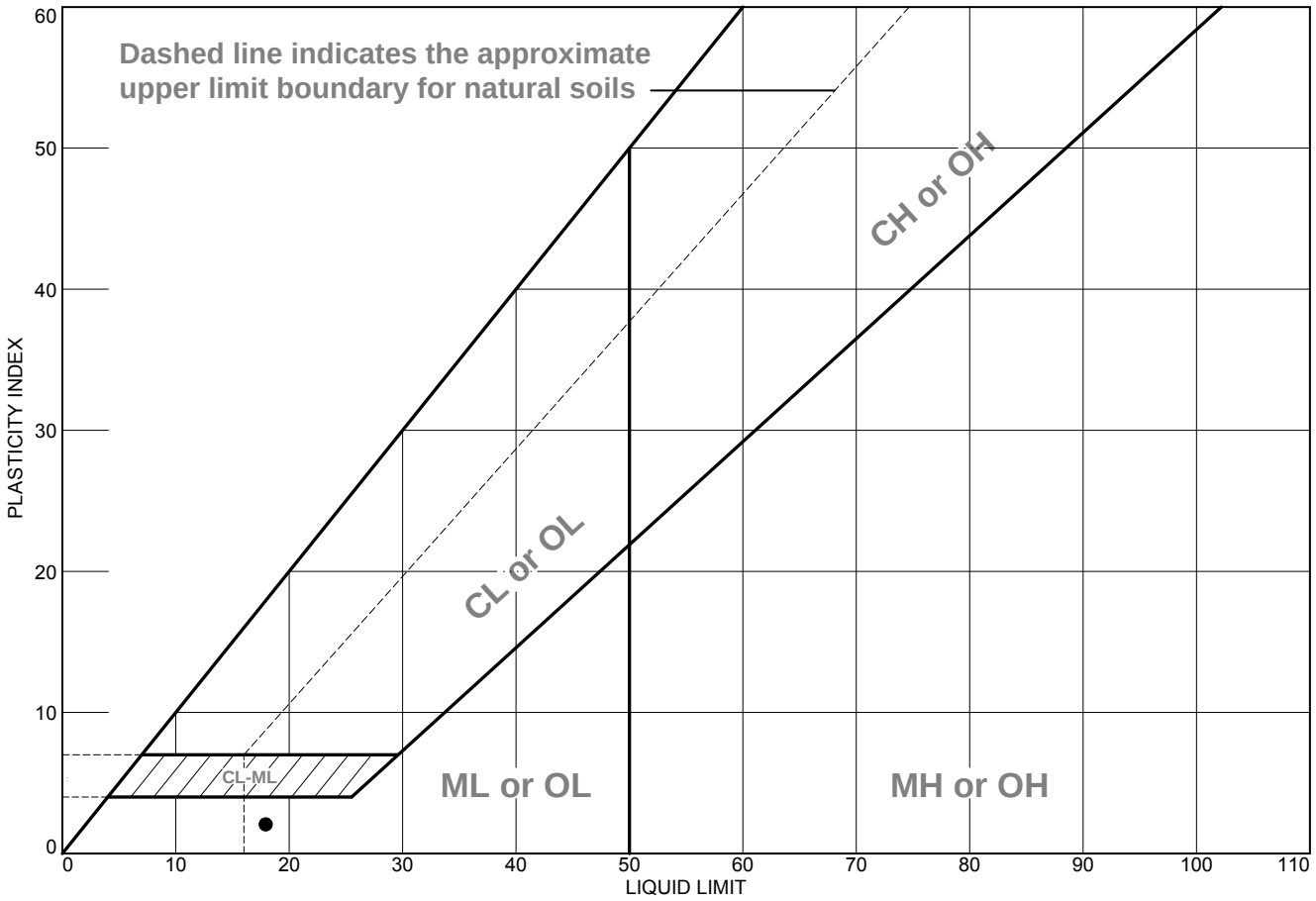
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	3	7	78	88			12

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0797	0.0874	0.1054	0.1277	0.1557	0.1921	0.3117	0.3611	0.4377	1.1093

Fineness Modulus
0.88

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark brown sandy SILT	18	16	2	85	51	ML

Project No. BA036 **Client:** Group Delta

Project: GHWTP - Santa Cruz

●**Source of Sample:** GD-B-4 **Depth:** 4.0 - 5.5'

Remarks:

B. HILLEBRANDT SOILS TESTING, INC.
+1 510-409-2816
SoilTesting@aol.com

Figure

Tested By: BH

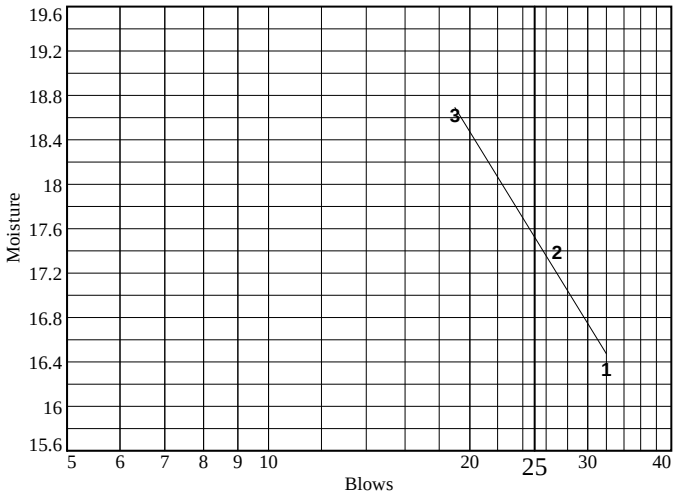
LIQUID AND PLASTIC LIMIT TEST DATA

5/30/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-4
Depth: 4.0 - 5.5'
Material Description: Dark brown sandy SILT
%<#40: 85 **%<#200:** 51 **USCS:** ML **AASHTO:** A-4(0)
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.48	29.25	27.04			
Dry+Tare	22.63	26.57	24.57			
Tare	11.31	11.16	11.31			
# Blows	32	27	19			
Moisture	16.3	17.4	18.6			

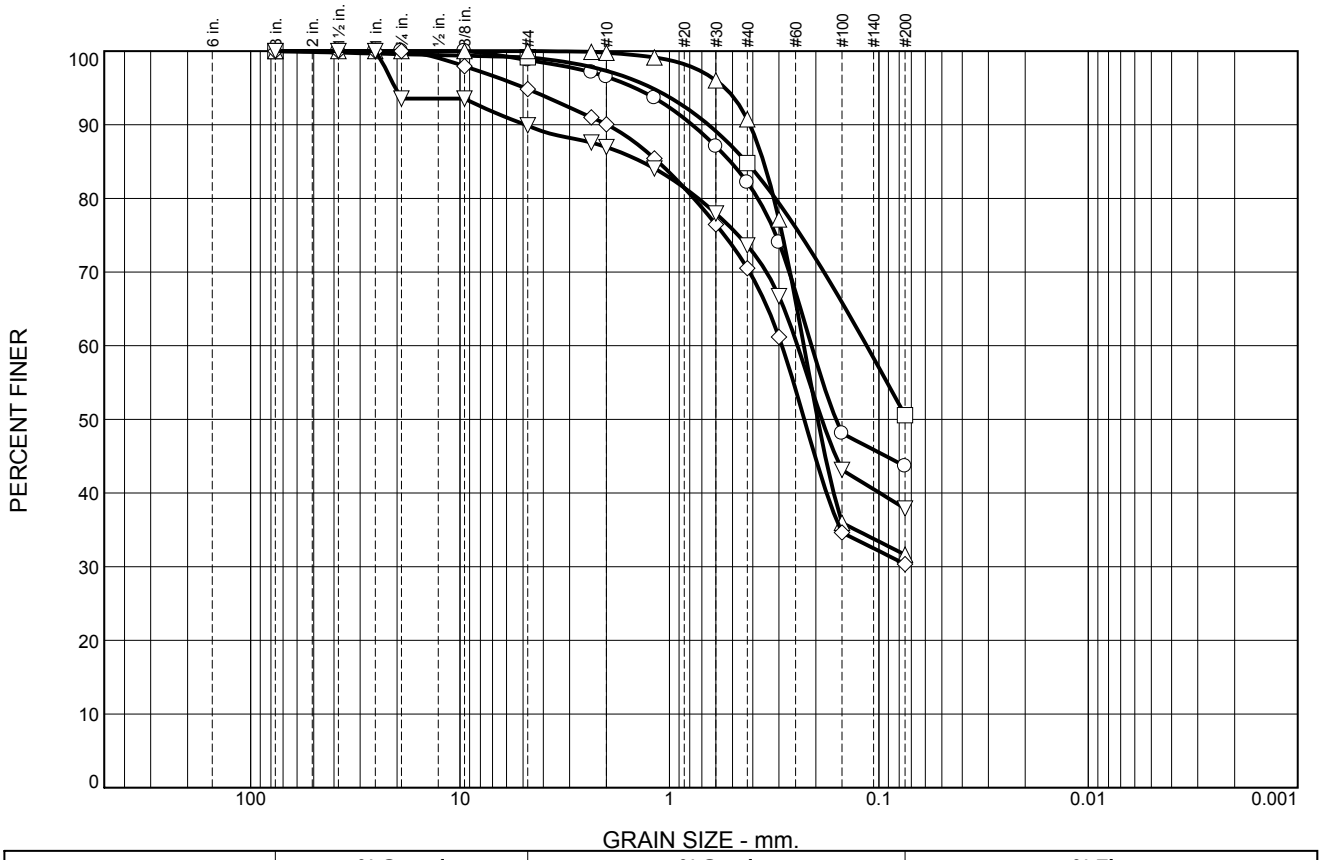


Liquid Limit= 18
Plastic Limit= 16
Plasticity Index= 2

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.77	17.17			
Dry+Tare	16.91	16.34			
Tare	11.27	11.31			
Moisture	15.2	16.5			

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

MATERIAL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-B-4		2.0 - 2.5'	Very dark brown silty SAND	
□	GD-B-4		4.0 - 5.5'	Dark brown sandy SILT	ML
△	GD-B-4		8.0 - 8.5'	Dark yellowisgh brown and olive brown silty SAND	
◇	GD-B-5		1.0 - 2.5'	Dark brown silty SAND	
▽	GD-B-5		4.0 - 4.5'	Very dark brown silty SAND	

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Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

GRAIN SIZE DISTRIBUTION TEST DATA

5/30/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-4
Depth: 2.0 - 2.5'
Material Description: Very dark brown silty SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
720.10	278.90	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	0.00	100
			#4	5.40	99
			#8	12.70	97
			#10	15.44	97
			#16	28.06	94
			#30	57.08	87
			#40	78.65	82
			#50	114.65	74
			#100	228.94	48
			#200	248.59	44

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	1	1	2	15	38	55			44

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1604	0.2096	0.3783	0.5111	0.7792	1.4615

Fineness Modulus
1.01

GRAIN SIZE DISTRIBUTION TEST DATA

5/30/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-4
Depth: 4.0 - 5.5'
Material Description: Dark brown sandy SILT
USCS: ML
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
262.40	34.40	0.00	3"	0.00	100
			#4	1.91	99
			#40	34.66	85
			#200	112.69	51

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	1	1	2	12	34	48			51

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.1143	0.3121	0.4311	0.6513	1.2132

Fineness Modulus
0.75

GRAIN SIZE DISTRIBUTION TEST DATA

5/30/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-4
Depth: 8.0 - 8.5'
Material Description: Dark yellowisgh brown and olive brown silty SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
577.20	292.80	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	0.00	100
			#4	0.00	100
			#8	0.28	100
			#10	0.65	100
			#16	2.44	99
			#30	11.32	96
			#40	26.32	91
			#50	64.98	77
			#100	182.15	36
			#200	194.44	32

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	0	0	0	9	59	68			32

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1644	0.1959	0.2281	0.3170	0.3551	0.4130	0.5425

Fineness Modulus
0.92

GRAIN SIZE DISTRIBUTION TEST DATA

5/30/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-5
Depth: 1.0 - 2.5'
Material Description: Dark brown silty SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
602.30	265.60	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	0.00	100
			3/8"	6.90	98
			#4	17.37	95
			#8	30.28	91
			#10	33.47	90
			#16	49.05	85
			#30	79.24	76
			#40	99.25	71
			#50	130.68	61
			#100	220.07	35
			#200	234.50	30

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	0	5	5	5	19	41	65			30

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1777	0.2270	0.2902	0.7647	1.1352	1.9813	4.9026

Fineness Modulus
1.58

GRAIN SIZE DISTRIBUTION TEST DATA

5/30/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-B-5
Depth: 4.0 - 4.5'
Material Description: Very dark brown silty SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
633.60	261.90	0.00	3"	0.00	100
			1.5"	0.00	100
			1"	0.00	100
			3/4"	23.97	94
			3/8"	23.97	94
			#4	37.48	90
			#8	46.15	88
			#10	48.44	87
			#16	59.24	84
			#30	81.94	78
			#40	98.11	74
			#50	123.69	67
			#100	211.32	43
			#200	230.82	38

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0	6	4	10	3	13	36	52			38

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.0990	0.1872	0.2446	0.7288	1.3618	4.8429	20.3774

Fineness Modulus
1.64

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
9245 ACTIVITY ROAD, SUITE 103
SAN DIEGO, CALIFORNIA 92126

Client: West Yost Associates
Attn:
Address:

COMPRESSION TEST REPORT

Project Name: GHWTP - Santa Cruz | Group Delta Project No.: BA036 | Date Sampled: April 17, 2017

Location in Structure: N/A

SAMPLING INFORMATION

Material: ☐ Shotcrete ☐ Concrete ☑ Other Rock Core

Specimens were obtained in accordance with ASTM C31
☐ YES ☐ NO ☐ SEE "REMARKS" BELOW

Specimens were tested in accordance with ASTM C39
☑ YES ☐ NO

TESTING INFORMATION

Received By: JIE | Tested By: JIE

Core Sample ID:	GD-C-3 (31-32')	GD-C-3 (36.5-37')						
Date Placed:	--	--						
Date Cored:	3/21/17	3/21/17						
Date Received:	5/4/17	5/4/17						
Date Tested:	5/5/17	5/5/17						
Age in Days:	--	--						
Specimen Diameter (in.):	2.39	2.39						
Specimen Height (in.):	4.89	3.86						
Aspect Ratio (_2_ to 1):	2.05	1.62						
Correction Factor:	1.00	0.97						
Plane ? (<0.002in.) Y / N	Y	Y						
Cross Sect. Area (in.^{2}):	4.49	4.49						
Maximum Load (lbs.):	48,540	79,250						
Compr. Strength (psi):	10,820	17,120						
Fracture Type:	3	3						

Notes: "<<<>>>" denotes test strength below the minimum required at the specified age.

The Material ☐ WAS ☐ WAS NOT ☐ SEE "REMARKS" SAMPLED AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMITTED DOCUMENTS.

The Material Tested ☑ MET ☐ DID NOT MEET THE REQUIREMENTS OF THE PERMITTED DOCUMENTS.

REMARKS:

cc: Project Inspector:

Signature

Report Date

Print Engineer Name / Title

GDC Revision Number 3 (10/1/16)

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

9 May, 2017

Job No. 1704177
Cust. No. 12925

Mr. Benjamin Serna
Group Delta
1970 Broadway, Suite 1100
Oakland, CA 94612

Subject: Project No.: BA036
Project Name: GHWTP, Santa Cruz
Corrosivity Analysis – ASTM Test Methods

Dear Mr. Serna:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on April 26, 2017. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, sample 001 is classified as "corrosive" and sample 002 is classified as "moderately corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations are none detected with a detection limit of 15 mg/kg.

The sulfate ion concentrations range from 39 to 140 mg/kg and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soils range from 4.76 to 6.81. Any soils with a pH of <6.0 is considered to be corrosive to buried iron, steel, mortar-coated steel and reinforced concrete structures. Therefore, corrosion prevention measures need to be considered for structures to be placed in this acidic soil.

The redox potentials range from 450 to 460-mV which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Group Delta
Client's Project No.: BA 036
Client's Project Name: GHWTP, Santa Cruz
Date Sampled: 26-Apr-17
Date Received: 26-Apr-17
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 9-May-2017

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1704177-001	GD-B-3 @ 2.5' - 3'	460	4.76	-	1,800	-	N.D.	140
1704177-002	GD-B-2 @ 3' - 3.5'	450	6.81	-	4,100	-	N.D.	39

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	8-May-2017	8-May-2017	-	9-May-2017	-	8-May-2017	8-May-2017

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

B. HILLEBRANDT SOILS TESTING, INC.

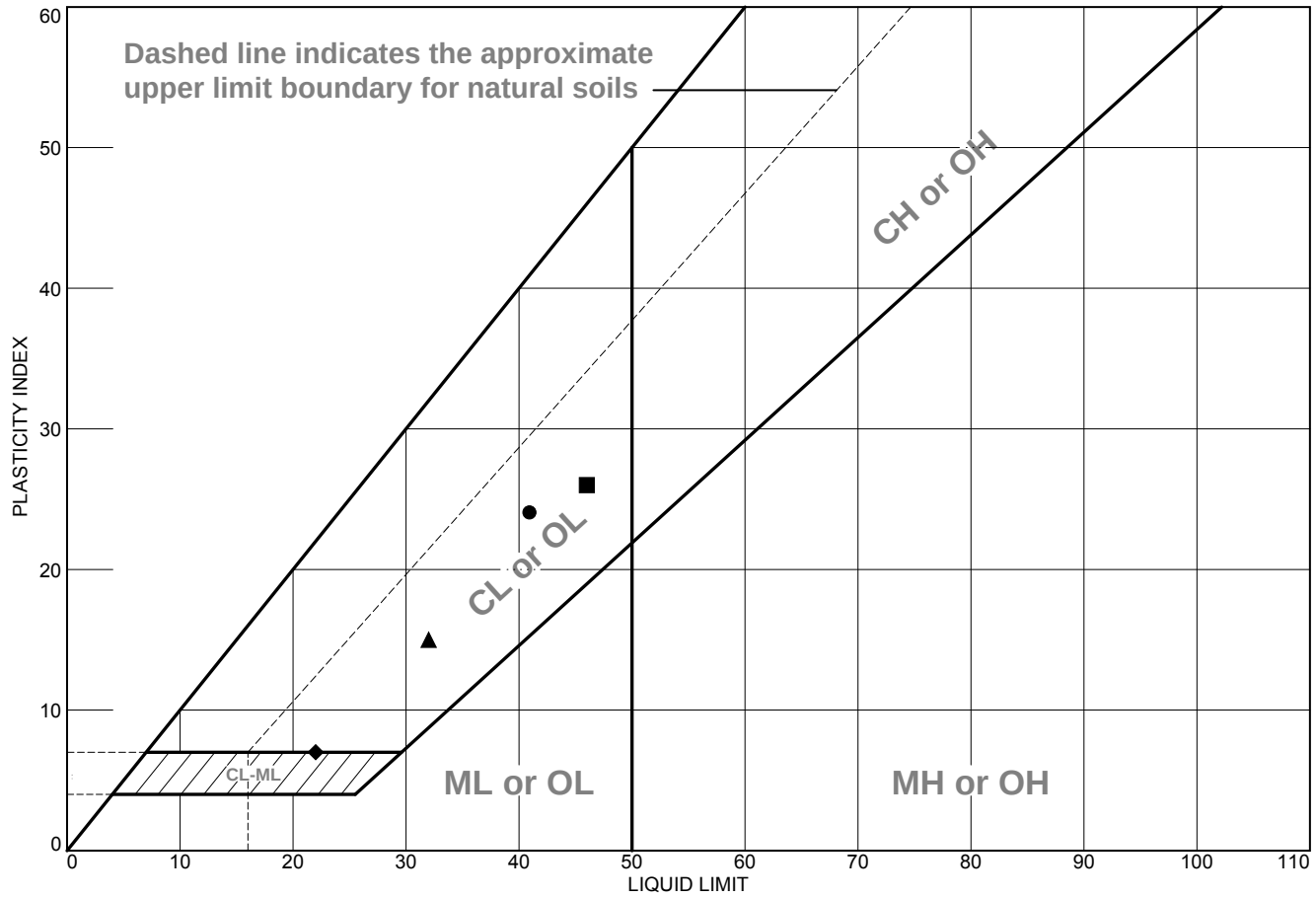
29 Sugarloaf Terrace, Alamo, CA 94507 - Tel: (510) 409-2916 - Fax: (925) 891-9267 - Email: soiltesting@aol.com

LAB RESULTS SUMMARY FORM

Project Number: BA036 **Project Name:** GHWTP - Santa Cruz **Results Due By:**
Requested By: MM **Request Date:** 9/14/17 **Throw Samples Out On:**

Boring #	Sample Depth (feet)	Dry Density (pcf)	Moisture Content (%)	Unconfined Compressive (ksf)	Atterberg			-200			Compaction		Pocket Penetrometer (tsf)	Torvane (tsf)	Remarks
					Liquid Limit	Plastic Limit	Plasicity Index	Passing #4 Sieve (%)	Passing #40 sieve (%)	Passing #200 sieve (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)			
GD-A-6	2.0 - 3.5							95	62	19					
GD-A-7	2.0 - 3.5							98	83	33					
GD-A-8	1.0 - 2.5				41	17	24								
GD-A-8	4.0 - 5.5							95	77	27					
GD-A-9	1.0 - 2.5				46	20	26								
GD-A-9	8.0 - 9.5							89	62	41					
GD-A-10	1.0 - 2.5				32	17	15								
GD-A-10	4.0 - 5.0							97	71	42					
GD-A-10	7.0 - 8.5				22	15	7								
GD-A-11	1.0 - 2.5				61	19	42								
GD-A-12	1.5 - 3.0				39	22	17								
GD-A-13	1.0 - 2.5							63	43	16					
GD-A-13	4.0 - 4.8							60	38	14					
GD-A-13	7.0 - 8.5							76	49	11					
GD-A-14	1.0 - 2.5							82	56	24					

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish brown clayey SAND with gravel	41	17	24			
■	Olive brown clayey SAND	46	20	26			
▲	Olive brown clayey SAND	32	17	15			
◆	Dark grayish brown clayey SAND	22	15	7			

Project No. BA036 **Client:** Group Delta

Project: GHWTP - Santa Cruz

Remarks:

●**Source of Sample:** GD-A-8 **Depth:** 1.0 - 2.5' **Sample Number:** 8-1

■**Source of Sample:** GD-A-9 **Depth:** 1.0 - 2.5' **Sample Number:** 9-1

▲**Source of Sample:** GD-A-10 **Depth:** 1.0 - 2.5' **Sample Number:** 10-1

◆**Source of Sample:** GD-A-10 **Depth:** 7.0 - 8.5' **Sample Number:** 10-3

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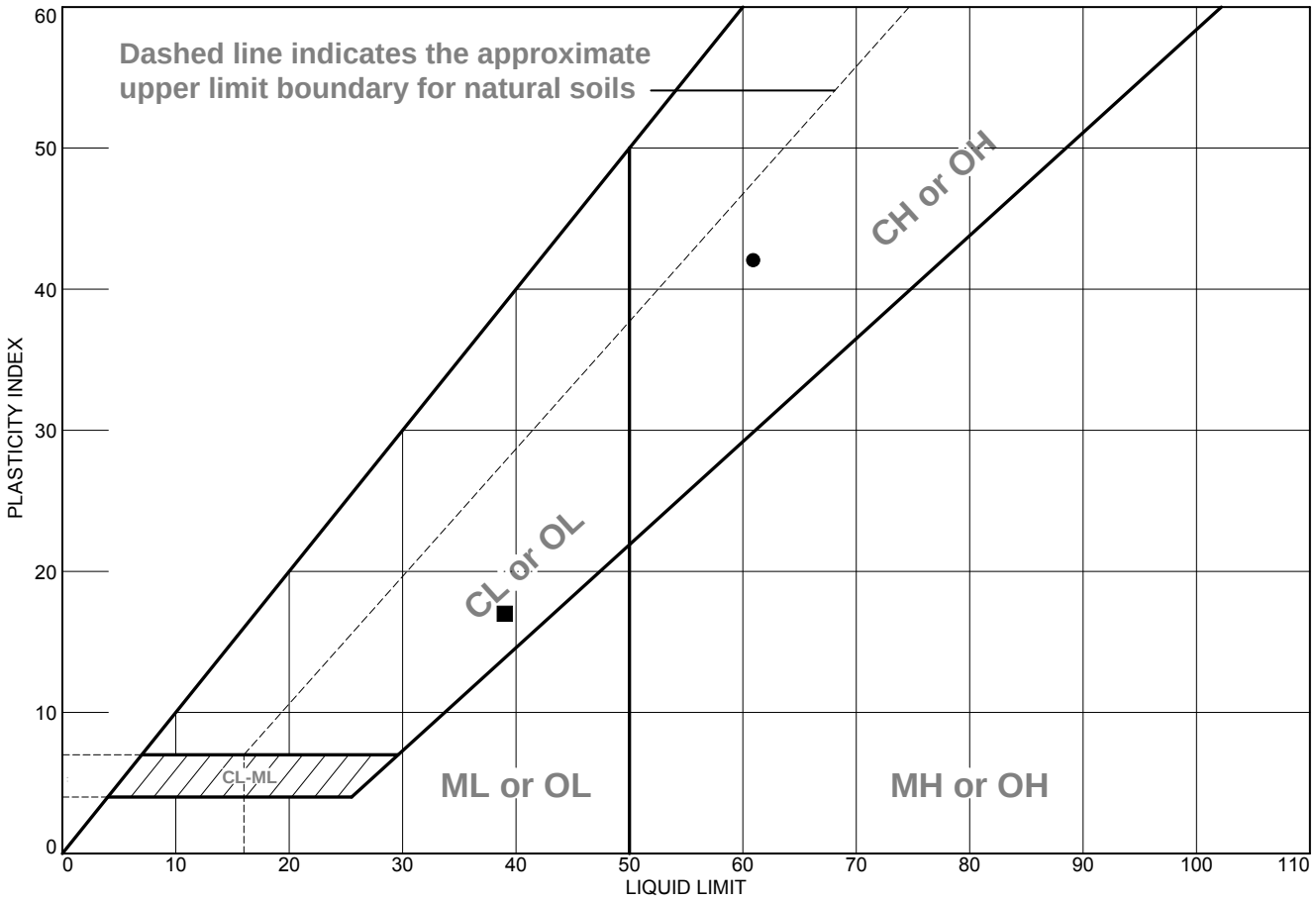
SoilTesting@aol.com

Figure

Tested By: BH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive brown fat CLAY with sand	61	19	42			
■	Brownish yellow sandy CLAY	39	22	17			

Project No. BA036 **Client:** Group Delta

Project: GHWTP - Santa Cruz

●**Source of Sample:** GD-A-11 **Depth:** 1.0 - 2.5' **Sample Number:** 11-1

■**Source of Sample:** GD-A-12 **Depth:** 1.5 - 3.0' **Sample Number:** 12-1

Remarks:

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SoilTesting@aol.com

Figure

Tested By: BH

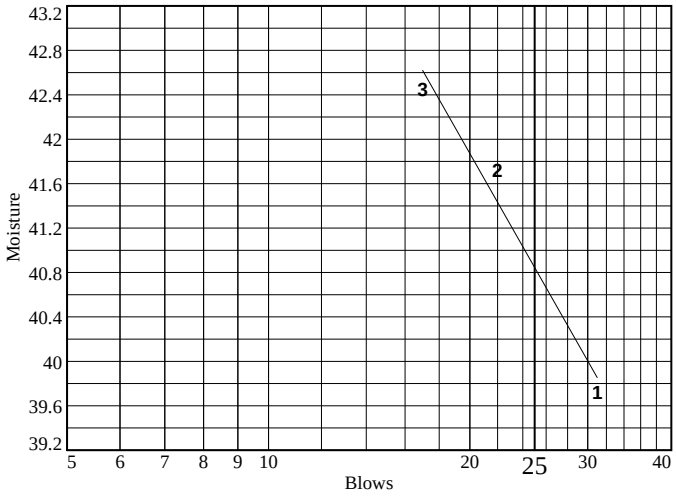
LIQUID AND PLASTIC LIMIT TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-8
Depth: 1.0 - 2.5' **Sample Number:** 8-1
Material Description: Yellowish brown clayey SAND with gravel
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.83	28.43	24.17			
Dry+Tare	24.53	23.39	20.26			
Tare	11.19	11.31	11.05			
# Blows	31	22	17			
Moisture	39.7	41.7	42.5			



Liquid Limit= 41
Plastic Limit= 17
Plasticity Index= 24

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.69	17.79			
Dry+Tare	17.56	16.84			
Tare	11.17	11.27			
Moisture	17.7	17.1			

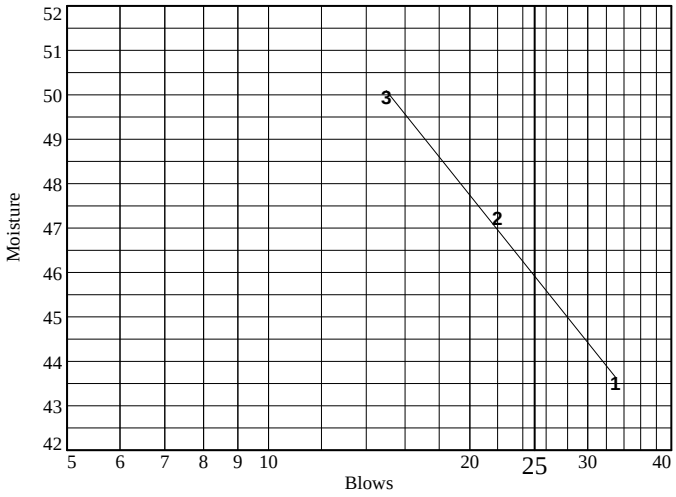
LIQUID AND PLASTIC LIMIT TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-9
Depth: 1.0 - 2.5' **Sample Number:** 9-1
Material Description: Olive brown clayey SAND
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.55	29.25	26.82			
Dry+Tare	23.25	23.44	21.65			
Tare	11.07	11.14	11.30			
# Blows	33	22	15			
Moisture	43.5	47.2	50.0			



Liquid Limit= 46
Plastic Limit= 20
Plasticity Index= 26

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.66	17.88			
Dry+Tare	16.62	16.76			
Tare	11.25	11.29			
Moisture	19.4	20.5			

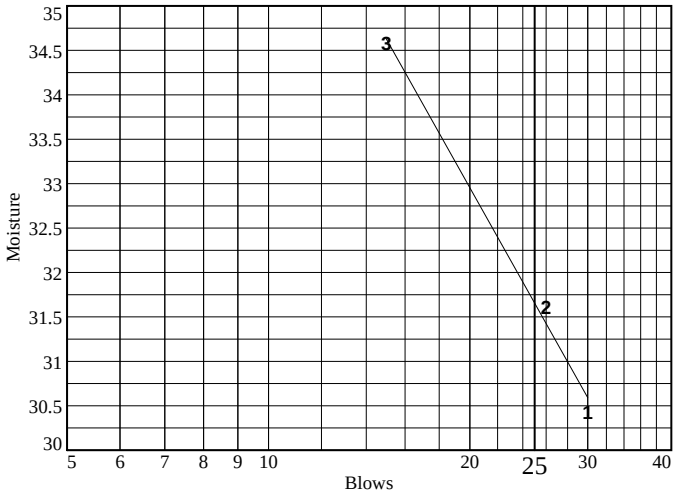
LIQUID AND PLASTIC LIMIT TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-10
Depth: 1.0 - 2.5' **Sample Number:** 10-1
Material Description: Olive brown clayey SAND
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.25	31.25	27.32			
Dry+Tare	23.54	26.45	23.19			
Tare	11.35	11.27	11.25			
# Blows	30	26	15			
Moisture	30.4	31.6	34.6			



Liquid Limit= 32
Plastic Limit= 17
Plasticity Index= 15

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.75	17.17			
Dry+Tare	16.81	16.29			
Tare	11.25	11.30			
Moisture	16.9	17.6			

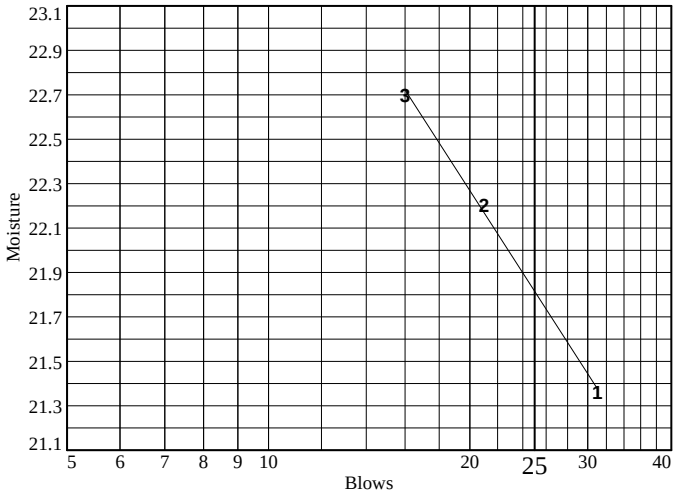
LIQUID AND PLASTIC LIMIT TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-10
Depth: 7.0 - 8.5' **Sample Number:** 10-3
Material Description: Dark grayish brown clayey SAND
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.25	28.44	29.57			
Dry+Tare	28.55	25.32	26.19			
Tare	11.23	11.27	11.30			
# Blows	31	21	16			
Moisture	21.4	22.2	22.7			



Liquid Limit= 22
Plastic Limit= 15
Plasticity Index= 7

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.29	17.44			
Dry+Tare	17.41	16.62			
Tare	11.27	11.31			
Moisture	14.3	15.4			

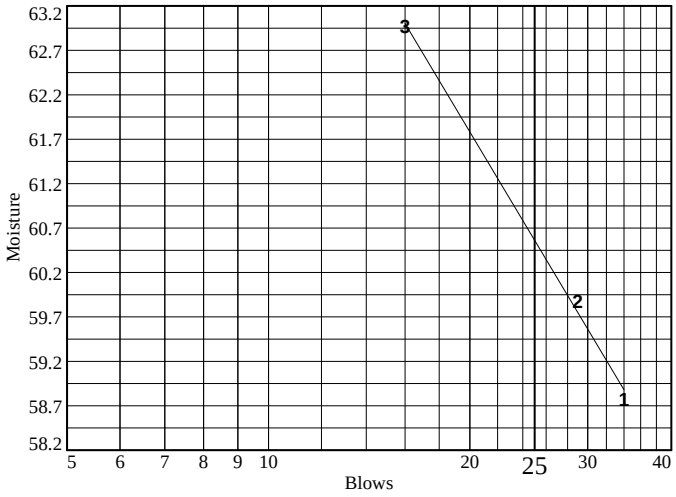
LIQUID AND PLASTIC LIMIT TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-11
Depth: 1.0 - 2.5' **Sample Number:** 11-1
Material Description: Olive brown fat CLAY with sand
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.31	27.24	26.28			
Dry+Tare	20.12	21.27	20.48			
Tare	11.29	11.30	11.27			
# Blows	34	29	16			
Moisture	58.8	59.9	63.0			



Liquid Limit= 61
Plastic Limit= 19
Plasticity Index= 42

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.81	17.98			
Dry+Tare	16.77	16.92			
Tare	11.36	11.30			
Moisture	19.2	18.9			

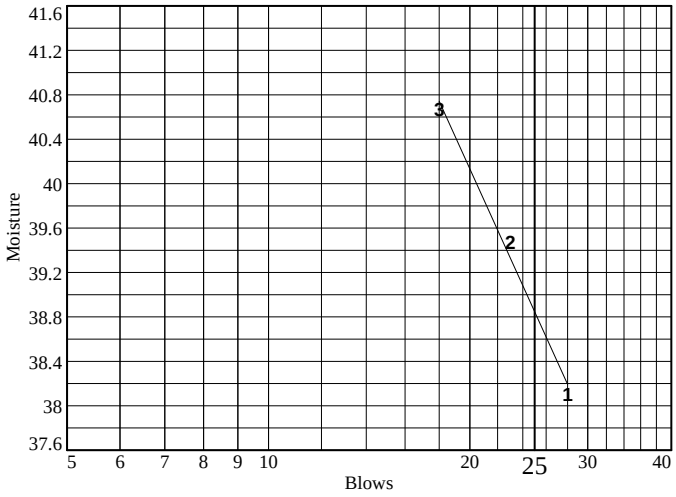
LIQUID AND PLASTIC LIMIT TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-12
Depth: 1.5 - 3.0' **Sample Number:** 12-1
Material Description: Brownish yellow sandy CLAY
Tested by: BH

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.93	27.84	31.13			
Dry+Tare	21.18	23.15	25.35			
Tare	11.34	11.27	11.14			
# Blows	28	23	18			
Moisture	38.1	39.5	40.7			

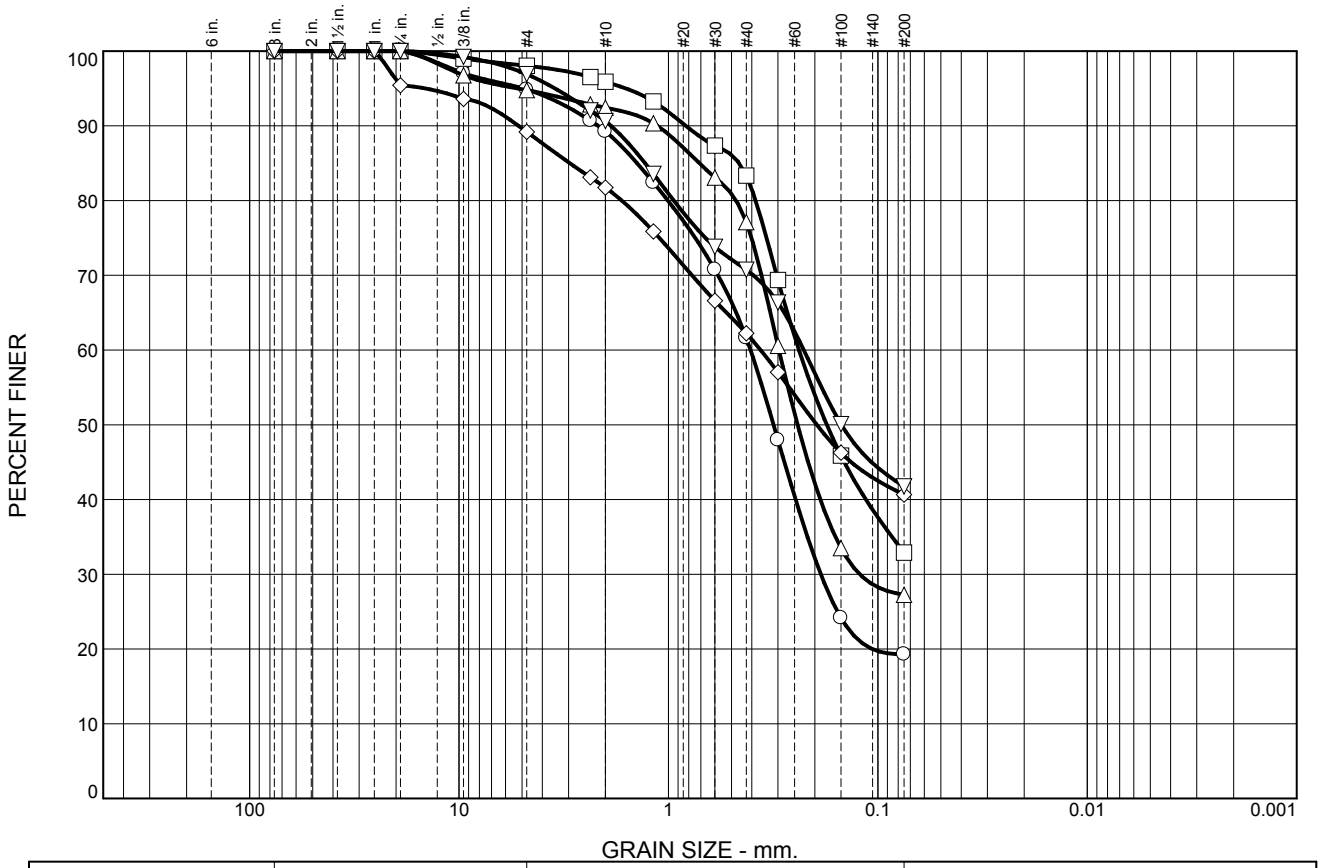


Liquid Limit= 39
Plastic Limit= 22
Plasticity Index= 17

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.91	17.17			
Dry+Tare	16.67	16.13			
Tare	11.09	11.28			
Moisture	22.2	21.4			

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	5.1	5.6	27.7	42.3	19.3	
□	0.0	0.0	2.0	2.1	12.6	50.4	32.9	
△	0.0	0.0	5.2	2.4	15.3	49.8	27.3	
◇	0.0	4.6	6.2	7.5	19.5	21.5	40.7	
▽	0.0	0.0	3.1	6.3	19.9	28.9	41.8	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-A-6	6-1	2.0 - 3.5	Brownish yellow clayey SAND	
□	GD-A-7	7-1	2.0 - 3.5'	Yellowish brown silty SAND	
△	GD-A-8	8-2	4.0 - 5.5'	Light olive brown silty SAND	
◇	GD-A-9	9-3	8.0 - 9.5'	Light olive brown clayey SAND	
▽	GD-A-10	10-2	4.0 - 5.0'	Dark yellowish brown clayey SAND	

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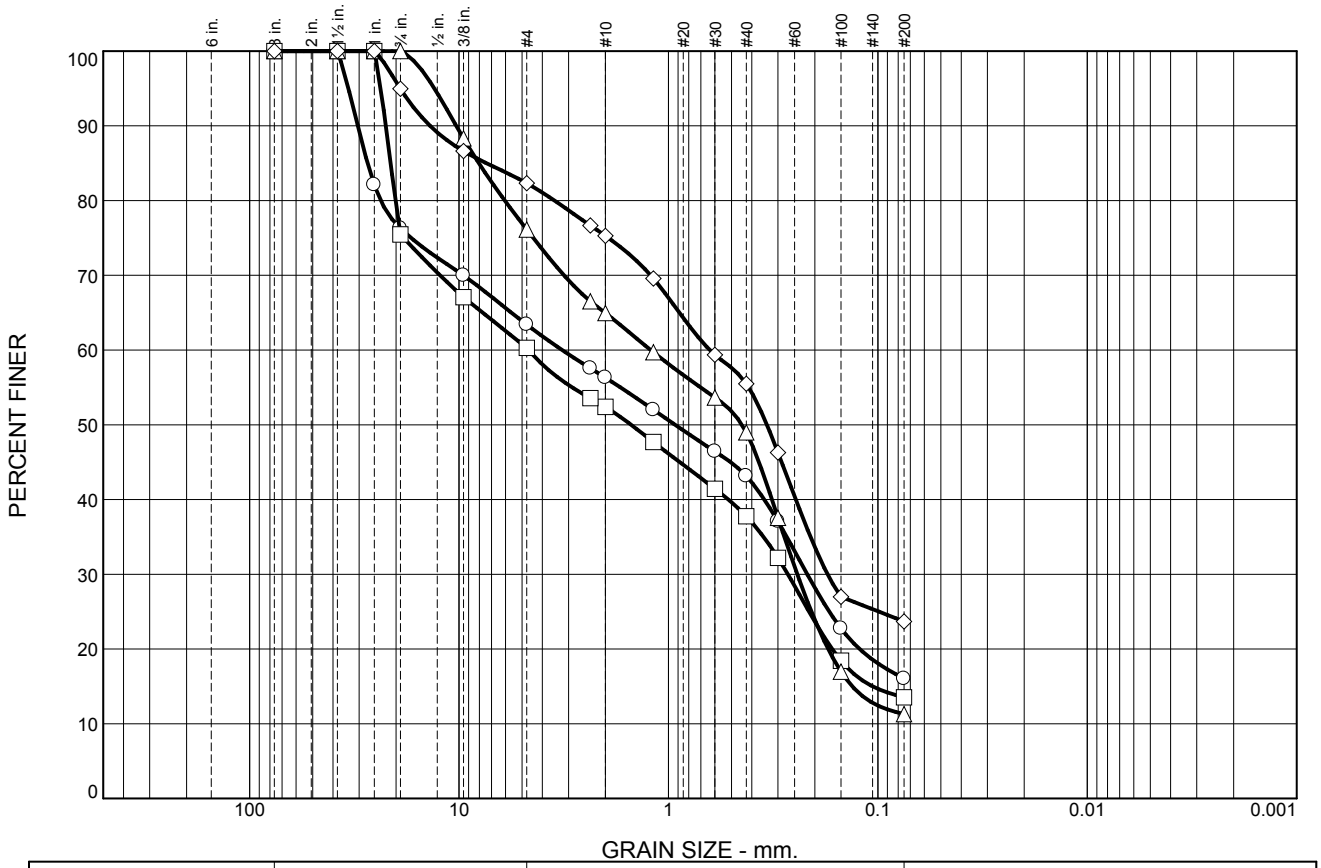
SoilTesting@aol.com

Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	23.7	12.9	7.1	13.2	27.1	16.0	
□	0.0	24.5	15.2	7.9	14.6	24.3	13.5	
△	0.0	0.0	23.9	11.1	16.0	37.7	11.3	
◇	0.0	5.0	12.7	7.0	19.8	31.8	23.7	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	GD-A-13	13-1	1.0 - 2.5	Dark yellowish brown silty SAND with gravel	
□	GD-A-13	13-2	4.0 - 4.8'	Olive brown silty SAND with gravel	
△	GD-A-13	13-3	7.0 - 8.5'	Yellowish brown poorly graded SAND with silt and gravel	
◇	GD-A-14	14-1	1.0 - 2.5'	Brown clayey SAND with gravel	

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Client: Group Delta
Project: GHWTP - Santa Cruz
Project No.: BA036 **Figure**

Tested By: BH

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-6
Depth: 2.0 - 3.5 **Sample Number:** 6-1
Material Description: Brownish yellow clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
713.90	264.10	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	0.00	100.0
			3/8"	13.32	97.0
			#4	23.14	94.9
			#8	41.84	90.7
			#10	48.35	89.3
			#16	79.13	82.4
			#30	131.60	70.7
			#40	172.60	61.6
			#50	234.02	48.0
			#100	341.11	24.2
			#200	363.04	19.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	5.1	5.1	5.6	27.7	42.3	75.6			19.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.1065	0.1872	0.2470	0.3149	0.4054	1.0057	1.4114	2.1694	4.9437

Fineness Modulus
1.92

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-7
Depth: 2.0 - 3.5' **Sample Number:** 7-1
Material Description: Yellowish brown silty SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
700.80	274.50	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	0.00	100.0
			3/8"	4.27	99.0
			#4	8.38	98.0
			#8	14.79	96.5
			#10	17.47	95.9
			#16	28.73	93.3
			#30	53.92	87.4
			#40	71.01	83.3
			#50	130.56	69.4
			#100	230.70	45.9
			#200	286.04	32.9

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.0	2.0	2.1	12.6	50.4	65.1			32.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1141	0.1753	0.2381	0.3833	0.4593	0.8261	1.5977

Fineness Modulus
1.11

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-8
Depth: 4.0 - 5.5' **Sample Number:** 8-2
Material Description: Light olive brown silty SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
302.10	38.50	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	0.00	100.0
			3/8"	8.52	96.8
			#4	13.75	94.8
			#8	18.79	92.9
			#10	19.96	92.4
			#16	25.45	90.3
			#30	44.59	83.1
			#40	60.31	77.1
			#50	103.94	60.6
			#100	175.28	33.5
			#200	191.75	27.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	5.2	5.2	2.4	15.3	49.8	67.5			27.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1221	0.1883	0.2417	0.2967	0.4749	0.7115	1.1290	5.2313

Fineness Modulus
1.48

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-9
Depth: 8.0 - 9.5' **Sample Number:** 9-3
Material Description: Light olive brown clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
724.60	271.00	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	20.77	95.4
			3/8"	29.01	93.6
			#4	49.02	89.2
			#8	76.58	83.1
			#10	82.81	81.7
			#16	109.44	75.9
			#30	151.50	66.6
			#40	171.26	62.2
			#50	194.91	57.0
			#100	243.74	46.3
			#200	269.17	40.7

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	4.6	6.2	10.8	7.5	19.5	21.5	48.5			40.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1956	0.3629	1.6701	2.9556	5.1971	14.4165

Fineness Modulus
1.93

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-10
Depth: 4.0 - 5.0' **Sample Number:** 10-2
Material Description: Dark yellowish brown clayey SAND
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
919.80	446.00	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	0.00	100.0
			3/8"	3.73	99.2
			#4	14.62	96.9
			#8	37.64	92.1
			#10	44.34	90.6
			#16	77.86	83.6
			#30	124.10	73.8
			#40	138.64	70.7
			#50	159.40	66.4
			#100	236.47	50.1
			#200	275.98	41.8

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.1	3.1	6.3	19.9	28.9	55.1			41.8

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1493	0.2258	0.9428	1.2938	1.8785	3.4808

Fineness Modulus
1.38

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-13
Depth: 1.0 - 2.5 **Sample Number:** 13-1
Material Description: Dark yellowish brown silty SAND with gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
566.10	270.50	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	52.92	82.1
			3/4"	70.05	76.3
			3/8"	88.73	70.0
			#4	108.18	63.4
			#8	125.44	57.6
			#10	129.15	56.3
			#16	141.88	52.0
			#30	158.36	46.4
			#40	168.08	43.1
			#50	186.05	37.1
			#100	228.35	22.8
			#200	248.19	16.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	23.7	12.9	36.6	7.1	13.2	27.1	47.4			16.0

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.1222	0.2172	0.3485	0.9294	3.2148	23.6832	27.3468	30.4299	33.7423

Fineness Modulus
3.75

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-13
Depth: 4.0 - 4.8' **Sample Number:** 13-2
Material Description: Olive brown silty SAND with gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
567.40	279.90	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	70.53	75.5
			3/8"	94.66	67.1
			#4	114.17	60.3
			#8	133.51	53.6
			#10	136.85	52.4
			#16	150.38	47.7
			#30	168.37	41.4
			#40	178.92	37.8
			#50	194.92	32.2
			#100	234.50	18.4
			#200	248.60	13.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	24.5	15.2	39.7	7.9	14.6	24.3	46.8			13.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.1059	0.1654	0.2689	0.5176	1.5069	4.6546	20.1059	21.2122	22.3601	23.6611

Fineness Modulus
4.04

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-13
Depth: 7.0 - 8.5' **Sample Number:** 13-3
Material Description: Yellowish brown poorly graded SAND with silt and gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
755.30	278.20	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	0.00	100.0
			3/8"	55.72	88.3
			#4	113.90	76.1
			#8	159.70	66.5
			#10	167.21	65.0
			#16	192.22	59.7
			#30	221.14	53.6
			#40	243.39	49.0
			#50	297.91	37.6
			#100	396.13	17.0
			#200	423.21	11.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	23.9	23.9	11.1	16.0	37.7	64.8			11.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.1325	0.1728	0.2425	0.3205	0.4456	1.2154	6.0452	8.0421	10.3173	13.1109

Fineness Modulus
3.01

GRAIN SIZE DISTRIBUTION TEST DATA

10/2/2017

Client: Group Delta
Project: GHWTP - Santa Cruz
Project Number: BA036
Location: GD-A-14
Depth: 1.0 - 2.5' **Sample Number:** 14-1
Material Description: Brown clayey SAND with gravel
Tested by: BH

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
691.80	229.70	0.00	3"	0.00	100.0
			1.5"	0.00	100.0
			1"	0.00	100.0
			3/4"	23.29	95.0
			3/8"	61.79	86.6
			#4	81.67	82.3
			#8	107.83	76.7
			#10	114.22	75.3
			#16	140.60	69.6
			#30	187.78	59.4
			#40	205.68	55.5
			#50	248.20	46.3
			#100	337.41	27.0
			#200	352.65	23.7

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	5.0	12.7	17.7	7.0	19.8	31.8	58.6			23.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1739	0.2465	0.3386	0.6347	3.5007	7.3969	13.7469	19.0900

Fineness Modulus
2.57

Appendix D. Graham Hill Water Treatment Plant Concrete Tanks Replacement Project Mitigation Monitoring and Reporting Program

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MITIGATION MONITORING AND REPORTING PROGRAM

GRAHAM HILL WATER TREATMENT PLANT CONCRETE TANKS REPLACEMENT PROJECT

City of Santa Cruz, California

May 2019

The City of Santa Cruz Water Department (City), as Lead Agency under the California Environmental Quality Act (CEQA) and State CEQA Guidelines, prepared the Initial Study and Mitigated Negative Declaration for the Graham Hill Water Treatment Plant Concrete Tanks Project. In accordance with CEQA, the lead agency must also adopt a program for reporting or monitoring mitigation measures that were adopted or made conditions of project approval (Public Resources Code [PRC] Section 21081.6[a]; State CEQA Guidelines Sections 15091[d], 15097).

This document represents the mitigation monitoring and reporting program (MMRP) for the Graham Hill Water Treatment Plant Concrete Tanks Project, and includes all measures required to reduce potentially significant environmental impacts to a less than significant level.

Table 1 includes the best management practices (BMPs) and mitigation measures, timing of implementation, the agency responsible for implementing the mitigation, and the agency responsible for monitoring the mitigation. **Table 2** includes the sequence for implementing project BMPs and mitigation measures.

Contact Information:

City of Santa Cruz
Water Department
212 Locust Street
Santa Cruz, CA 95060
Contact: Jessica Martinez-McKinney, Planner
(831) 420-5220

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Staging Area			
BMP -1. Staging Area Water Quality and Resource Protection Measures. The offsite staging area will be located on a site that has been previously disturbed. The site will be located within five (5) miles of the GHWTP, and will be approximately 100 x 200 feet in size. Any adjacent waterways and/or sensitive resources will be protected. Although the City has not determined a specific offsite staging area, one area being considered for use is APN 008-012-07, a vacant lot owned by the City on River Street. This lot is graveled and has been used by the City for materials storage in the past. This site is used regularly by the City for storage and staging purposes, and is fenced for security purposes. When in use, BMPs are implemented per the City's Stormwater management program to ensure that the adjacent San Lorenzo River and sensitive resources are protected from construction related impacts.	Pre-Construction Plans or Approvals Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP -2. Staging Area Materials Storage and Transportation Measures. The offsite staging location will be used for materials/equipment storage and/or employee parking. The contractor may include security fencing and/or personnel to ensure the safety of the equipment and materials used for project construction activities. In the event that the offsite area was used for employee parking, a daily shuttle will transport employees between the offsite parking location and the GHWTP. If spoils were transported and/or stored at the offsite staging area, water quality best management practices will be implemented to ensure that all materials remained contained on the site, and there will be no runoff to adjacent land uses. If an offsite staging area is used that deviates from these specifications, additional environmental evaluation and review may be required.	Pre-Construction Plans or Approvals Implement During Construction	Contractor	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – San Lorenzo River Parkway Phase III Project			
Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Air Quality			
BMP-3. Fugitive Dust Measures. To reduce the generation of fugitive dust throughout project implementation, the construction contractor will be required to prepare and implement dust control measures at the construction and staging areas, which will include: water all active construction areas as needed based on the type of construction activity, soil, and wind exposure; maintain at least 2-feet of freeboard, or cover dirt and loose materials, in haul trucks throughout transportation; cover inactive storage piles and stock piles of dirt; and sweep any roadways/paths if loose soil material remains at the end of the work day.	Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP-4. Portable Construction Equipment Measures. If portable construction equipment that is used for project implementation includes engines 50 horsepower (Hp) in size or greater, the City will comply with required permits issued by MBARD, in compliance with the California Air Resources Board regulations.	Pre- Construction Plans and Approvals	City	City, construction inspector or qualified consultant
BMP-5. Compliance with Monterey Bay Area Resource District's (MBARD) Clean Construction Equipment Measures. Given the close proximity of residences, the City will comply with the MBARD's recommendation to use cleaner construction equipment that conforms to the Environmental Protection Agency's Tier 3 or Tier 4 emission standards. Wherever feasible, construction equipment will use alternative fuels such as compressed natural gas, propane, electricity or biodiesel.	Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP-6. Compliance with MBARD's National Emissions Standards for Hazardous Air Pollutants Rule 424. As necessary, the project will comply with MBARD Rule 424, National Emissions Standards for Hazardous Air Pollutants. Rule 424 defines the investigation and reporting requirements for asbestos which include surveys and advanced notification on structures being renovated or demolished. Air District notification will be required at least ten days prior to renovation or demolition activities. If old underground piping or other asbestos containing construction materials are encountered during trenching activities, Rule 424 may also apply.	Pre-Construction Plans and Approvals Implement During Construction	Contractor	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Water Quality			
BMP – 7. Preparation of the Project Storm Water Pollution Prevention Plan (SWPPP). Implementation of the project will result in the ground disturbance of more than one acre and, therefore, will be regulated under the Clean Water Act through the National Pollutant Discharge Elimination System (NPDES) stormwater program, which requires compliance with the Construction General Permit. This permit requires the development and implementation of a SWPPP which must describe the site, the facility, erosion and sediment controls, runoff water quality monitoring, means of waste disposal, implementation of approved local plans, control of construction sediment and erosion control measures, maintenance responsibilities, and non-stormwater management controls.	Pre-Construction Plans or Approvals Implement During Construction	City will file Notice of Intent to enroll under the Construction General Permit Contractor will develop SWPPP and submit to City Contractor will implement measures defined in the Project SWPPP	City, construction inspector or qualified consultant
BMP - 8. Measures for On-going Compliance with the SWPPP. The inspection of construction sites before and after storms is required to evaluate stormwater discharge from the construction site, and to identify and implement additional erosion controls, where necessary. Compliance with the NPDES-required SWPPP will reduce the overall risk of soil erosion.	Construction Monitoring/Periodic Inspection	City	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
BMP – 9. Compliance with City Storm Water Ordinances and the City Construction Work Best Management Practices. All construction and staging activities will be conducted in accordance with the City's Storm Water Ordinances (Chapters 16.19 Storm Water and Urban Runoff Pollution Control) and the City's Construction Work Best Management Practices, Chapter 4 of the Best Management Practices Manual for the City's Storm Water Management Program (revised June 2014). This includes the preparation and implementation of an Erosion Control Plan, which will specify detailed water quality protection and erosion/sediment control BMPs. The Erosion Control Plan will also include requirements for equipment and vehicle maintenance, materials storage, and other construction practices which could result in the inadvertent release of fuel, motor oil, and other hazardous fluids and materials. Measures to ensure proper disposal of construction and demolition waste, including asbestos, lead and other debris containing hazardous materials are also included. BMPs will be selected to represent the best available technology that is economically achievable, subject to review and approval by the City. The City will perform routine inspections of the construction area to verify the BMPs are being properly implemented and protection measures are being maintained. The City will notify the contractor immediately if there were a violation that will require immediate compliance.	Pre-Construction Plans or Approvals Installation Prior to Construction Start Implement During Construction Construction Monitoring/Periodic Inspection	Contractor will prepare an Erosion Control Plan City will review and approve Erosion Control Plan Contactor will install materials as necessary prior to the start of construction and throughout construction activities City will provide periodic inspection	City, construction inspector or qualified consultant
BMP – 10. Grading Measures to Protect Slope Stability. Excavation and grading activities on or near slopes exceeding thirty (30) percent will occur outside of the winter rainy season at the discretion of the City based on weather conditions and forecasts. All grading, regardless of the time of year or weather conditions, will employ BMPs as described in the Erosion Control Plan and SWPPP.	Pre-Construction Plans or Approvals Implement During Construction Construction Monitoring/Periodic Inspection	Contractor will prepare an Erosion Control Plan City will review and approve Erosion Control Plan Contactor will comply with the Erosion Control Plan, SWPPP and timing of grading activities City will provide periodic inspection	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Biological Resources			
BMP – 11. Biological Resources Education Materials and Training. A binder with information containing any permits and environmental requirements for the project, including avoidance of special-status species and habitats, will be created and kept at the project area at all times. Prior to starting construction, all employees and contractors who will be present during project activities will receive training from a qualified individual on the contents of the binder, including species identification, avoidance and minimization measures, and stop work and reporting requirements.	Pre-Construction Trainings/ Inspections Implement During Construction	City will provide education program Contractor will comply with education program throughout project implementation	City, construction inspector or qualified consultant
BMP – 12. Measures to Implement Heritage Tree Protections. Pre-construction activities will include identifying, marking, and measuring the trees that will be removed or trimmed for project construction. Although the City of Santa Cruz Heritage Tree Ordinance is not applicable to the project, pursuant to California Government Code section 53091, any impacts to heritage trees (trees with a circumference of forty-four (44) inches, approximately fourteen (14) inches in diameter, measured at breast-height, approximately fifty-four (54) inches above existing grade) will be avoided to the greatest extent feasible, and pruning or removal will be performed by a state tree care license issued by the State of California in accordance with a consulting arborist report prepared for the project area. The City will also comply with mitigation requirements, in accordance with the project arborist report.	Pre-Construction Biological Surveys or Reviews Implement During Construction	City will prepare an arborist report. Contractor will comply with requirements of arborist report	City, construction inspector or qualified consultant
BMP – 13. Measures to Implement Heritage Tree Protection. The City will also comply with mitigation requirements as described in a consulting arborist report.	Post-Construction Measures	City will implement mitigation requirements	City staff or qualified consultant
BMP – 14. Surveys for Birds of Prey. To protect nesting birds, no tree or vegetation trimming or removal, or noise generating activities above existing ambient noise levels, could occur from February 1 through August 31 unless the following Avian Nesting Surveys are completed by a qualified biologist. A survey for nesting activities of birds of prey within the project area and a 500-foot radius within 14 days prior to starting project activities shall be undertaken. In the event that this area includes private property for which access is restricted, visual inspection of adjacent habitats will be undertaken. If any active nests are observed, these nests shall be designated as Environmentally Sensitive Areas (ESAs) and protected by a 500-foot avoidance buffer, to the greatest extent possible, within the project area, until the breeding season has ended, or until a qualified biologist has determined that the young have fledged and are no longer reliant upon the nest site or parental care for survival.	Pre-Construction Biological Surveys or Reviews Implement During Construction	City will perform biological surveys prior to construction Contractor will comply with measures throughout project implementation	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
BMP – 15. Surveys for Other Avian Species. To protect nesting birds, no tree or vegetation trimming or removal, or noise generating activities above existing ambient noise levels, could occur from February 1 through August 31 unless the following Avian Nesting Surveys are completed by a qualified biologist. A survey for nesting activities within the project area and, to the greatest extent possible, a 250-foot buffer, within 14 days prior to starting project activities shall be undertaken. In the event that this area includes private property for which access is restricted, visual inspection of adjacent habitats will be undertaken. If any nesting activity is found, the City shall designate nests and nest substrate (trees, shrubs, ground, or burrows) as an ESA and protect with a 250-foot buffer until young have fledged and are no longer reliant on the nest site or parental care.	Pre-Construction Biological Surveys or Reviews Implement During Construction	City will perform biological surveys prior to construction Contractor will comply with measures throughout project implementation	City, construction inspector or qualified consultant
BMP – 16. Surveys for Bat Species. Pre-construction surveys of suitable roosting habitat features shall be conducted within the project area and a 250-foot buffer by a qualified biologist within 14 days prior to the start of project construction activity. In the event that this area includes private property for which access is restricted, visual inspection or echolocation monitoring of adjacent habitats will be undertaken. Surveys will be conducted during the appropriate time of day to maximize detectability to determine if bat species are roosting within or near the project area. Surveys may include observational methods or echolocation monitoring to determine whether bats are present. A survey report shall be completed that includes, but is not limited to, the survey methodology and biologist qualifications and, if bats are present, the colony size, roost location, and characteristics. If surveys confirm that bats daytime roost in areas impacted by the project, the permittee shall maintain a 300-foot buffer around bat roost sites during project activities, within the project area. If present, bats shall not be disturbed without specific notice to and consultation with CDFW.	Pre-Construction Biological Surveys or Reviews Implement During Construction	City will perform biological surveys prior to construction Contractor will comply with measures throughout project implementation	City, construction inspector or qualified consultant
BMP – 17. Surveys for American Badger. Pre-construction surveys for American badger and sign of their burrows shall be conducted within 14 days of the start of construction. Any American badger detected within the project area during project activities shall be allowed to move out of the work area of its own volition. If American badger is denning on or immediately adjacent to the project work area, CDFW shall be consulted to determine whether the animal(s) may be evicted from the den. Eviction of badgers will not be approved by CDFW unless it is confirmed that no dependent young are present.	Pre-Construction Biological Surveys or Reviews Implement During Construction	City will perform biological surveys prior to construction Contractor will comply with measures throughout project implementation	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
BMP – 18. Surveys for San Francisco Dusky-Footed Woodrat. Pre-construction surveys for San Francisco dusky-footed woodrat and nests shall be conducted within 30 days of the start of construction. All active woodrat nests shall be avoided and protected during project construction activities with a minimum 25-foot buffer. If nests cannot be avoided by this buffer, the City shall consult with CDFW regarding a reduced buffer or to dismantle the nests prior to land clearing activities. CDFW may approve the dismantling of nests during the nonbreeding season, between October 1 and December 31, to allow animals to escape harm and to reestablish territories for the next breeding season.	Pre-Construction Biological Surveys or Reviews Implement During Construction	City will perform biological surveys prior to construction Contractor will comply with measures throughout project implementation	City, construction inspector or qualified consultant
BMP – 19. Measures to Limit Work Timing. Many of the special-status animals with a potential to occur within the project area are active at dusk and during the night. To avoid impacts to these species, all noise-generating work activities shall be confined to daylight hours.	Implement During Construction	Contractor will comply with measures throughout project implementation	City, construction inspector or qualified consultant
BMP – 20. Erosion Control Measures. To protect the small seep area adjacent to the project area at the bottom of the slope below the lower cement pad, erosion control measures, as identified if the project erosion control plan, shall be implemented and maintained along the southern edge of the project area. Erosion control shall be inspected and maintained until the project is complete.	Installation Prior to Construction Start Construction Monitoring/ Periodic Inspection	Contractor	City, construction inspector or qualified consultant
BMP – 21. Measures to Install Temporary Fencing to Protect Resources Outside of the Construction Zone. Prior to the onset of construction activities, the contractor will install temporary fencing between areas of disturbance and areas that will remain undisturbed throughout project implementation to prevent impacts beyond the construction area, specifically along the northern and western project boundaries. This will protect vegetation and trees, and associated wildlife species, including the Mount Hermon June beetle and common wildlife species present onsite.	Installation Prior to Construction Start Construction Monitoring/ Periodic Inspection	Contractor	City, construction inspector or qualified consultant
BMP – 22. Measures to Implement Biological Compliance Monitoring. In accordance with the HCP, compliance monitoring by a qualified biologist will occur throughout all construction activities and O&M activities in suitable or occupied MHJB habitat. The qualified biologist will ensure that all HCP measures are implemented. The qualified biologist will also be responsible for effects monitoring, which will include the calculation of areas of habitat disturbance and the number, if any, of individual MHJB relocated. All information gathered by the biologist will be included in the HCP annual report prepared by the City for the USFWS.	Construction Biological Monitoring Post-Construction Reporting	City will provide ongoing biological monitoring services and effects monitoring/ reporting	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
BMP – 23. Measures to Limit Construction Area. To the extent practical, the covered activities of the HCP that occur on the portion of the project area characterized by Zayante sands will be located either within, or immediately adjacent to, the footprint of the existing GHWTP facilities (i.e., existing buildings, water tanks, service roads, pipelines, etc.).	Pre-Construction Plans or Approvals	Contractor	City, construction inspector or qualified consultant
BMP – 24. Measures to Implement Temporary Fencing and Signage. Temporary fencing and signs will be erected before any vegetation clearing, excavation, or grading activities occur to clearly delineate the boundaries of the project's impact area between areas disturbed by construction activities and those that will remain in existing conditions, specifically in the northern and western perimeters of the project area. Warning signs will be posted on the temporary fencing to alert workers not to proceed beyond the fence. All protective fencing will remain in place until the construction activities have been completed. Signs will include the following language: "NOTICE: SENSITIVE HABITAT AREA. DO NOT ENTER."	Installation Prior to Construction Start	Contractor	City, construction inspector or qualified consultant
BMP – 25. Measures to Cover Disturbed Soils. If construction or other ground disturbing activities occur during any portion of the MHJB flight season (May 15 through August 15), all exposed Zayante soils within the impact area will be covered by tarps, plywood, erosion control fabric, or another suitable impervious material. Exposed soils should be covered between the hours of 7:00 p.m. and 7:00 a.m. daily by a qualified biologist. This will prevent adult males from burrowing into the exposed soils and subsequently being injured or killed by soil disturbance (digging, grading, covering, etc.).	Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP – 26. Measures to Control Dust. Appropriate dust control measures, such as periodically wetting down the work areas, will be used as necessary during excavation or any soil disturbing activities in the impact area or any other covered activities that generate dust.	Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP – 27. Measures to Comply with Lighting Requirements for MHJB. Adult MHJBs are active at dusk and may be distracted by incandescent, mercury vapor, sodium, and black light sources, which can disrupt normal behaviors and breeding activities. Thus, any new outdoor lighting installed as part of this project will use bulbs certified to not attract nocturnal insects.	Pre-Construction Plans or Approvals Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP – 28. Measures to Protect Habitat Conditions for MHJB. Because MHJB adults emerge from the soil to attract and search for mates, turf grass, dense ground covers (such as ivy), weed matting, aggregate, and mulch can degrade habitat conditions and will not be used in this project. Material for revegetation will use plants endemic to the Zayante Sandhills.	Pre-Construction Plans or Approvals Implement During Construction	Contractor	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Cultural Resources			
BMP – 29. Cultural Resources Education Materials and Training. Prior to the onset of construction activities, a qualified archaeologist will provide an education program for the contractor and construction crew to provide an overview of cultural, historic and paleontological resources, and what resources may be discovered through ground disturbing activities. The program will include an overview of the steps that will be required in the event of an unexpected discovery of resources through the implementation of construction related activities at the GHWTP.	Pre-Construction Trainings/ Inspections Implement During Construction	City will provide education program Contractor will comply with education program throughout project implementation	City, construction inspector or qualified consultant
BMP – 30. Measures to Protect Unexpected Discovery of Cultural Resources. In the event that unexpected cultural, historic or paleontological resources are discovered by any person at the construction site, the City shall implement measures consistent with Section 24.12.430, Protection of Archaeological Resources, of the Santa Cruz Municipal Code. Work will be stopped in the event that unexpected occurrences of cultural, historic or paleontological resources are discovered through implementation of construction activities. If evidence of cultural resources are identified during ground disturbance associated with the proposed project, the construction crews will stop all work within 100 feet of the discovery until a qualified archaeologist who meets the Secretary of the Interior's Professional Qualifications Standards as promulgated in 36 CFR 61 and who has experience with precontact, historic period, and tribal resources assesses the previously unrecorded discovery and provides recommendations.	Implement During Construction	Contractor will comply with the education program City will comply with requirements if unexpected resources are discovered	City, construction inspector or qualified consultant
Noise			
BMP – 31. Measures to Inform Neighbors of Construction Schedule. Notify neighbors located adjacent to the GHWTP of the construction schedule to ensure awareness of the upcoming project activities and projected duration of construction activities.	Pre-Construction Plans or Approvals Implement During Construction	City	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
BMP – 32. Measures to be Implemented by the Construction Coordinator. A "Construction Coordinator" will be identified by the City. The contact information for the Construction Coordinator will be included on notices distributed to neighbors regarding planned construction activities, and posted outside of the GHWTP. The Construction Coordinator will be responsible for responding to any local concerns about construction noise. The Construction Coordinator shall notify the City within 48 hours of a report, determine the cause of the concern, and implement, as feasible, reasonable measures to resolve the concern, as deemed acceptable by the City. A reporting program will be implemented by the Construction Coordinator that documents complaints received, actions taken to resolve problems and effectiveness of the actions.	Pre-Construction Plans or Approvals Implement During Construction	City	City, construction inspector or qualified consultant
BMP – 33. Noise Control Measures. To the extent practicable noise control measures will be implemented throughout the construction area, including a feasible combination of parapet walls, enclosures/housing for noisy equipment, locating enclosure openings/ventings away from neighboring residences and/or the construction of noise barriers.	Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP – 34. Measures to Quiet Stationary Noise. Where technology exists, quiet models of air compressors and other stationary noise sources will be required for use to the extent practicable.	Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP – 35. Measures to Quiet At-Grade Motors. New at-grade motors will be fully enclosed and specifications will require the installation of quiet models. The pump stations will be designed to leave space for the installation of sound enclosures, as necessary, to limit noise generation. At a maximum, the proposed pumps will generate noise levels of 70 dBA at 3 feet per testing conducted by the pump motor manufacturer.	Pre-Construction Plans or Approvals Implement During Construction	Contractor	City, construction inspector or qualified consultant
BMP – 36. Measures to Control Noise throughout Construction Implementation. Construction of the proposed project will occur during daylight hours. In addition, noise-generating project activities will be restricted to 8:00 a.m. through 5:00 p.m. Monday through Friday, unless prior approval by the Water Department Director is obtained, which is in accordance with the City and County noise ordinances.	Implement During Construction	Contractor	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Traffic			
BMP – 37. Preparation of Traffic Control Plan. A traffic control plan will be prepared through the County encroachment permit process to minimize project effects on local traffic around the project area, including Graham Hill Road and the roadways around the offsite staging area, if offsite staging is required. The County approved traffic control plan will ensure that roadways and pedestrian/bicycle paths remain open throughout project construction to the greatest extent feasible, and that any lane and path closures will be safely and effectively managed, with detours clearly identified. Emergency access will be retained on all roadways during construction.	Pre-Construction Plans or Approvals	Contractor will prepare a Traffic Control Plan City will review and approve Traffic Control Plan	City, construction inspector or qualified consultant
BMP – 38. Implement Traffic Control Plan. Prior to the start of construction activities, signage will be installed on Graham Hill Road near the GHWTP, and will include the dates for construction, contact information for the Construction Coordinator to answer project specific questions, and detour information to minimize the effects of temporary pedestrian/bicycle path closures, as necessary. Additionally, the local safety personnel (e.g., police and fire department) will be informed of any detours or lane closures to maintain effective emergency service access throughout the duration of the project.	Pre-Construction Plans or Approvals Implement During Construction	Contractor will comply with Traffic Control Plan throughout project implementation City will provide periodic inspection	City, construction inspector or qualified consultant
BMP – 39. Designated Truck Routes within the Traffic Control Plan. City designated truck routes will be used by construction equipment to import and export material from the project area to the City of Santa Cruz Resource Recovery Facility on Dimeo Lane, or another approved waste disposal facility.	Implement During Construction	Contractor will comply with Traffic Control Plan throughout project implementation City will provide periodic inspection	City, construction inspector or qualified consultant
Mitigation Measures			
Mitigation Measure BIO-1: Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation). To mitigate for incidental take, the HCP includes the creation and management of an off-site mitigation area: 17.0 acres at the City of Santa Cruz's Laguna Creek watershed property (APN 080-241-18) in Bonny Doon (Preserve) (HCP) (McGraw 2017). Although the City is already complying with the HCP, and impacts are already mitigated via implementation of the HCP, the identification of the habitat creation and management mitigation measure is included here to clearly link the impacts of this project to the mechanism that has already provided mitigation for them.	Pre-Construction Biological Surveys or Reviews	City	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Mitigation Measure BIO-2: Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants (Habitat Conservation Plan Implementation). Temporarily impacted areas at the GHWTP will be cleared of vegetation or graded to assist in construction of the proposed project, but will not be permanently covered by new structures or other hardscape after the project is completed. This includes the area adjacent to the road widening and the trenching for the pipeline through the HCP area. After project completion, these temporarily impacted areas with Zayante soils will be revegetated with plants native to the Zayante Sandhills, including: sticky monkeyflower (Mimulus aurantiacus), deer weed (Lotus scoparius), silver bush lupine (Lupinus albifrons var. albifrons), Ponderosa pine and coast live oak. These native plants will provide suitable habitat conditions for MHJBs that might eventually colonize the temporarily impacted portion of the impact area. Revegetated areas will not include any landscape elements that degrade habitat for the MHJB, including mulch, bark, weed matting, rock, aggregate, or turf grass.	Post-Construction	Contractor	City, construction inspector or qualified consultant
Mitigation Measure GEO-1: Stop Work in the Event of Unexpected Paleontological Resources or Unique Geological Features during Construction. Per **BMP – 29. Cultural Resources Education Materials and Training,** an education program for cultural and paleontological resources will be undertaken for the construction crew prior to the onset of construction activities. If paleontological resources or unique geologic features are discovered during soil-disturbing activities by construction crews, all work will stop immediately and the City will notify a qualified paleontologist. A paleontologist will inspect the discovery and determine whether further investigation is required. If the discovery can be avoided, no further mitigation will be required. If the resource cannot be avoided, the qualified paleontologist will evaluate the resource and determine whether it meets the definition of "unique". If the resource is determined to not be unique, work may continue in the area. If the resource is determined to be unique, work will remain halted, and a preservation or recovery plan will be prepared. Preservation in place is the preferred protective measure. If preservation in place is not possible, resources and/or fossils will be recovered, prepared, identified, catalogued and analyzed according to current professional standards under the direction of the qualified paleontologist. Work may commence at the time of completion of the treatment. A final summary report will be completed and submitted to the City. The report will include a discussion of the methods used, stratigraphy exposed, fossils collected, and the significance of the recovered fossils. The report will also include an itemized inventory of all the collected and catalogued fossil specimens.	Implement During Construction	Contractor will comply with the education program specifications City will comply with requirements if unexpected resources are discovered	City, construction inspector or qualified consultant

Table 1. Mitigation Monitoring and Reporting Plan – Graham Hill Water Treatment Plant Concrete Tanks Project			
Best Management Practices/Mitigation Measure	**Timing**	**Implementation Responsibility**	**Monitoring Responsibility**
Mitigation Measure NOI-1: Preparation and Implementation of a Noise Control Plan for Construction Activities. The City will require, through the project construction contract specifications, that the construction contractor submit to the City for review and approval a Noise Control Plan prepared by a qualified noise consultant at least 28 days prior to the onset of construction activities. A qualified noise and vibration consultant is defined as a Board Certified Institute of Noise Control Engineering member or other qualified consultant or engineer approved by the City. The Noise Control Plan shall present noise control measures and Noise Performance Standards to ensure compliance with the standards established by the City noise ordinance and Santa Cruz County noise regulations. The City shall be responsible for ensuring that the construction contractor design and implements noise control measures correctly and that the construction activities comply with the project Noise Performance Standards.	Pre-Construction Plans or Approvals Construction Monitoring/ Periodic Inspection	Contractor will prepare a Noise Control Plan City will review and approve Noise Control Plan Contactor will comply with the Noise Control Plan City will provide periodic inspection	City, construction inspector or qualified consultant

Table 2. Mitigation Monitoring and Reporting Plan – Summary of BMPs and Mitigation Measure Implementation Sequence					
BMP/ Mitigation Measure Number	**Activity**	**City**			**Contractor**
		City Staff or Representative	**Biologist**	**Other Monitor**	
Pre-Construction Plans & Approvals					
BMP – 1	Staging Area Water Quality and Resource Protection Measures	✓			✓
BMP – 2	Staging Areas Materials Storage and Transportation Measures	✓			✓
BMP – 4	Portable Construction Equipment Measures	✓			
BMP – 6	Compliance with MBARD's National Emissions Standards for Hazardous Air Pollutants Rule 424				✓
BMP – 7	Preparation of the Project Storm Water Pollution Prevention Plan	✓			✓
BMP – 9	Compliance with City Storm Water Ordinances and the City Construction Work Best Management Practices	✓			✓
BMP – 10	Grading Measures to Protect Slope Stability	✓			✓
BMP – 12	Measures to Implement Heritage Tree Protections	✓			✓
BMP – 23	Measures to Limit Construction Area				✓
BMP – 27	Measures to Comply with Lighting Requirements for MHJB				✓
BMP – 28	Measures to Protect Habitat Conditions for MHJB				✓
BMP – 31	Measures to Inform Neighbors of Construction Schedule	✓			
BMP – 32	Measures to be Implemented by the Construction Coordinator	✓			
BMP – 35	Measure to Quiet At-Grade Motors				✓
BMP – 37	Preparation of Traffic Control Plan	✓			✓
BMP – 38	Implement Traffic Control Plan	✓			✓
MM NOI – 1	Preparation and Implementation of a Noise Control Plan for Construction Activities	✓			✓

Table 2. Mitigation Monitoring and Reporting Plan – Summary of BMPs and Mitigation Measure Implementation Sequence					
BMP/ Mitigation Measure Number	**Activity**	**City**			**Contractor**
		City Staff or Representative	**Biologist**	**Other Monitor**	
Pre-Construction Biological Surveys or Reviews					
BMP – 12	Measures to Implement Heritage Tree Protections	✓	✓		✓
BMP – 14	Surveys for Birds of Prey	✓	✓		✓
BMP – 15	Surveys for Other Avian Species	✓	✓		✓
BMP – 16	Surveys for Bat Species	✓	✓		✓
BMP – 17	Surveys for American Badger	✓	✓		✓
BMP – 18	Surveys for San Francisco Dusky-Footed Woodrat	✓	✓		✓
MM BIO – 1	Creation and Management of an Off-Site Mitigation Area (Habitat Conservation Plan Implementation)	✓	✓		
Installation Prior to Construction Start					
BMP – 9	Compliance with City Storm Water Ordinances and the City Construction Work Best Management Practices	✓			✓
BMP – 20	Erosion Control Measures				✓
BMP – 21	Measures to Install Temporary Fencing to Protect Resources Outside of the Construction Zone				✓
BMP – 24	Measures to Implement Temporary Fencing and Signage				✓
Pre-Construction Trainings/Inspections					
BMP – 11	Biological Resources Education Materials and Training	✓	✓		✓
BMP – 12	Measures to Implement Heritage Tree Protection	✓	✓		✓
BMP – 14	Surveys for Birds of Prey	✓	✓		✓
BMP – 15	Surveys for Other Avian Species	✓	✓		✓
BMP – 16	Surveys for Bat Species	✓	✓		✓
BMP – 17	Surveys for American Badger	✓	✓		✓

Table 2. Mitigation Monitoring and Reporting Plan – Summary of BMPs and Mitigation Measure Implementation Sequence					
BMP/ Mitigation Measure Number	**Activity**	**City**			**Contractor**
		City Staff or Representative	**Biologist**	**Other Monitor**	
BMP – 18	Surveys for San Francisco Dusky-Footed Woodrat	✓	✓		✓
BMP – 29	Cultural Resources Education Materials and Training	✓		✓	✓
Implement During Construction					
BMP – 1	Staging Area Water Quality and Resource Protection Measures	✓			✓
BMP – 2	Staging Areas Materials Storage and Transportation Measures	✓			✓
BMP – 3	Fugitive Dust Measures				✓
BMP – 5	Compliance with Monterey Bay Area Resource District's Clean Construction Equipment Measures	✓			
BMP – 6	Compliance with MBARD's National Emissions Standards for Hazardous Air Pollutants Rule 424				✓
BMP – 7	Preparation of the Project Storm Water Pollution Prevention Plan	✓			✓
BMP – 9	Compliance with City Storm Water Ordinances and the City Construction Work Best Management Practices	✓			✓
BMP – 10	Grading Measures to Protect Slope Stability	✓			✓
BMP – 11	Biological Resources Education Materials and Training		✓		✓
BMP – 12	Measures to Implement Heritage Tree Protections	✓			✓
BMP – 14	Surveys for Birds of Prey	✓	✓		✓
BMP – 15	Surveys for Other Avian Species	✓	✓		✓
BMP – 16	Surveys for Bat Species	✓	✓		✓
BMP – 17	Surveys for American Badger	✓	✓		✓
BMP – 18	Surveys for San Francisco Dusky-Footed Woodrat	✓	✓		✓

Table 2. Mitigation Monitoring and Reporting Plan – Summary of BMPs and Mitigation Measure Implementation Sequence					
BMP/ Mitigation Measure Number	**Activity**	**City**			**Contractor**
		City Staff or Representative	**Biologist**	**Other Monitor**	
BMP – 19	Measures to Limit Work Timing				✓
BMP – 25	Measures to Control Disturbed Soils				✓
BMP – 26	Measures to Control Dust				✓
BMP – 27	Measures to Comply with Lighting Requirements for MHJB				✓
BMP – 28	Measures to Protect Habitat Conditions for MHJB				✓
BMP – 29	Cultural Resources Education Materials and Training	✓		✓	✓
BMP – 30	Measures to Protect Unexpected Discovery of Cultural Resources	✓		✓	✓
BMP – 31	Measures to Inform Neighbors of Construction Schedule	✓			
BMP – 32	Measures to be Implemented by the Construction Coordinator	✓			
BMP – 33	Noise Control Measures				✓
BMP – 34	Measures to Quiet Stationary Noise				✓
BMP – 35	Measure to Quiet At-Grade Motors				✓
BMP – 36	Measures to Control Noise throughout Construction Implementation				✓
BMP – 37	Preparation of Traffic Control Plan	✓			✓
BMP – 38	Implement Traffic Control Plan	✓			✓
BMP – 39	Designated Truck Routes within the Traffic Control Plan	✓			✓
MM – GEO – 1	Stop Work in the Event of Unexpected Paleontological Resources of Unique Geological Features during Construction	✓		✓	✓
Construction Biological Monitoring					
BMP – 22	Measures to Implement Biological Compliance Monitoring	✓	✓		

Table 2. Mitigation Monitoring and Reporting Plan – Summary of BMPs and Mitigation Measure Implementation Sequence					
BMP/ Mitigation Measure Number	**Activity**	**City**			**Contractor**
		City Staff or Representative	**Biologist**	**Other Monitor**	
Construction Monitoring/Periodic Inspection					
BMP – 8	Measures for On-Going Compliance with the SWPPP	✓			
BMP – 9	Compliance with City Storm Water Ordinances and the City Construction Work Best Management Practices	✓			
BMP – 10	Grading Measures to Protect Slope Stability	✓			
BMP – 20	Erosion Control Measures				✓
BMP – 21	Measure to Install Temporary Fencing to Protect Resources Outside of the Construction Zone				✓
MM – NOI – 1	Preparation and Implementation of a Noise Control Plan	✓			
Post Construction Measures and Reporting					
BMP – 13	Measure to Implement Heritage Tree Protection	✓		✓	
BMP – 22	Measures to Implement Biological Compliance Monitoring	✓	✓		
MM – BIO – 2	Revegetate the Area of Temporary Habitat Loss with Native Sandhills Plants	✓	✓		✓

Appendix E. Graham Hill Water Treatment Plant Concrete Tanks Replacement Project - Comments and Responses on the IS/MND

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Harris & Associates

May 28, 2019

City of Santa Cruz Water Department
212 Locust Street
Santa Cruz, CA 95060

Subject: Graham Hill Water Treatment Plant Concrete Tanks Replacement Project – Comments and Responses on the IS/MND

The purpose of this memorandum is to document the comments received on the Initial Study/Mitigated Negative Declaration (IS/MND) prepared for the Graham Hill Water Treatment Plant Concrete Tanks Replacement Project (Project).

The IS/MND was circulated for a 30-day public review period from March 8, 2019, to April 8, 2019. It was submitted to the State Clearinghouse (SCH) and thus distributed to State agencies, including the California Department of Fish and Wildlife, Department of Water Resources, State Water Resources Control Board, Regional Water Quality Control Board and the Native American Heritage Commission.

Attached are the SCH letter, which acknowledges receipt and distribution of the IS/MND, and the following three comment letters received. The three comment letters and the individual comments within each letter have been bracketed and numbered in the right margin.

1. Annette Olson and Ethan Sanford, neighboring residents
2. Joshua Drews and Cara Sloman, neighboring residents
3. David Frisbey, Planning & Air Monitoring Manager, Monterey Bay Air Resources District

A summary of the comments received and responses to those comments are provided below in **Table 1**. The responses pertaining to the environmental issues evaluated in the IS/MND and the adequacy of the IS/MND were developed by Harris' environmental analysts, in coordination with the project engineers and City staff. Additionally, a technical memorandum was prepared for the City by West Yost Associates on May 1, 2019, to address additional project concerns and technical issues that fall outside the parameters of the CEQA analysis covered in the IS/MND. The responses in **Table 1** reference the West Yost memorandum where appropriate.

In response to the comments received, additional review and analysis was conducted for geology, hydrology, and noise to ensure the conditions were documented to a level necessary to accurately account for potential impacts. As a result, minor revisions have been made to the IS/MND in the geology/soils, hydrology/water quality, and noise sections for clarification or to provide additional information. These revisions do not result in any changes to the significance of any impact determinations or additional mitigation required to offset project impacts on the environment. Therefore, these changes did not result in a "substantial revision" as defined by CEQA (Section 15073.5[b]) and do not require recirculation of the IS/MND.

Table 1. Summary of Comments and Responses for the Graham Hill Water Treatment Plant Concrete Tanks Replacement Project IS/MND

Comment Letter Date	Comment Letter Number	Commenter Name	Comment Summary	Response to Comment
March 31, 2019	**1**	**Annette Olson and Ethan Sanford** Neighboring Residents	**1-1. Geology and Soils (a)(b)(c).** The commenter states that the IS/MND does not include adequate slope stability information, and that there is a risk to downslope neighbors as native soils and overlying fill slope do not meet County standards and may fail in the future. There are concerns about the stability of the fill wedge/slope area in relation to the safety of downhill neighbors.	**1-1.** CEQA requires identification of potential impacts caused by a proposed project, in comparison to existing (baseline) conditions for the respective environmental resources, such as geology and soils. CEQA does not require the analysis and mitigation of the impact of existing environmental conditions on a project's future users or residents, unless the project would exacerbate impacts from existing environmental hazards (*California Building Industry Association v. Bay Area Quality Management District*, December 26, 2015). As discussed in the Project Description and Geology and Soils sections of the IS/MND, the project would improve the drainage and geologic stability of the project area, resulting in a beneficial change to existing conditions. Furthermore, the overall safety of the project area would be improved through the replacement of the concrete tanks that are beyond their lifetime. The existing conditions and stability of the project area have been evaluated for static, seismic and varying groundwater conditions, as part of the studies that have been undertaken to prepare the Preliminary Geotechnical Report for the Graham Hill Water Treatment Plant Tank Improvement Project (Group Delta, March 2018). Testing included 26 borings, 3 cores, and the installation of 2 piezometers to verify groundwater, soil, and geologic conditions. It was determined through the slope stability analysis that the safety factors for the project are within the acceptable range; this means that the project has been designed within the range determined safe for the geologic features found within the project area. Furthermore, the project seismic performance was evaluated according to guidelines in the California Building Code and California Geologic Survey Special publications and were found to

Comment Letter Date	Comment Letter Number	Commenter Name	Comment Summary	Response to Comment
				be acceptable. The data collection and analyses conducted by Group Delta (2018) and the project engineers support the conclusion that no additional stabilization measures beyond those as designed in the project are required. Additionally, the geotechnical report prepared by Group Delta (2018) did not identify a plausible slope stability mechanism that could impact the neighboring properties. The loads from the new tanks would be transferred to bedrock and not to fill and/or underlying soils. In addition, the potential for water infiltration in the future is low because the new tanks would include a subdrain system to collect and intercept any leakage or groundwater around the tanks. Additionally, surface infiltration on the tank pad would be addressed through project design by an impervious asphalt surface and a storm drain collection system that discharges directly to the San Lorenzo River. The slope stability conclusions have been further validated by the performance of the slope over the past 60 years since it was constructed. While there has been some surficial erosion and sloughing, there are no indications of shallow or deep slope instability such as crest settlement or cracking. In addition, the GHWTP was subject to severe ground shaking during the 1989 Loma Prieta earthquake and remained both functional and stable in nature. The IS/MND has been revised to include additional technical information about existing conditions and project safety in the geology/soils and hydrology/water quality sections, and to include reference to the geotechnical report prepared by Group Delta (2018) that has been included as Appendix C. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			1-2. Geology and Soils (a)(b)(c). The	**1-2.** The concerns about slope stability in relation to groundwater

Comment Letter Date	Comment Letter Number	Commenter Name	Comment Summary	Response to Comment
			commenter is concerned about slope stability in relation to groundwater conditions.	conditions have been addressed in a technical memorandum prepared by West Yost Associates (May 1, 2019). This memorandum is available upon request from the City. The IS/MND (Geology/Soils section) has been revised to include additional technical information about slope stability in relation to groundwater conditions. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			1-3. Geology and Soils (a)(b)(c). The commenter is concerned that the project may result in a landslide onto neighboring properties which could result in damage to downslope properties or the risk of life.	**1-3.** Refer to Response 1-1 in addition to the below response. Regarding the commenter's reference to the previous "slide" problems on the slope north of the existing sludge storage tanks, addressed in the 2006 *Geotechnical Investigation for Santa Cruz Water Treatment Plant Slide Investigation* report that was prepared by Pacific Crest Engineering, water may have discharged over the slope and caused the surface to be eroded and experience surficial slumps. It is also possible that previously leaking tanks and surface infiltration temporarily resulted in groundwater seepage which outcropped at the toe of the slope. This local condition was mitigated by construction of the solider pile and lagging wall and backfilling the gully in the former slide area. As identified by the Pacific Crest Engineering report (2006), and confirmed by Group Delta (2018), the project has been designed with drainage improvements (surface and subsurface) to prevent runoff from flowing onto downhill slopes. These improvements include subdrains below the new tanks to collect and intercept any potential leakage from the tanks. Drainage benches will be included on cut slopes per the Group Delta recommendations. Surface infiltration on the lower pad will be mitigated by an impervious asphalt surface and a storm drain system. Furthermore, the storm drain collection and conveyance system that was installed as a result of the previous "slide" problems will be maintained with the

Comment Letter Date	Comment Letter Number	Commenter Name	Comment Summary	Response to Comment
				proposed project. The geology and soils section of the IS/MND has been revised to include information from the Group Delta (2018) geotechnical report that was prepared for the proposed project, and design requirements have been included in the construction BMPs and MMRPs. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			1-4. Geology and Soils (a)(b)(c). The stability of the expanded access road should be further evaluated. Concerning issues include the potential for the widened road to undermine the stability of the existing wash water tank, and runoff collection that could occur behind the proposed retaining wall that could result in the destabilization of the slope.	**1-4**. The access road will be designed to direct water to the storm drain system. The existing lower tank pad area already includes an asphalt berm and the proposed project will include concrete curbs along the outboard side to prevent runoff from sheet flowing onto the downhill slope. The existing drainage culvert with the "Tee" discharge will be removed and runoff conveyed to the existing storm drain system that discharges directly to the San Lorenzo River. Regarding the impact of the retaining wall, located below the wash water supply tank, on slope stability, the alignment of the retaining wall is within an area of shallow bedrock. The wall will be conservatively designed to support soil loads associated with a sloping backfill condition and will be supported vertically and laterally into stable bedrock. Cuts into the slope will be fully supported by the new concrete walls such that local wall/slope stability will meet or exceed appropriate safety factors for sliding, bearing capacity, and overturning. In addition, the roadway cuts below the wall and will essentially unload the slope below the wall, thereby increasing existing rock slope stability. The IS/MND (geology/soils and hydrology/water quality sections), have been updated to reflect the March 2018 geotechnical report that was prepared for the proposed project by Group Delta. No additional mitigation will be required; however, additional

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				technical information will be added regarding the conditions and safety of the project. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			1-5. Geology and Soils (a)(b)(c). Will the City's winter grading prohibition be adhered to? And, will the City of Santa Cruz Water Department apply for a building permit? There are concerns regarding discharge and runoff to adjacent properties from the GHWTP during both storm and potential tank overtopping events.	**1-5.** While the City of Santa Cruz Building & Safety Division does not issue grading permits for water infrastructure projects of this type, staff will consult with the Building & Safety Division regarding *Chapter 18.45 Excavation and Grading Regulations*. The proposed project is regulated under the National Pollutants Discharge Elimination System (NPDES) and requires coverage under the General Permit for Discharges of Storm Water associated with Construction Activity administered by the State Water Resources Control Board and the General Permit for Discharges of Storm Water from Small Municipal Separate Storm Sewer Systems (MS4) administered by the City of Santa Cruz. The proposed project will require in its specifications the preparation of a Stormwater Pollution Prevention Plan (SWPPP) and an Erosion Control Plan prepared by a qualified SWPPP Developer and a qualified Erosion Control Specialist, respectively. The inspection of the construction area before and after storms will also be required to evaluate stormwater discharge from the construction area, and to identify and implement additional erosion controls, where necessary. As included in the project BMPs, excavation and grading activities on or near slopes exceeding thirty percent will occur outside of the winter rainy season at the discretion of the City based on weather conditions and forecasts. All grading, regardless of the time of year or weather conditions, will employ best management practices (BMP's) as described in the Erosion Control Plan and SWPPP. Regarding concerns of overtopping from the tanks, the design of the proposed project includes an overflow device at each of the proposed concrete tanks to prevent water from overtopping the

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				tank walls. Overflow devices are required by the *American Water Works Association D100-13 Standard for Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks 3.11.2.1*; and the *State of California Title 22 Code of Regulations, Chapter 16 – Water Works Standards, Article 6, 64585(b)(5)*. The project design is based on these standards thereby requiring the installation of an overflow device that will be sized to pass the maximum design tank inflow rate. The overflow devices will discharge into the existing storm drain conveyance system. Additionally, the GHWTP is staffed by State certified Water Treatment Operators twenty-four hours a day, three hundred and sixty-five days a year, and a central supervisory control and data acquisition system (SCADA) used to monitor and control the system facilities at all times. The water levels in each tank are monitored by Water Treatment Operators, and the tanks will have sensors and an alarm system to warn Water Treatment Operators of the potential for an impending overflow event so action can be taken to prevent the overflow. Therefore, an overflow event is unlikely, and should an overflow event occur identification of the problem and a quick response would be executed. The construction BMPs have been updated in the Project Description of the IS/MND to reflect this additional information. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			1-6. Hydrology. The commenter is concerned that there has not been a stormwater drainage plan that has been prepared for the project area; therefore, there is not a basis for the IS/MND conclusion that there will be a less than significant impact. There is a concern whether the existing stormwater drainage system	**1-6**. A stormwater drainage plan would be prepared as part of the project design and specification documents. Through project implementation, the stormwater drainage system for the GHWTP would be improved. The existing stormwater drainage pipe leaving the GHWTP site has a maximum capacity of 23 cubic feet per second (cfs). Through implementation of the project, the 100-year design flow would be 21 cfs. As the existing storm drain pipe has sufficient capacity for the 100-year design storm event an

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			could convey the additional runoff that would be generated through the increase in impervious surfaces that would result from project implementation.	additional outlet is not warranted; however, the proposed project will be consistent with the existing stormwater drainage conditions, and will include features to continue to drain the site in compliance with the SWPPP requirements. The project also includes the elimination of the existing storm drain conveyance that terminates in a "Tee" diffuser with subsequent overland flow onto neighboring properties. The proposed improvements include capturing the runoff and conveying it to the existing storm drain pipeline that discharges directly to the San Lorenzo River. The designs for the project will include sheets for the Erosion Control Plan, site paving, grading and drainage. The project will be designed with drainage improvements (surface and subsurface) to prevent runoff from flowing onto the downhill slopes. The project specifications will identify the requirements for the SWPPP and the Erosion Control Plan. This will ensure that these drainage measures are implemented during the implementation of the project. The construction Best Management Practices in the Project Description, and the hydrology and water quality section of the IS/MND have been updated to reflect this additional information. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			1-7. Hydrology. The commenter is concerned that the outboard edge of the road does not include a curb, and therefore, may result in sheet flow across unstable slopes.	**1-7.** Please refer to Geology and Soil response 1-4.
			1-8. Hydrology. The commenter is concerned that the project has not been designed in accordance with the 100-year flood assumptions to ensure that slope	**1-8.** Please refer to Geology and Soils response 1-1 and Hydrology response 1-6.

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			stability does not become a hazardous issue in the event of heavy rainfall.	
			1-9. Hydrology. The commenter is concerned that the project requires a safe overflow pipeline to ensure that, in the event of the breaking down or clogging of the existing pipeline, waters would continue to leave the project site safely, and would not result in erosion impacts or risks to adjacent properties.	**1-9**. Please refer to Geology and Soil response 1-5 and Hydrology response 1-6.
			1-10. Erosion. The commenter is concerned that the current "Tee" design for the storm drainage system is inefficient, and results in gullying on neighboring properties. This has resulted in a significant amount of erosion on neighboring properties.	**1-10.** Please refer to Geology and Soils response 1-5 and Hydrology response 1-6.
			1-11. Hydrology. The commenter is concerned that changes in the stormwater drainage system from the GHWTP that are included in the project must be included in the CEQA analysis.	**1-11.** Please refer to Geology and Soils response 1-5 and Hydrology response 1-6.
			1-12. Hydrology. The commenter is concerned that there is not ample space within the GHWTP for safe groundwater infiltration of runoff from the project area without risking slope stability issues. It is suggested that additional runoff that is generated by the project be piped offsite to the San Lorenzo River.	**1-12.** Please refer to Geology and Soils response 1-5 and Hydrology response 1-6.
			1-13. Noise. The commenter suggests that an ambient noise study be provided to ensure that the additional pumps proposed by the project would not result in a significant increase in noise levels	**1-13.** While the City noise ordinance is not applicable to water infrastructure projects of this type, the project would comply with the ordinance in order to minimize impacts to adjacent land uses throughout the construction of the project. This would also result in compliance with the similar County noise ordinance. This

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			following project implementation. The project should also comply with the County noise ordinance.	information is included within the Noise section of the IS/MND. In addition, the IS/MND includes BMPs for noise control; these include providing notification to the neighbors about upcoming construction activities, identification of a "Construction Coordinator" to provide information to the public and to respond to any local concerns about the project, implementation of practicable noise control measures throughout construction, and to utilize, where possible, quiet models of air compressors and other stationary noise sources. The project also includes Mitigation Measures NOI-1: Preparation and Implementation of a Noise Control Plan for Construction Activities within the Noise section that will require, through the project construction contract specifications, that the construction contractor submit to the City for review and approval a Noise Control Plan prepared by a qualified noise consultant at least 28 days prior to the onset of construction activities. The City shall be responsible for ensuring that the construction contractor designs and implements noise control measures correctly, and that the construction activities comply with the City noise ordinance. The following noise BMP has also been added to the IS/MND regarding on-going increases in ambient noise levels generated by the GHWTP: New at-grade motors will be fully enclosed and specifications will require the installation of quiet models. The pump stations will be designed to leave space for the installation of sound enclosures, as necessary, to limit noise generation. At a maximum, the proposed pumps would generate noise levels of 70dBA at 3 feet per testing conducted by the pump motor manufacturer. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.

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			1-14. Summary of Specific Points. The response letter summarizes 13 specific topics that have been expressed throughout the comments letter.	**1-14.** The summarized specific points have been answered within the above responses; all specific points that have been identified were also included in a larger context within the letter. Concerns regarding engineering specifics for the project have been addressed in a technical memorandum that was prepared for the City of Santa Cruz Water Department by West Yost Associates on May 1, 2019, in response to the received comment letters for the project. In response to the comments, minor revisions have been made throughout the IS/MND for informational purposes, and there have been no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
April 5, 2018	**2**	**Joshua Drews and Cara Sloman** Neighboring Residents	**2-1. Location.** The residence of Joshua and Cara is located west of the project area, which is not acknowledged as an area that supports a residence; consideration for the location of the residence should be included in the IS/MND. Quail Crossing was also incorrectly identified as being south of the project area.	**2-1.** The western location of the residence has been included in the IS/MND. Aerial photographs were considered throughout the analysis of the project in the IS/MND, and, therefore, the location of this residence was considered. Quail Crossing has also been updated to reflect the correct western location in relation to the GHWTP. The IS/MND will be updated to reflect the location of this residence to the west, and the western location of Quail Crossing. The minor revision is for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			2-2. Geology and Soils. There are concerns about the safety of the project regarding slope stability and potential damage to adjacent land uses. Further explanation is warranted regarding the proposed retaining walls adjacent to the relocated tanks. There are concerns about the stability of the toe slope of the slip area.	**2-2.** Please refer to Geology and Soils responses 1-1 and 1-3 through 1-5. The IS/MND will be updated to reflect the March 2018 geotechnical report that was prepared for the proposed project by Group Delta. No additional mitigation will be required; however, additional technical information has been added regarding the conditions and safety of the project. The minor revisions are for informational purposes, and there are no changes to the impact conclusions or

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				identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			2-3. Hydrology. The commenter is concerned that the project does not include a stomwater management and drainage plan that accounts for 100-year events. Because of ongoing drainage issues, the increase in impermeable surfaces is concerning as an increase in sheet flow from the site would add to the amount of water entering neighboring land uses that is currently resulting in extensive erosion.	**2-3.** Please refer to Geology and Soils responses 1-4 and 1-5, and Hydrology responses 1-6.
			2-4. Noise. There are concerns that the project needs to conform with the noise ordinances that have been established for the area, and there are concerns about the additional pumps, both in number and location, resulting in a significant increase in the noise levels being generated by the GHWTP. Because the resident is located directly west of the property boundary for the site, and additional cement structures will be added through project implementation, there are concerns about the project noise impacts on the property. The project should also be required to obtain a building permit, and comply with the requirements of the permit.	**2-4.** Please refer to Geology and Soils response 1-5, and Noise response 1-13.

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April 8, 2019	**3**	**David Frisbey** Planning and Air Monitoring Manager Monterey Bay Air Resources District	**3-1. Air Quality.** There are concerns that the project should comply with required permits or registration requirements for portable construction equipment with engines greater than 50 Hp.	**3-1**. Under the Other Public Agencies Whose Approval is Required in the Project Description of the IS/MND, coordination to determine compliance requirements with the Monterey Bay Air Resources District has been identified in the event that equipment over 50 Hp will be used for project construction and implementation.
			3-2. Construction Equipment. Given the proximity of residences, the Monterey Bay Air Resources District recommends using cleaner construction equipment that conforms to EPA's Tier 3 or Tier 4 emission standards. We further recommend that, whenever feasible, construction equipment use alternative fuels such as compressed natural gas, propane, electricity or biodiesel.	**3-2.** The following Air Quality BMP has been added to the IS/MND: Given the nearby proximity of residences, the Air District recommends using cleaner construction equipment that conforms to EPA's Tier 3 or Tier 4 emission standards. Whenever feasible, construction equipment will use alternative fuels such as compressed natural gas (CNG), propane, electricity or biodiesel. This minor revision is for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			3-3. Fugitive Dust. The BMPs for the project regarding fugitive dust are sufficient; however, they should also include the staging area, in the event that staging occurs offsite.	**3-3.** The following Air Quality BMP has been modified within the Project Description of the IS/MND to include the staging area: To reduce the generation of fugitive dust throughout project implementation, the construction contractor would be required to prepare and implement dust control measures at the construction and staging areas, which would include: water all active construction areas as needed based on the type of construction activity, soil, and wind exposure; maintain at least 2-feet of freeboard, or cover dirt and loose materials, in haul trucks throughout transportation; cover inactive storage piles and stock piles of dirt; and sweep any roadways/paths if loose soil material remains at the end of the work day. This minor revision is for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.
			3-4. Tank Demolition and Trenching Activities. The project must comply with Air District Rule 424, National Emissions	**3-4.** The project will conform with Air District Rule 424, and the following BMP has been added to the Project Description of the IS/MND:

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			Standards for Hazardous Air Pollutants, as applicable. Rule 424 contains the investigation and reporting requirements for asbestos which includes surveys and advanced notification on structures being removed or demolished.	The IS/MND Hazardous Materials Impacts a through c, and Utilities and Services Impacts d and e, have add compliance with Air District Rule 424 where the handling of lead, asbestos and construction materials are discussed. This minor revision is for informational purposes, and there are no changes to the impact conclusions or identification of additional mitigation measures. The IS/MND does not need to be recirculated.

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Gavin Newsom
Governor

Kate Gordon
Director

April 9, 2019

Jessica Martinez-McKinney
Santa Cruz, City of
212 Locust Street
Santa Cruz, CA 95060

Subject: GHWTP Concrete Tanks Replacement Project
SCH#: 2019039049

Dear Jessica Martinez-McKinney:

The State Clearinghouse submitted the above named MND to selected state agencies for review. The review period closed on 4/8/2019, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act, please visit: https://ceqanet.opr.ca.gov/2019039049/2 for full details about your project.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Scott Morgan
Director, State Clearinghouse

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL 1-916-445-0613 state.clearinghouse@opr.ca.gov www.opr.ca.gov

Jessica Martinez-McKinney, Associate Planner
City of Santa Cruz Water Department
212 Locust Street, Suite C
Santa Cruz, CA 95060

Dear Ms. Martinez-Mckinney:

Thank you for the opportunity to comment on the tank replacement project initial study / mitigated negative declaration. We are downslope neighbors of the water treatment tank. I have worked for almost 15 years as a land use planner where writing initial studies is a routine part of my work. Although we are very much in support of the project, we do have comments regarding three areas: slope stability (Geology and Soils), stormwater management (Hydrology), and noise. We have included comments that may not be within the scope of the CEQA analysis but given that this is the primary opportunity for public comment, we include them here. We appreciate your consideration of the following comments which are divided into our three topics of concern with a summary section at the end.

1. **Geology and Soils (a)(b)(c)**

   A. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault, referring to Division of Mines and Geology Special Publication 42, strong seismic ground shaking, seismic-related ground failure, including liquefaction, or landslides;

   B. Result in substantial soil erosion or the loss of topsoil;

   C. 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;

Because almost any no technical slope stability information was provided in the IS, it is impossible to evaluate whether or not a significant impact will result from the project. The only technical information used to support the findings of "less than significant" appears to be the 2006 Pacific Crest Engineering (PCE) geotechnical report.

PCE Report This report, which is now 13 years old, and for which no update letter was provided, is an analysis of the old and new slide areas which are a part of the failing fill wedge that supports the existing tank locations (it was not, as stated in the IS, prepared for the project). The report identifies **a clear and present life safety issue** to the occupants of the downslope residences posed by the improperly keyed fill wedges supporting the existing tanks. As outlined on page 9 of the report, the native soils and overlying fill slope do

1-1

not meet minimum County slope stability standards and can eventually fail on top of the adversely sloping bedrock surface.

At the community meeting on March 21, 2019, I learned that the new tanks will be placed on schist bedrock. Although it is a relief that the new tanks will be on (presumably) competent material, it is impossible to discern whether or not the toe of the fill wedge/slide areas has been, or will be, stabilized. As downhill neighbors, this continues to be a concern given the large volume of unstable fill and native soils identified in the 2006 PCE report. 1-1

Group Delta Report On March 22nd, Chris Coburn emailed me the project geotechnical report prepared by Group Delta (March 2, 2018). We were encouraged that a project-specific report had been prepared. However, the report is difficult for a layperson to understand and, although it finds higher factors of safety than the PCE report in several areas, the report corroborates PCE's analysis that the calculated pseudo static factor of stability for the area near the old slide (with groundwater assumed at 25 feet) is less than one and the minimum safety standard (page 11). The report does not provide the actual number and this number should be provided.

This finding is concerning. Amplifying this concern is the fact that Boring B-2 encountered a seep, i.e., water, at 16 feet. We also know that there is water in the slope from the biotic report which identified a .02 acre wetland in the vicinity. Would a pseudo static calculation done for actual conditions, i.e., water at 16 feet result in a lower factor of safety? Is it reasonable to assume that, if the failure plane is at 25 feet, the water encountered at 16 feet would eventually make its way to 25 feet? It is difficult to understand the implications of this report which speaks to the need for the initial study to provide a summary of the significant portions. 1-2

Although the stability of the existing, improperly keyed fill wedge may be considered to be a baseline condition, given the scope of work-- where thousands of cubic yards of soil will be graded with heavy equipment, retaining walls will be pounded into bedrock, slope profiles will change, and the simple fact that the water tank loads will be located in a different, if nearby, location-- the project itself may result in the destabilization of the slope.

The Group Delta report does not provide recommendations for stabilizing the toe of the slope, focusing its analysis on the stability of the water tanks and "proposed improvements." Consideration is not given to downhill properties. As noted above, if the fill wedge and native soils have not previously been stabilized such that they no longer pose a risk to downslope residents (which based upon the less than one safety factor identified by Group Delta, this does not appear to be the case), and if there is no plan for doing so as a part of the project, the project may result in a significant impact in the form of a landslide which could result in downslope property damage or even loss of life. As downhill neighbors, we are very concerned about this prospect. 1-3

In addition, it does not appear that the report evaluated the wash water tank's stability. The tank is located above our home. I understand that the wash water tank is not directly a part of the project. However, its stability should be evaluated given the intention to widen the road below it and install a retaining wall to protect the road. Borings B-7, B-8 and B-9 of the Group Delta report suggest that some evaluation occurred. Does widening the road have the potential to undermine the stability of that tank? And have the retaining walls been designed to ensure that runoff does not collect behind the walls which could potentially destabilize the slope? 1-4

Will plan review letters be provided by the project geotechnical engineer to confirm that the civil plans were prepared in conformance with the geotechnical report? Will the City's winter grading prohibition be adhered to? Will the Water Department apply for a building permit? All of these questions should be addressed in a recirculated initial study. 1-5

Hydrology

C. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation on- or off-site, substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite, create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff, or impede or redirect flood flows;

No stormwater management plan was provided so it is impossible to evaluate whether or not there will be significant impacts to slope stability or downstream erosion impacts[1]. There is no evidence to support the conclusion that impacts will be "less than significant." Even basic feasibility cannot be evaluated based upon the information provided since, for example, it is unclear whether or not the single 24-inch pipe[2] that is proposed to convey runoff off-site has the capacity to accept the additional runoff generated by the expanded impervious area. 1-6

Surface Water In addition, based upon information provided at the March 21, 2019 community meeting, it appears that there is at least one design flaw in the current plan. The outboard edge of the lower road does not currently include a curb. Unless the grade of the road ensures that no runoff surface flows could ever run west over the road bed, the current design would result in sheet flow onto the unstable slopes. If that is indeed the 1-7

[1] The author of the IS states, "Through project design, the increase in impermeable surfaces has been accounted for, and the project drainage plan will be developed to ensure the continued effective drainage of the site (76)." It is unclear how the increase in impermeable surface "have been accounted for" if no project drainage plan has been prepared. "Effective drainage" must consider downhill properties, not just the site.

[2] I learned about this 24-inch outlet pipe at the community meeting, not from the IS.

case, the design contravenes the recommendations of the 2006 PCE report which states in bold type, “No surface water runoff should be allowed to run over the face of any slopes in this area” (page 15). As a result, a significant impact in the form of erosion and slope instability may result. The obvious and easy fix would be to install a curb. 1-7

Design Storm Related to the capacity analysis noted above is the lack of information identifying the design storm. Given that the infiltration / retention of runoff cannot be allowed on the subject parcel’s unstable slopes, the design storm should be the 100-year event. Although it is unusual to design for such a large storm, this large storm event is an appropriate design storm given the known unstable slopes that support this critical community infrastructure (which almost 100,000 people rely upon for water) and the inability to infiltrate water into the unstable slopes. 1-8

Safe Overflow. Further, given the critical nature of the water treatment plant for our community and the potential deleterious downstream impacts if the drainage system becomes overwhelmed in a large storm event, a design for safe overflow should be provided. An additional outlet should be provided; relying on a single outlet—the 24-inch pipe—which could become blocked, corrode, or fail in a large storm event is not prudent. All of this said, in the absence of **any** stormwater management information (e.g. a stormwater management plan by a civil engineer, supported by a preliminary stormwater management report) provided in the IS, it is impossible to determine whether a significant impact would result from the project. 1-9

Erosion In addition, a 24-inch in diameter corrugated metal drainage pipe currently exits the wash water tank’s slope, crosses a graded bench, and releases runoff on the hillside. Although there is a “T” cap that dissipates some of the runoff’s energy, there are no other improvements west of the pipe’s termination other than an informal ditch downslope of the outlet. A portion of the drainage from this pipe flows into the ditch and, eventually, onto our property. In February, the runoff from that pipe overwhelmed the existing informal ditch, entered our property about 100 yards north of its historic path, eroded new channels, and caused a significant amount of erosion over a large area in a short period of time. The addition of this large volume of water above our house increases many unwelcome drainage impacts and, possibly, the likelihood of slope failure. 1-10

It is worth noting that the historic path of some portion of the runoff is into a large erosional feature on our property. Although there is no imminent threat to the pipes within the “tail” of the water treatment plant’s property, continued erosion of this area from water treatment plant runoff has the potential to erode the “tail” and undermine the pipes within it. The IS should include careful consideration of downstream erosion; even small changes to the existing system could have a significant downstream impact.

If this project includes any plan to alter the corrugated metal pipe[3] or the size of the area it collects, this must be identified in the IS and mitigations must be included to address any adverse impacts. We strongly encourage you to find a piped solution for handling this site's drainage (one that picks up the corrugated pipe's runoff too) since infiltration is not possible on the site's slopes. The water treatment plant already has a path for transporting water off-site: the treated water pipe. I understand there may be regulatory constraints limiting your ability to collect water from your facility's surfaces, but if you were allowed to collect, treat and release stormwater as drinking water, that would be an elegant solution. <u>In any scenario, a comprehensive, quantitative drainage plan is needed.</u>

1-11

Finally, the following should be corrected. On page 77 of the authors of the IS write,

> Implementation of the project would result in a net increase in impermeable surfaces with the expansion of the lower pad area and access road. However, the site would continue to support expanses of open lands that would continue to allow groundwater recharge. Furthermore, water would continue to drain throughout the site downhill, towards the San Lorenzo River, and would not be channeled into impermeable waterways.

As noted above, the PCE report expressly forbids the runoff onto the site's slopes because of their low stability factor. Given the location of the lower pad at almost the lowest elevation of the parcel and at its most western extent, the site does not have "expanses of open lands" for groundwater recharge. If by "site" the authors mean the neighboring properties, see discussion above, and be aware that it is standard to maintain the predevelopment (i.e. pre-project) release rate. Since it does not appear that there is any way to retain or detain the runoff on slopes, it's unclear how the pre-development rate could be maintained which, again, speaks to the need to hard pipe the runoff off the slopes to a safe outlet (e.g., the San Lorenzo River). Implementing LID and BMP standards, which typically call for infiltration, appear to be infeasible on this site.

1-12

<u>Noise</u>

A. Result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
B. Result in the generation of excessive groundborne vibration or groundborne noise levels; or

No acoustical study was provided nor was the threshold of significance identified for operational noise impacts. The water treatment plant is located adjacent to a rural neighborhood where there is very little ambient noise. As such, any new noise impacts may

1-13

[3] Given that the pipe now crosses the area where the road is proposed, it would appear that the pipe is in the way of the project and so must be altered.

be significant. However, because no acoustical information was provided, it is impossible to evaluate whether a significant impact will result from the project. Based upon the project description, it appears that a significant impact may occur. The project description on page three states that there will be three at-grade pumps and one pump placed in a vault.

The at-grade pumps, unless located with an acoustically-effective structure, are likely to generate a substantial amount of noise. It is unclear if other noise-generating equipment is included in the project or not, but, if so, that noise should be evaluated as well.

The initial study suggests that the baseline noise will be similar to the existing operational noise and, therefore, "less than significant." There is no evidence presented to support this conclusion and given the addition and relocation of pumps, this seems unlikely. As we know from our Crossing Street neighbors' experience, the replacement of just one of the water department's pump with a variable speed pump has resulted in noise far beyond "baseline." Actual data is needed to conclude that the operational noise impacts will be less than significant. It would be standard to provide an acoustical study with measured values for the ambient noise (night and day), calculated values for the project, with a comparison of both to the thresholds of significance[4], and, if needed, attenuation recommendations. 1-13

Our valley's acoustics can carry noise over a surprisingly long distance. We would like any potential noise impacts addressed as a part of the project design (and mitigations, if needed), not after construction when noise attenuation may be more difficult to implement.

Page 14 of the IS contains BMPs for Noise. Construction days and hours were not included. A standard BMP is to limit construction days/times to weekdays between 8 AM and 5 PM to allow neighbors the quiet enjoyment of their homes. Given that construction is anticipated to last 2.5 years (!), this would appear to be a reasonable request.

<u>Summary of specific points</u>

1. The Group Delta geotechnical report should provide the actual factor of safety for groundwater at 25 feet along cross section A (page 10 - 11).

2. The Group Delta geotechnical report should provide a solution for the low factor of safety identified in the report for the areas west of the proposed improvements. Recommendations for stabilizing the toe of the slides/failing fill wedge should be provided. 1-14

3. The Group Delta report should include additional stormwater management recommendations. A clear statement that water must be kept off the slope should be made as the PCE report does.

[4] Note that the County's noise standards are found in the General Plan Noise Element. Note the nighttime "penalty."

4. A plan review letter of the civil sheets by the project geotechnical engineer should be provided to ensure that the civil sheets are designed in accordance with the geotech's recommendations.

5. A building permit should be applied for to ensure that the project conforms with the CBC. As a part of the building permit, the Group Delta geotechnical report should be peer-reviewed.

6. A curb should be added to the outboard edge of the road accessing the lower tank area in order to keep runoff off of the slopes. For the same reason, that curb should extend to encircle the entire lower pad area.

7. In the BMP section, the City's winter grading prohibition should be identified (Municipal Code 18.45.040) and the project should comply with it.

8. Group Delta should evaluate the stability of the wash water tank slope, particularly the potential for the proposed retaining walls to destabilize the slope.

9. A comprehensive stormwater management plan designed for the 100-year storm should be provided. That plan should evaluate the downstream capacity and condition of the 24-inch drainage outlet. A minimum of a second outlet should be provided.

10. Safe overflow analysis should be provided. That safe overflow must consider the potential for tank overtopping and how, in that circumstance, those waters would be handled. Does designing a bathtub-like enclosure for the lower pad, for example, have merit?

11. If any change is proposed to the corrugated pipe that directs runoff toward our property, this must be identified now and the appropriate calculations to size the pipe and mitigations, if needed, should be provided.

12. Acoustical information about the project improvements should be provided and acoustically effective barriers should be included as a part of project design.

13. Noise BMPs should include construction days and hours, i.e., weekdays 8 AM to 5 PM.

1-14

Thank you again for your consideration of our comments. We very much appreciate the public outreach efforts that you and your team have made.

Sincerely,

Annette Olson and Ethan Sanford

Jessica Martinez-McKinney, Associate Planner
City of Santa Cruz Water Department
212 Locust Street, Suite C Santa Cruz, CA 95060

Dear Ms. Martinez-Mckinney

Thank you for the opportunity to provide public comments on the tank replacement project initial study / mitigated negative declaration. We have been immediate downslope neighbors of the water treatment plant since 2006. As an architect, I have considerable experience in the review of plans, geotechnical reports, etc. While we recognize and support the needs of the treatment plant to modernize and improve facilities, we have a number of concerns due to our location and proximity, including slope stability, storm water management, and noise and vibration (both during construction and long-term operational).

On page 16 under the heading "Environmental Setting and Surrounding Land Uses," it describes residences to the North, South, and East. It goes on to say "Extensive open space surrounds the Western portion of the plant…" However, our home is located directly West of the tanks, and appears from the satellite imagery to be the closest residence to the construction area. We are concerned that the design and measurement of negative impacts on the surrounding areas have ignored our very existence. 2-1

Slope Stability

The Initial Study provides very little information regarding slope stability, making it difficult to evaluate whether or not the project will have a significant impact. What is clear in the 2006 Pacific Crest Engineering geotechnical report is the identification of "a clear and present life safety issue to the occupants of the downslope residences posed by the improperly keyed fill wedges supporting the existing tanks." Clearly, stability of the tanks and safety for downslope neighbors needs to be improved as a result of this project. If the proposed tanks are to be placed at the same elevation as the existing tanks, how is it that they will now be placed on schist bedrock, and how will the issue of improperly keyed fill wedges be fixed?

It appears in Figure 1 "GHWTP Concrete Tanks Replacement Project Components" (pg.22) that the middle tank will move only slightly further back from the outbound edge of the slope, while the new Northernmost tank will move significantly closer to the edge in an area that has already been identified as a problem slide. A retaining wall is shown wrapping this Northernmost tank, however no details are provided to show how this will protect downslope residences. Presumably the portion of the retaining wall to the Eastern uphill side of the tanks is to retain earth post-excavation, but how does the portion of the retaining wall wrapping the West side of this tank function? Is it below grade supporting the base of the tank? If so, how deep does it go and what is it founded on? 2-2

I have not had a chance to review the more recent Group Delta report, but I understand from a neighbor that it focuses its analysis on the stability of the tanks without consideration of the downhill properties. Since historic fill wedge soils have not previously been stabilized, and if there is no plan to do so as a part of this project, then the proposed project which moves the location of the tanks and will include substantial excavation, extensive trenching for pipe systems, etc. may very well result in a significant adverse impact on slope stability for downhill properties. Given the importance of maintaining the City's water system in functioning order, and the life-safety threat to downhill

neighbors, it is imperative that this be designed above and beyond the minimum safety standard, which it does not appear to be.

2-2

Storm water Management / Hydrology

A stormwater management plan is not included in the I.S., so it is impossible to evaluate whether there will be significant impacts to slope stability, and no evidence is provided to support the conclusion of "less than significant impact". On page 76 the I.S. states "Through project design, the increase in impermeable surfaces has been accounted for, and the project drainage plan will be developed to ensure the continued effective drainage of the site." How has the increase in impermeable surfaces been accounted for if no project drainage plan has been prepared? We also take issue with the phrase "continued effective drainage of the site," as we can point to multiple uphill drainage issues that have occurred both before and during the time of our residency.

On page 77 the I.S. states,

> "Implementation of the project would result in a net increase in impermeable surfaces with the expansion of the lower pad area and access road. However, the site would continue to support expanses of open lands that would continue to allow groundwater recharge. Furthermore, water would continue to drain throughout the site downhill, towards the San Lorenzo River, and would not be channeled into impermeable waterways."

2-3

However, the PCE report forbids runoff onto the site's slopes due to their low stability factor. Furthermore, the tanks sit quite close to the Western property boundary and what undeveloped land there is in this area slopes steeply towards the several downhill properties between the tank site and the San Lorenzo river (ours included). We can attest from personal experience that there is often a substantial, and sometimes alarming amount of both surface runoff, and water welling up from below ground across much of our property.

Since the standard in this kind of scenario is to maintain the pre-project release rate, and retention/percolation on unstable slopes is forbidden by the PCE report, it seems implementing LID and BMP standards calling for infiltration are infeasible in this situation. Hard piping runoff from impermeable surfaces and away from slopes to a safe outlet would appear to be the safest alternative. Given the unknowns imposed by climate change, the importance of maintaining the functionality of the water treatment system for SC residents, and protecting downhill neighbors from known slope stability issues, designing the system to cope with the 100-year storm event would seem prudent. In any case, a comprehensive, quantitative drainage plan is an imperative.

Construction Noise

While we have been verbally assured by Water Dept. staff that construction activities will be limited to weekdays between 8am-5pm, we find no such assurances codified in writing. In the past, during much smaller, shorter-term construction projects at the treatment plant, noise and vibration disturbance has often begun before 6am in the form of large vehicles arriving at the site, idling, and "back-up beeping", all of which are audible inside our home with the windows closed and even earplugs in. Vibrations from a single large vehicle have been strong enough to rattle our high-quality double-pane windows and can be felt in every room of the house.

2-4

Once, extremely loud cutting of heavy metal pipe went on until well after 1 am. When I called the next day to enquire why, first I was told that it hadn't happened, but after insisting that it had happened led to further investigation, we were told that the contractor had "opted to work late to complete the project, rather than have to return for another day of work." There was no emergency or need to complete the project that night. We were deprived of a night's rest simply out of convenience for an out-of-town contractor.

On another occasion, during construction of an 8'+ tall retaining wall built with zero set-back from our property line shared with the water department, I had to stop an excavator which was picking up 1000+ lb boulders and intentionally tossing them down the hill on to the roots of redwood trees on our and our neighbor's property. The operator's explanation was that he had no idea the property line was there. I was confused as to how the water dept. had attained a permit to build such a large structure with no setback from the property line, but I have since come to the understanding that the water dept. does not necessarily need to attain permits, and this wall may very-well have been built without proper review for code compliance.

This proposed project will be substantially larger (in the number of vehicles and people involved) and last two to three years. For both these reasons we feel it is imperative that a project of this size and complexity attain a building permit, be thoroughly peer-reviewed, and a reasonable construction schedule be strictly adhered to, including no vehicles arriving at the site or being turned on prior to 8am. 2-4

Long-Term Operational Noise

No acoustical study was provided nor was the threshold of significance identified for operational noise impacts. While touring the facility it is clear that a number of structures / processes generate significant, and in some cases constant noise. This noise is already audible most of the time at our residence. While we would not describe it as "loud," we do consider it to be significant compared to the quiet rural nature of the site. In Figure 1. "GHWTP Concrete Tanks Replacement Project Components" (pg.22) Item #6 is labeled "Build new reclaim & decant pump stations." I believe this is the replacement for the equipment which is currently housed in a brown metal shed directly adjacent to the West side of the existing middle tank. The new location for these above-grade pumps is significantly closer to our residence and set extremely close to the outboard edge of the graded flat area surrounding the tanks, providing no obstruction in sound transmission from topography as is currently the case. Making the matter even worse, the pumps will be closely backed by two of the H20 tanks and a massive retaining wall, all of which will provide hard surfaces reflecting sound towards our residence. We feel it is imperative that long-term operational noise does not increase, and ideally it would decrease from its current level. How will this be accomplished, and how will sound transmission be measured? If initial mitigation steps are insufficient, what further actions will be implemented to insure that constant ambient background noise does not increase?

Thank you for your careful consideration of these comments which are of great importance to our family's safety and quality of life.

Sincerely,

Joshua Drews & Cara Sloman

Resident/Owners of 69 Quail Crossing, Santa Cruz CA. 95060

Monterey Bay Air Resources District
Serving Monterey, San Benito, and Santa Cruz Counties

24580 Silver Cloud Court
Monterey, CA 93940
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April 8, 2019

Jessica Martinez-McKinney, Associate Planner
City of Santa Cruz Water Department
212 Locust Street, Suite C, Santa Cruz, CA 95060
Email: jmartinezmckinney@cityofsantacruz.com

Re: Concrete Tanks Replacement Project

Dear Ms. Martinez-McKinney:

Thank you for providing the Monterey Bay Air Resources District (Air District) with the opportunity to comment on the above-referenced project. The Air District has reviewed the document and has the following comments:

- **Permits Required** – Air District permits or registration with the California Air Resources Board (CARB) may be required for portable construction equipment with engines 50 Hp or greater. Please contact the Air District's Engineering Division at (831) 647-9411 if you have questions about permitting. 3-1
- **Construction Equipment** - Given the nearby proximity of residences, the Air District recommends using cleaner construction equipment that conforms to EPA's Tier 3 or Tier 4 emission standards. We further recommend that, whenever feasible, construction equipment use alternative fuels such as compressed natural gas (CNG), propane, electricity or biodiesel. 3-2
- **Fugitive Dust** - The Air District appreciates the inclusion of Best Management Practices and standard mitigation measures to reduce fugitive dust from construction activities. Please also apply dust mitigation measures in the project staging area. 3-3
- **Tank Demolition and Trenching Activities** - Air District Rule 424, National Emissions Standards for Hazardous Air Pollutants, may apply to this project. Rule 424 contains the investigation and reporting requirements for asbestos which includes surveys and advanced notification on structures being renovated or demolished. Air District notification is required at least ten days prior to renovation or demolition activities. If old underground piping or other asbestos containing construction materials are encountered during trenching activities, Rule 424 may also apply. Rule 424 can be found online at https://www.arb.ca.gov/drdb/mbu/cur.htm. Please contact Shawn Boyle, Air Quality Compliance Inspector, at (831) 647-9411 for more information regarding asbestos survey and notification requirements. 3-4

Best Regards,

David Frisbey
Planning and Air Monitoring Manager

cc: Richard Stedman, Shawn Boyle