Draft

PINE MOUNTAIN TUNNEL TANKS REPLACEMENT

Initial Study/Mitigated Negative Declaration

Prepared for
Marin Water

September 2021

ESA

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September 2021

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CHAPTER 1
Introduction

1.1 Purpose of the Initial Study

The Marin Municipal Water District (Marin Water), as the California Environmental Quality Act (CEQA) Lead Agency, has prepared this Initial Study (IS) for the Pine Mountain Tunnel Replacement Tank Project (Project) in compliance with CEQA, the CEQA Guidelines (California Code of Regulations [CCR] §15000 et. seq.) and the regulations and policies of Marin Water. Marin Water serves more than 191,000 people in central and southern Marin with 100 percent locally sourced drinking water, and the potable and raw water distribution system includes approximately 886 miles of water mains, 94 pump stations, and 121 treated water storage tanks with a total storage capacity of 74.96 million gallons (MG), not including 3 clearwells and 7 hydropneumatic tanks.

Marin Water proposes to discontinue using the existing Pine Mountain Tunnel for water storage, and to replace the existing storage by building two, 2-million-gallon concrete water storage tanks on Marin Water's watershed property on Mt. Tamalpais and connecting the tanks to the existing water pipeline in Concrete Pipe Road. The proposed Project is described in Chapter 2, Project Description.

1.1.1 Public Review Period

Publication of this IS marks the beginning of a 30-day public review and comment period. During this period, the IS will be available to local, state, and federal agencies and to interested organizations and individuals for review. Written comments concerning the environmental review contained in this IS during the 30-day public review period should be sent to:

Alex Anaya, Engineering Manager
Marin Water
220 Nellen Ave.
Corte Madera, CA 94925
415.945.1588
aanaya@marinwater.org

1.1.2 Consideration of the Initial Study and Project

Following the conclusion of the public review period, the Marin Water Board of Directors (Board) will consider the adoption of the Initial Study/Mitigated Negative Declaration (IS/MND) for the Project at a regularly scheduled meeting. The Board shall consider the IS/MND together with any comments received during the public review process. Upon adoption of the MND, Marin Water may proceed with Project approval actions.

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CHAPTER 2
Project Description

2.1 Introduction and Background

Constructed in the late 1910s to convey water from Alpine Reservoir to Fairfax and San Rafael, Pine Mountain Tunnel was converted to a water storage facility in 1971 and remains in that use today. However, the tunnel has exceeded its useful life and the State has indicated that this facility be removed from the system or be completely repaired (California Department of Public Health, April 30, 2009). Therefore, the Marin Municipal Water District (Marin Water) is seeking to design and construct two 2-million-gallon (MG) storage tanks to replace the storage capacity of the tunnel and cease use of the tunnel as a storage facility.

The two new storage tanks would have a combined capacity of up to 4-MG and would be located along the upslope (west) side of Concrete Pipe Road near its intersection with Bolinas Road and Sky Oaks Road on Marin Water's watershed property. Concrete Pipe Road is used by Marin Water maintenance and ranger vehicles, pedestrians, bicyclists, and equestrians; it is not open to public vehicle traffic. Because the topography is sloping at approximately 40 percent west to east at the Project site, the tanks would be partially buried into the hillside. The tanks would be connected to an existing 30-inch pipeline in Concrete Pipe Road with minimal piping interconnecting the tanks. No Project-related activity is anticipated at the Pine Mountain Tunnel site, other than draining the Tunnel when the replacement tanks have been commissioned and are in use. No ground disturbance or other physical changes at the tunnel site would occur as part of this Project.

2.2 Project Objectives

The purpose of this Project is to replace the storage capacity of the existing Pine Mountain Tunnel with two new 2-MG concrete storage reservoirs, or tanks. The Project objectives include:

- Increase reliability of storage in Ross Valley;
- Cease use of the existing Pine Mountain Tunnel for storage; and,
- Provide emergency storage on Marin Water's watershed to aid in firefighting capabilities.

2.3 Project Location and Setting

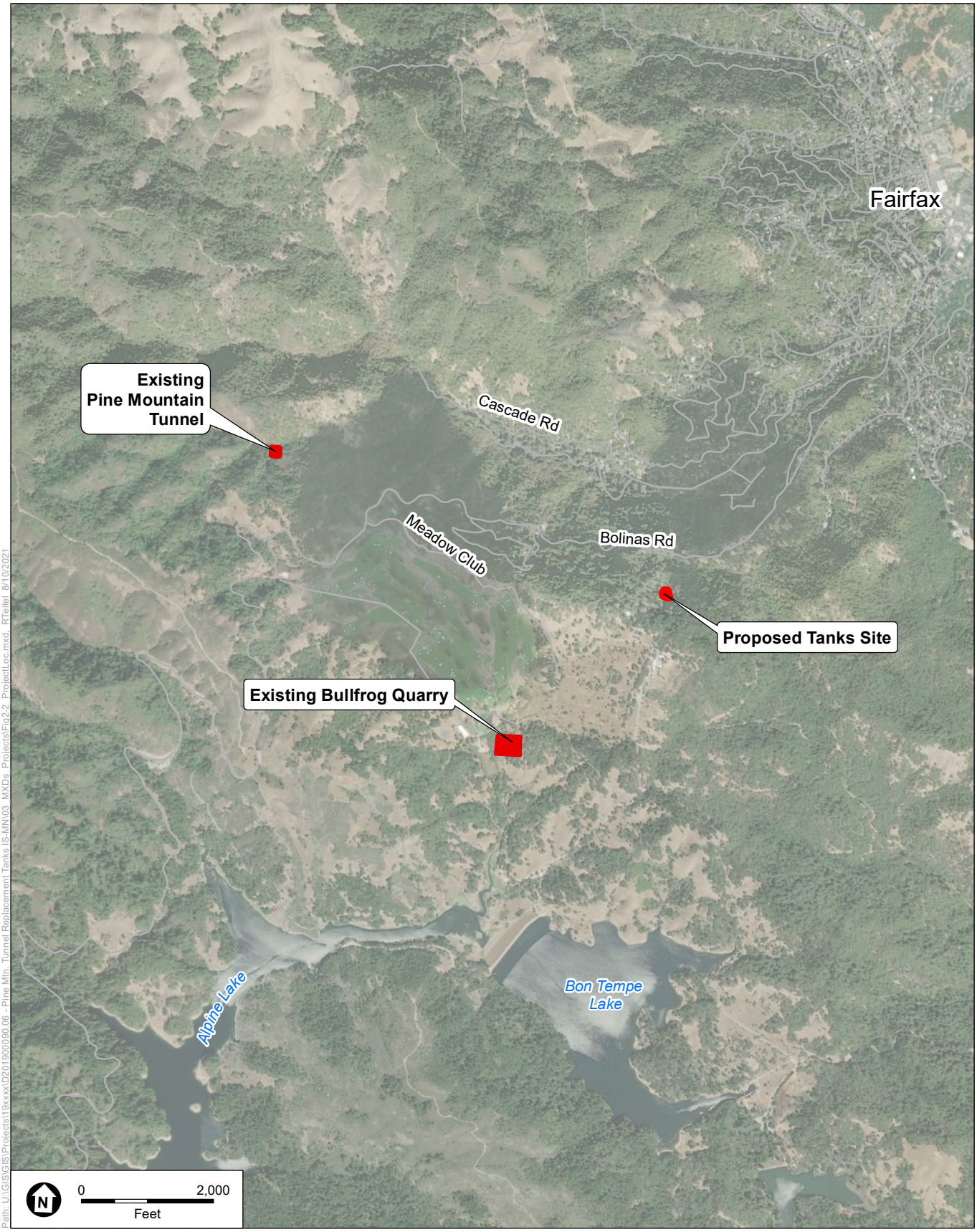
The less than 1-acre Project site is located in unincorporated Marin County just outside the Town of Fairfax (see **Figure 2-1**, **Regional Location**). The Project site is on, and accessed by, Concrete Pipe Road, approximately 700 feet south of Bolinas Road (see **Figure 2-2**, **Project Location***)*.

SOURCE: ESRI

Pine Mountain Tunnel Replacement Tanks

Figure 2-1
Regional Location

ESA



SOURCE: ESRI Imagery

Pine Mountain Tunnel Replacement Tanks

Figure 2-2
Project Location

ESA

The Project site is undeveloped and surrounded by woodland. It slopes steeply downward from west to east, from approximately 610 feet above mean sea level (AMSL) to 490 feet AMSL – a drop in elevation of approximately 120 feet over a distance of approximately 300 feet (a 40 percent slope). There are single-family residences located on the north side of Bolinas Road, approximately 700 feet to the north of the Project site. Single-family residences on large lots are also located between Sky Oaks Road and Scott Tank Road approximately 400 to 750 feet to the west-southwest of the Project site.

2.4 Proposed Project

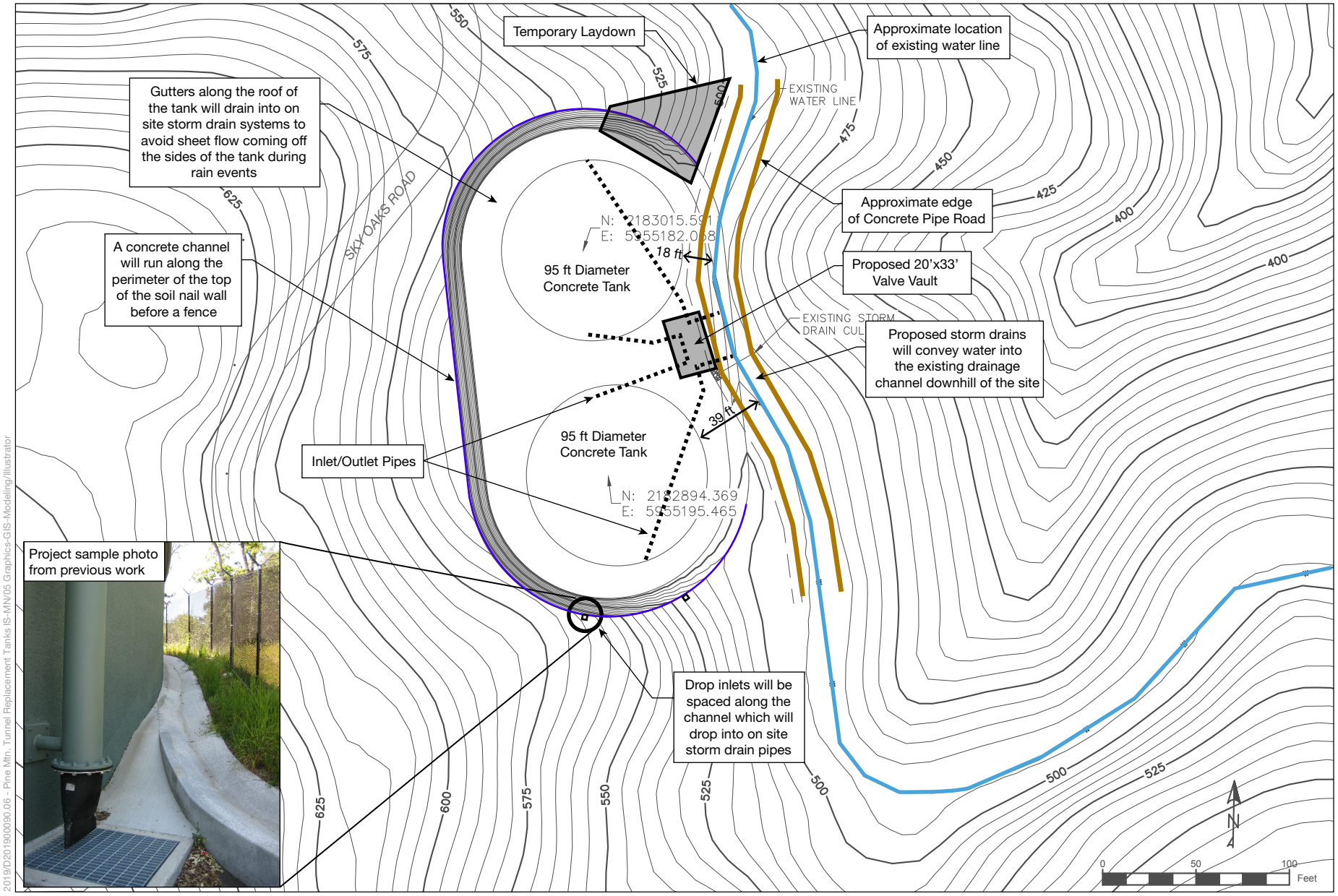
For the most part, the Project would be constructed and operated within the approximate limits of grading shown on **Figure 2-3**, **Project Site**. The main Project components include:

- Two, 2-MG concrete water storage tanks, including concrete foundation slabs, concrete walls and roofs, and site drainage facilities
- Steel pipes up to 30-inches in diameter and valves that are to be located within a new, buried, concrete vault structure, would connect each of the new tanks with the existing 30-inch diameter pipe in Concrete Pipe Road
- Perimeter fencing and motion-sensor lighting
- Materials and spoils storage at Bullfrog Quarry and other currently developed or disturbed sites on Marin Water's watershed property

Each of the concrete water storage tanks would be spiral wound reinforced concrete and would be approximately 95 feet in diameter and 45 feet in height. The tanks would be built with a colored concrete to blend them visually into the surroundings. The concrete would be unfinished and rough in texture with a single color (e.g., a dark forest green) that produces a non-reflective surface and would blend in with the surrounding foliage. Because of the steep topography of the Project site and surroundings, the tanks would be partially buried into the hillside to restore the slope and visual character of the site. The cut slope would be prepared as a soil nail wall[1] stabilized with shotcrete and concrete. A representative schematic cross-section of the tank site is provided in **Figure 2-4**, **Representative Tank Cross-Section**.

Two naturally occurring drainages between Sky Oaks Road and Concrete Pipe Road would be re-routed around the new tanks, one or two new culverts would be constructed under Concrete Pipe Road, and storm flows would be discharged back into the natural drainage below the Project site. As proposed, approximately 200 linear feet of existing ephemeral drainage would be rerouted into a concrete channel, which would run along the perimeter of the soil nail wall. Drop inlets would be spaced along the channel to drop into proposed new storm drain pipes, as depicted in Figure 2-3, Site Plan. Gutters would be installed along the roofs of the proposed tanks to allow for drainage into on-site storm drain systems to capture and convey stormwater and avoid sheetflow

[1] A soil nail wall is an earth retention system that provides stability for cut slopes. Following top-down excavation, steel reinforcing elements (soil nails) are installed and grouted in sub-horizontal drilled-holes to form a coherent mass with improved shear strength.



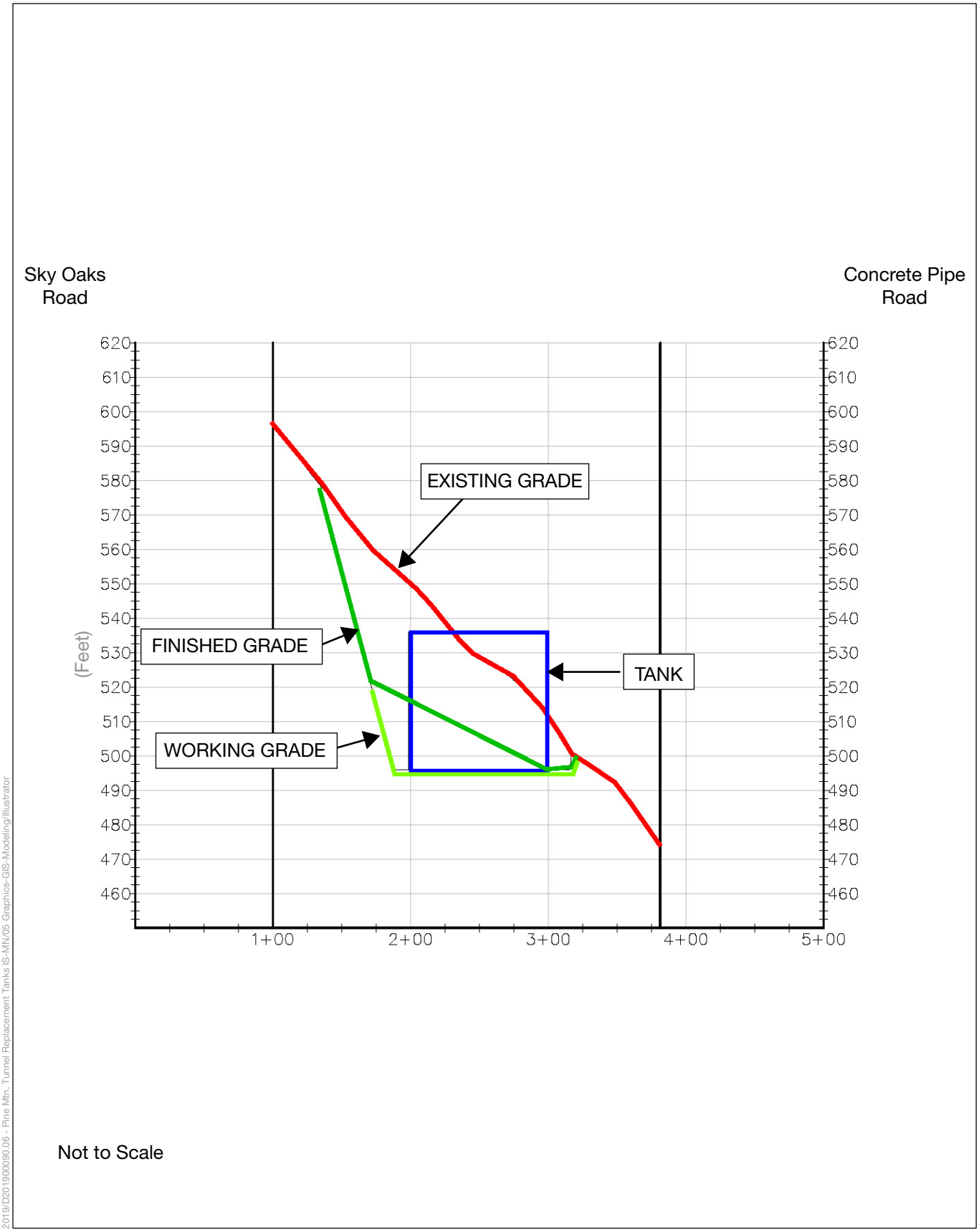
2019/D2019000090.06 - Pine Mtn. Tunnel Replacement Tanks IS-MN/05 Graphics-GIS-Modeling/Illustrator

SOURCE: Woodard & Curran, 2021

Pine Mountain Tunnel Replacement Tanks

Figure 2-3
Project Site

ESA



2019/D201900090.06 - Pine Mtn. Tunnel Replacement Tanks IS-MN/05 Graphics-GIS-Modeling/Illustrator

SOURCE: Woodard & Curran, 2021

Pine Mountain Tunnel Replacement Tanks

Figure 2-4
Representative Tank Cross-Section

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off the tank roofs during rain events. Proposed storm drains would be designed to convey stormwater into the existing ephemeral drainage channel downslope from the site. Soil disturbance would be limited (as proposed in the site plan) to the 0.7-acre grading footprint. Following construction, impacted areas at the Project site, not utilized as hardscape, would be reseeded or replanted with ecologically-appropriate, native plantings.

Welded steel pipes of up to 30-inches in diameter would connect the tanks to the existing 30-inch diameter water pipeline in Concrete Pipe Road. The new steel pipelines would allow for the conveyance of water to and from the tanks. The valving for the tanks and new steel pipelines would be constructed within a new, accessible, buried concrete vault structure. Once completed, the Project would add approximately 20,000 square feet of impervious surface at the site.

The perimeter of the site would be fenced for security. Likewise, motion-activated lighting would also be included as a security feature.

2.5 Project Construction

2.5.1 Construction Schedule/Sequencing

Project construction is anticipated to take 635 workdays that would begin in January 2022 and be completed by December 2026[2]. The general construction sequence would be as follows:

- Site preparation, clearing/grading/demolition, staging locations – January 2022, and August 2022 through January 2023 (153 workdays)
- Tank, vault, and pipeline construction – August 2023 to December 2026 (459 workdays)
- Site clean-up, paving and restoration – November to December 2026 (23 workdays)

This schedule takes the February through July Northern Spotted Owl nesting season into consideration; to avoid conflicts with nesting season, construction activities would only occur August through January in each of the Project's construction years (a construction year therefore, includes approximately 185 days), unless no nests are confirmed to be in the area, or if nests become inactive.

The daily construction schedule is anticipated to be generally from 7:00 AM to 6:00 PM, Monday through Friday, although loud, noise-generating construction-related equipment would generally be operated between 8:00 AM to 5:00 PM, to coincide with and adhere to the noise standards set forth in the Marin County noise ordinance (Chapter 6.70.030). There would be up to sixteen extended workdays to accommodate concrete placement that must not be interrupted. No work on weekends (Saturday/Sunday) and holidays (e.g., Thanksgiving, Christmas) is anticipated.

2.5.2 Staging/Materials Delivery and Laydown

Work areas would be confined to the Project site and adjacent portions of Concrete Pipe Road, totaling approximately 0.7 acre. Because the area around the Project site would be constrained, materials and equipment not being immediately used would be stored at Bullfrog Quarry and

[2] Due to the February 1 through July 31 Northern Spotted Owl nesting season, construction would typically occur between August 1 and January 31 of the following year.

other developed or previously disturbed areas on Marin Water's watershed property. The area at Bullfrog Quarry dedicated to Project staging and storage would be approximately 1.0 acre.

Trucks would off haul unused or excess materials (i.e., excavated spoils to accommodate the tanks) and haul in materials for construction. The Project site is accessible from US Highway 101 via Sir Francis Drake Boulevard and Bolinas Road. Additionally, internal watershed property roads would be used to move materials and equipment from Bullfrog Quarry and any other watershed sites used for storage or staging.

It is expected that as much of the excavated material as possible that is generated at the Project site would be salvaged and reused onsite. However, excess material would be hauled to Bullfrog Quarry for use as needed on future Marin Water projects (see Section 2.5.4).

2.5.3 Construction Equipment

A range of large equipment would be used during construction, such as:

- excavators (1)
- dumpers/tenders (2)
- graders (1)
- off-highway trucks (1)
- bore/drill rigs (1)
- cement/mortar mixers (12)
- cranes (1)

2.5.4 Excavation and Fill Information

The Project would require excavation of the tank site, and Marin Water's standard specifications for Earthwork (Section 02200), Environmental Protection (Section 18000), and High Fire Danger Alerts and Closures (Section 01000) will be complied with and are included as Appendix A.

Approximately 45,000 cubic yards (CY) of excavation would be required to prepare the Project site and accommodate the tanks. The top 12- to 18-inches of soil would be removed and off-hauled to an approved landfill. This would amount to approximately 2,700 CY of spoils which would be off-hauled and disposed of at the Redwood Landfill in Novato. Approximately 22 percent, or 10,000 cubic yards of the excavated spoils, would be reused on site for restoration. The remainder, approximately 32,300 CY, would be off hauled to Bullfrog Quarry for permanent storage and use on future Marin Water projects. For purposes of the following analyses, it is assumed the haul trucks would have a capacity of 16 CY.

2.5.5 Vehicle Trips and Haul Routes

There would be an average of approximately 8 construction workers daily over the duration of Project construction. It is assumed that all workers would drive to and park their personal vehicles on Concrete Pipe Road near the Project site each workday.

There would be approximately one (1) Project-related truck delivery at the Project site per day, ranging from equipment and materials deliveries to daily deliveries of parts and tools, distributed over the course of the anticipated 48-month construction period (limited to ~635 construction days because of the Spotted Northern Owl nesting season). It is possible that there would be several trips on some days and none on other days. Spoils off-hauling would require 170 truck trips (340 round trips) between the Project site and the Redwood Landfill, and 2,020 truck trips (4,040 round trips) between the Project site and Bullfrog Quarry. There would be approximately 313 concrete deliveries, representing a total of 626 round trips.

The assumed truck and worker commute route used for this analysis would be from U.S. Highway 101 to Sir Francis Drake Boulevard to Bolinas Road to Concrete Pipe Road and the Project site. Excluding the Concrete Pipe Road, all these roadways are well-traveled routes in the area. No access through neighboring parcels would be needed.

Most of the spoils excavated from the site (32,300 CY) would be hauled to Bullfrog Quarry to the west on Marin Water's watershed property. The haul route would follow Sky Oaks Road, Bon Tempe Dam Trail, and Bullfrog Road (see **Figure 2-5**, **Haul Routes**). At the Project site, a temporary access road would provide direct access to Sky Oaks Road to the north, and west of the site. When the temporary access road would not be available, haul trucks would use Bolinas Road (via Concrete Pipe Road) to reach Sky Oaks Road.

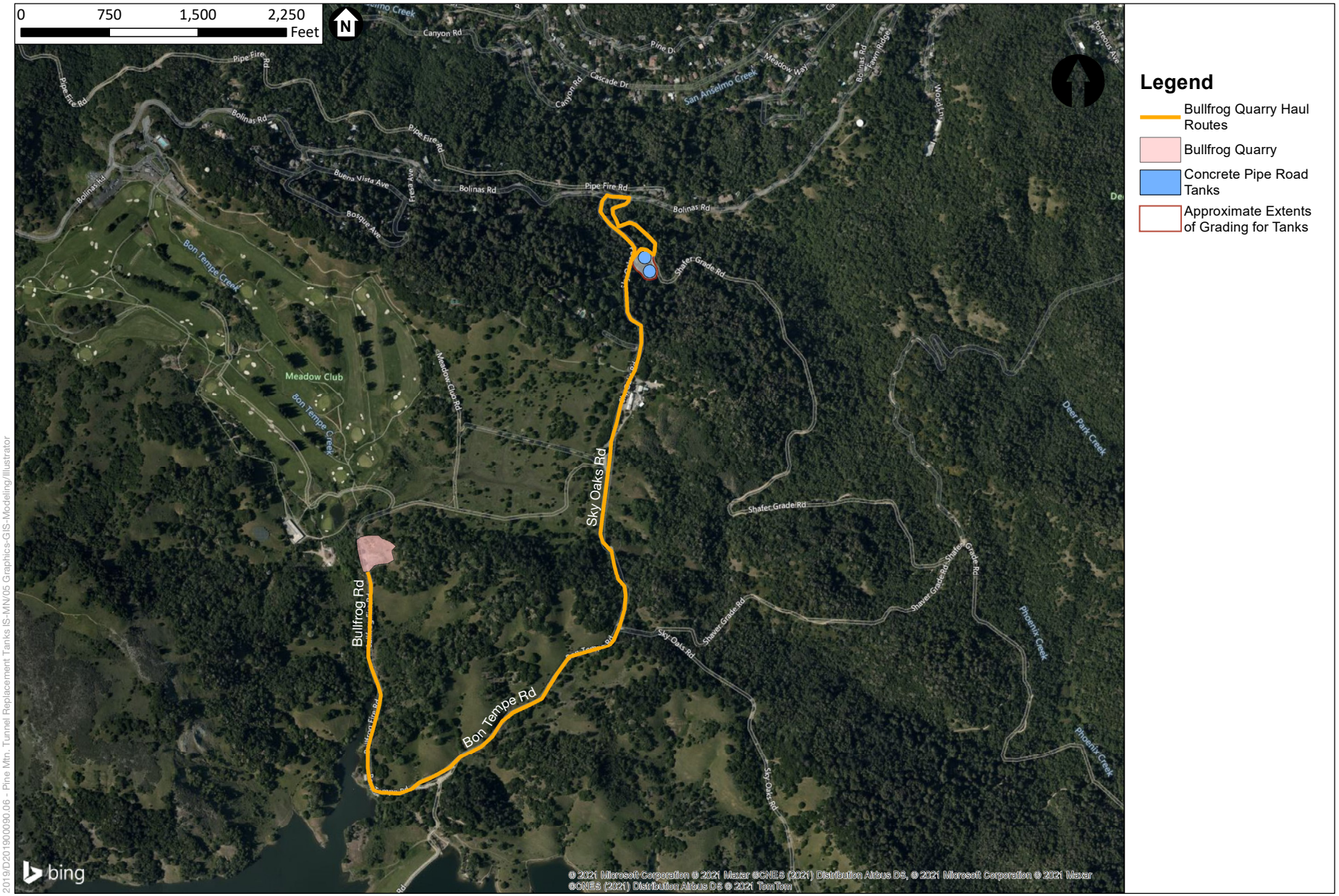
Whenever possible, construction traffic trips to and from the Project site would occur during non-commuter peak hours of 10:00 AM to 4:00 PM weekdays. A possible exception would be concrete deliveries during "continuous pour" events during construction, when an entire component would be constructed and a constant pour of concrete would be needed to complete the task (e.g., for the foundation slab, and roof).

2.6 Project Operations and Maintenance

Upon completion of Project construction, and after the tanks are commissioned and operational, the Project would require minimal maintenance. It is anticipated that no new staff would be required specifically for operations or to perform routine maintenance. For the purposes of the following analyses, it is anticipated that routine inspection and maintenance would occur up to 2 days per month. Primary operations and maintenance activities would include water quality sampling, instrument checks, pipe inspection, tank cleaning, and site mowing. Major repair activities would be episodic and occur only as needed; these activities cannot be reliably anticipated or scheduled at this time. Therefore, additional truck trips resulting from maintenance of the tanks and appurtenances would be minimal. No waste or discharge would be generated at the Project site, unless resulting from an unanticipated major repair.

References

California Department of Public Health, Drinking Water Field Operations Branch, letter to Robert Castle at MMWD, dated April 30, 2009.



2019/D2019000090.06 - Pine Mtn. Tunnel Replacement Tanks IS-MN/05 Graphics-GIS-Modeling/Illustrator

SOURCE: Woodard & Curran, 2021

Pine Mountain Tunnel Replacement Tanks

Figure 2-5
Haul Routes

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CHAPTER 3
Environmental Checklist – Initial Study

1. Project Title:	Pine Mountain Tunnel Tanks Replacement
2. Lead Agency Name and Address:	Marin Municipal Water District (Marin Water)
3. Contact Person and Phone Number:	Alex Anaya, (415) 945-1588
4. Project Location:	Unincorporated Marin County Assessor Parcel No. 197-120-23
5. Project Sponsor's Name and Address:	Marin Water 220 Nellen Ave. Corte Madera, CA 94925 415.945.1588
6. General Plan Designation(s):	Open Space, and Agricultural and Conservation
7. Zoning:	Open Area

8. Description of Project:

Marin Water proposes to cease using the Pine Mountain Tunnel for water storage, and to replace the existing storage by building two, 2-million-gallon concrete water storage tanks on Marin Water's watershed property. See Chapter 2.

9. Surrounding Land Uses and Setting:

Watershed lands consisting of mixed oak forest and woodland.

10. Other public agencies whose approval is required:

County of Marin Public Works Department, Traffic Control Plan

CA Department of Fish and Wildlife, Fish and Game Code Section 1602 Lake and Streambed Alteration Permit

11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?

According to the requirements of PRC Section 21080.3.1(b), one tribe, the Federated Indians of Graton Rancheria, has previously requested consultation regarding projects in the vicinity of lands under the jurisdiction of Marin Water. On June 22, 2021, ESA sent a request to the

Native American Heritage Commission (NAHC) for a sacred lands file search and a list of culturally-affiliated Native American tribes in reference to the Project. The NAHC responded on July 14, 2021, that the results were negative for sacred sites and provided a list of tribes to contact who might provide additional information about the Project site and vicinity. On July 15, 2021, Marin Water sent letters to the Federated Indians of Graton Rancheria and the Guidiville Indian Rancheria. By letter dated August 19, 2021, the Federated Indians of Graton Rancheria notified Marin Water of their formal request for tribal consultation.

3.1 Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

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

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial study:

☐ 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. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ 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.

September 17, 2021

Signature — Date

Signature — Date

3.2 Environmental Checklist

3.2.1 Aesthetics

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
I. AESTHETICS — Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within 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?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☐	☐	☒	☐

Discussion

a) **Less than Significant.** The Marin Countywide Plan identifies Ridge and Greenbelt areas as sensitive and includes several design strategies within goal DES-4 to protect visually prominent ridgelines and identifies Ridge and Upland Greenbelt Areas (Map 3-4 of the Countywide Plan) but does not identify individual scenic vistas. The project area is within an identified Ridge and Upland Greenbelt area but is not located on or within view of a prominent ridgeline and, due to the enclosed nature of the project site and immediate area, is not seen within a scenic vista. The project site is visible from the adjacent Concrete Pipe Road, which is a Marin Water service road accessible for use as a non-motorized trail by the public. However, due to density of trees surrounding the site, and the steep topography surrounding the site, the Project would not be seen within the context of a scenic vista. Further, while the project includes construction of two tanks of approximately 40 feet in height, they would be partially buried within the adjacent hillside and would not block the surrounding ridgelines. Thus, the Project would not substantially affect views from scenic vistas as designated by Marin County. This impact would be less than significant.

b) **No Impact.** In Marin County, Caltrans-designated State Scenic and Eligible State Scenic Highways include portions of Interstate 101 and State Route 37 in the vicinity of the City of Novato. None of these highways are in the visible vicinity of the Project site. There would be no impact under this criterion.

c) **Less than Significant.** The project site is located adjacent to a hillside/slope adjacent to Concrete Pipe Road, which is available to the public for use as a non-motorized trail. The project would not be visible from Sky Oaks Road due to intervening vegetation and

topography; and would not be visible from Bolinas Road for the same reason. The existing site itself is undeveloped forest, set within undeveloped watershed lands. Construction activities and, during project operation, the tanks and associated infrastructure would be visible by trail users passing the site and would be seen as contrasting with the surrounding forested lands. However, once trail users move past the immediate site, the project would recede from views. Although in a natural setting, the relatively limited public viewing opportunities and length of view would not create substantial visual contrast with the surrounding areas. The visual character or quality of the site or its surroundings would not be substantially degraded with the presence of this Project. This impact would be less than significant.

d) **Less than Significant.** There are minimal sources of existing light in the project vicinity, due to the undeveloped nature of the area. Light is limited primarily to that of the few residential structures to the north, along Bolinas Road and to the west, along Sky Oaks Road. As discussed in Section 2.5.1, Construction Schedule/Sequencing, daily construction schedule is anticipated to be generally from 8:00 AM to 5:00 PM Monday through Friday. However, there will be up to sixteen extended daytime workdays to accommodate concrete placement that must not be interrupted. Construction activities would only occur August through January in each of the Project's construction years. Thus, it is possible that the extended workdays could require lighting during evening activities. However, given the enclosed nature of the work site and vicinity, it is not likely that light trespass would occur beyond the immediate project vicinity and would not cause light and glare effects to motorists passing on nearby Sky Oaks Road or Bolinas Road. While the tanks and associated infrastructure would be visible as trail users pass the site, the tanks would be built with a colored concrete to blend them visually into the surroundings. The concrete would be unfinished and rough in texture with a single color (e.g., dark forest green) that will produce a non-reflective surface and blend in with the surrounding foliage. Project elements would not create a substantial new source of light when considered with the existing condition. This impact would be less than significant.

References

Marin County Community Development Agency. November 6, 2007 (adopted). *Marin Countywide Plan*. https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/cwp_2015_update.pdf

3.2.2 Agriculture and Forestry Resources

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE AND FORESTRY 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 Dept. 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?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion

a) **No Impact.** The Project site is not zoned for agricultural use and does not include prime farmland, unique farmland, or farmland of statewide or local importance. The Project does not propose to convert Prime farmland, Unique farmland, or Farmland of Statewide Importance to non-agricultural use. The Project site would be constructed on less than 1-acre of land just outside of Fairfax in unincorporated Marin County and is designated as Urban and Built-Up Land by the California Department of Conservation (California Department of Conservation 2016). No Project components or staging area would occur on Prime, Unique, or Farmland of Statewide Importance to non-agriculture use. Therefore, there would be no impact.

b) **No Impact.** The Project site is not located on any land used for agriculture or zoned for agricultural use. The site and surrounding areas are zoned as Open Area (OA) and no agricultural lands conserved under the Williamson Act are present (Marin County, 2021). Project construction and staging also would not be located or near existing zoning for agricultural use, therefore, the Project will not conflict with existing zoning for agricultural use or an active Williamson Contract and there would be no impact.

c) **No Impact.** The Project site is steep and surrounded by existing woodland. The woodland is not zoned for forestland, timberland, or zoned Timberland Production, therefore, there would be no impact (Marin County 2021).

d) **No Impact.** Project construction would remove trees onsite. As discussed in item c), the project site is not zoned for forest land and is considered open area; therefore, the project would not convert forest land to non-forest use and there would be no impact.

e) **No Impact.** As discussed above, the project site and the surrounding areas would not be designated or zoned for any type of farmland or forestland. The project will not involve any other changes in the existing environment that could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use. For these reasons, the Project would have no impact.

References

California Department of Conservation (DOC). 2016. California Important Farmland Finder. Available: https://maps.conservation.ca.gov/DLRP/CIFF/. Accessed August 9, 2021.

Marin County. 2021. MarinMap Map Viewer. Available: https://www.marinmap.org/Html5Viewer/Index.html?viewer=smmdataviewer. Accessed August 11, 2021.

3.2.3 Air Quality

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. 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?	☐	☐	☒	☐
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?	☐	☒	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

The Project would be in unincorporated Marin County along Concrete Pipe Road near its intersection with Bolinas Road and Sky Oaks Road on Marin Water's watershed property. Marin County is located within the San Francisco Bay Area Air Basin (SFBAAB), which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Air quality in the SFBAAB is influenced by such natural factors as topography, meteorology, and climate, in addition to the presence of existing air pollution sources and ambient conditions. The air basin's moderate climate steers storm tracks away from the region for much of the year, although storms often affect the region from November through April. Marin County's proximity to the Pacific Ocean and exposure to onshore breezes provides generally good air quality in the County. Annual temperatures in Marin County and in the vicinity of the Project site average in the mid-50s (degrees Fahrenheit), ranging from the low 40s on winter mornings to the mid-70s during summer afternoons. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the "rainy" period from November through April. Precipitation varies widely from year to year as shifts in the annual storm track of a few hundred miles can mean the difference between a very wet year and drought conditions.

Atmospheric conditions such as wind speed and direction, and variable air temperatures interact with the physical features of the landscape to influence the movement and dispersal of air pollutants, regionally. In southern Marin the distance from the ocean is short and ground elevations are lower, resulting in higher incidence of more humid maritime air in that area. The complex terrain in central Marin creates sufficient friction to slow the air flow. The prevailing wind directions throughout Marin County are generally from the northwest. Air pollution potential is highest in eastern Marin County, where most of population is in semi-sheltered valleys. In the southeast, the influence of marine air keeps pollution levels low (BAAQMD, 2017a).

Criteria Air Pollutants

Criteria air pollutants are a group of six common air pollutants for which the U.S. Environmental Protection Agency (U.S. EPA) has set national ambient air quality standards (NAAQS), including

ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) 10 microns or less in diameter (PM_{10}), PM 2.5 microns or less in diameter ($PM_{2.5}$), and lead. Most of the criteria pollutants are emitted as primary pollutants. Ground level ozone, however, is a secondary pollutant that is formed in the atmosphere by chemical reactions between nitrogen oxides (NO_x) and reactive organic gases (ROG) in sunlight. In addition to the criteria air pollutants identified by the U.S. EPA, California has added four state criteria air pollutants (visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride) to the California ambient air quality standards (CAAQS). The SFBAAB is designated as a non-attainment area with respect to the state and federal 8-hour ozone standards, the state 1-hour ozone standard, the state 24-hour PM_{10} standard, the state annual PM_{10} standard, the federal 24-hour $PM_{2.5}$ standard, and the state annual $PM_{2.5}$ standard. The SFBAAB is designated as an attainment area, or unclassified, relative to all the other criteria pollutant standards (BAAQMD, 2017c).

Toxic Air Contaminants

Toxic air contaminants (TACs) are state-designated, airborne substances that are capable of causing short-term (acute) and long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations, as well as heavy-duty trucks and heavy equipment. The current California list of TACs includes nearly 200 compounds, including diesel particulate matter (DPM) exhaust emissions from diesel-fueled engines (CARB, n.d.).

Sensitive Receptors

Some receptors are considered more sensitive to air pollutants than others. The reasons for greater than average sensitivity include age, pre-existing health problems, proximity to emissions sources, and duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air-quality related health problems than the general public. Children are particularly sensitive to air pollution due to their rapid breathing rate, smaller body size, and early developmental stage of their respiratory system. Residential areas are sensitive to poor air quality because people usually stay at home for extended periods of time, with greater associated exposure to ambient air quality. Recreational uses are also considered sensitive because vigorous exercise associated with recreation places a high demand on the human respiratory system and increases exposure to ambient air quality conditions. Sensitive receptors in the vicinity of the proposed Project site include single-family residences.

Discussion

The following analysis of air quality impacts considers the potential impacts related to emissions of nonattainment pollutants, their precursors, and TACs on the surrounding community. Therefore, ozone precursors (ROG and NO_x), PM_{10}, $PM_{2.5}$, and diesel particulate matter (DPM), are the focus of this assessment.

a) **Less than Significant Impact.** The federal Clean Air Act (CAA) and the California CAA require any air district that has been designated as a nonattainment area relative to

the NAAQS and the CAAQS for ozone, CO, SO_2, or NO_2 to prepare and submit a plan for attaining and maintaining the standards.

The most recently adopted air quality plan for the SFBAAB is the 2017 Clean Air Plan. The Clean Air Plan is a road map that demonstrates how the Bay Area will implement all feasible measures to reduce ozone in accordance with the requirements of the California CAA. It also provides a control strategy to reduce ozone, PM, TACs, and GHGs (BAAQMD, 2017b). In determining consistency with the Clean Air Plan, this analysis considers whether the Project would:

- Support the primary goals of the Clean Air Plan;
- Include applicable control measures from the Clean Air Plan; and
- Avoid disrupting or hindering implementation of control measures identified in the Clean Air Plan.

The Clean Air Plan includes 85 control measures aimed at reducing air pollutants and GHGs in the SFBAAB. Many of these measures address stationary sources and will be implemented by the BAAQMD using its permit authority, and therefore, are not suited for implementation through local planning efforts or project approval actions. Furthermore, most measures that would be applicable to local planning actions would only apply to Project operations; however, operation of the Project is anticipated to generate only two maintenance trips per month, which would generate nominal emissions.

Measures included in the Clean Air Plan that would be applicable to construction activities associated with the Project include measures TR 19 (Medium and Heavy Duty Trucks), and TR 22 (Construction, Freight, and Farming Equipment). TR 19 requires BAAQMD to provide and encourage other organizations to provide incentives for the purchase of new lower-emission trucks, while TR 22 requires BAAQMD to provide incentives for the deployment of Tier 3 and Tier 4 off-road engines used for construction. Implementation of these measures is the responsibility of the BAAQMD and, therefore, are not applicable to the Project.

As discussed under impact discussion b), below, the Project would result in a net increase in emissions of criteria air pollutants that would not exceed the significance thresholds for ROG, NO_x, PM_{10}, and $PM_{2.5}$. Thus, criteria air pollutant emissions that would be generated from construction and operation of the Project would not conflict with the Clean Air Plan. Additionally, as discussed under impact discussion c), the Project would not generate a significant impact with regard to health risk.

The Project would not generate emissions that would exceed the BAAQMD thresholds of significance for criteria air pollutants and would support the goals of the Clean Air Plan. Furthermore, measures included in the Clean Air Plan fall under the responsibility of the BAAQMD for implementation, or are otherwise not applicable to the Project, and the Project would also not conflict with or hinder the implementation of these measures.

Therefore, the Project would be consistent with the BAAQMD Clean Air Plan, and the impact would be considered less than significant.

b) **Less than Significant with Mitigation.** Construction of the Project would generate emissions of criteria air pollutants from the use of heavy-duty construction equipment, haul trips, and construction worker vehicle trips, while operational emissions would be generated from employees traveling to the Project site for maintenance twice per month. On-site emissions of criteria pollutants that would result from construction equipment use were estimated using the California Emissions Estimator Model (CalEEMod), version 2020.4.0, while off-site emissions of criteria pollutants from worker, vendor, and haul vehicles were calculated using the on-road mobile source emission factor model, EMFAC 2021. These models are regulatory-approved for CEQA projects and have been developed by, or in coordination with the California Air Resources Board (CARB) and are approved for use by the BAAQMD. It should be noted that CalEEMod has EMFAC2017 imbedded within the model to estimate on-road passenger vehicle emissions. This is an older version of EMFAC than the most recent version, EMFAC2021; thus, the mobile source emissions from the Project were calculated outside of the CalEEMod model runs. Project-specific information was used for modeling when possible, and where project-specific information was not available, CalEEMod defaults were used. CalEEMod assumptions and detailed modeling outputs are included in **Appendix B.**

Construction-related emissions are considered short-term in duration, but nevertheless can represent a significant, adverse impact on air quality. Construction of the Project is assumed to begin in January 2022, and would continue through December 2026; however, construction activity would only take place from August through January each calendar year to avoid the Northern Spotted Owl nesting season. Construction would begin with site preparation, followed by tank, vault, and pipeline construction, and ending with a site clean-up phase. During the course of construction, the Project would require off-hauling of approximately 45,000 cubic yards of excavated material, 2,700 of which would be hauled to a local landfill in Redwood City, and the remainder of which would be hauled to Bullfrog Quarry, approximately 2 miles southeast of the project site; and import of 10,000 cubic yards of material from Bullfrog Quarry for infill. It was estimated that approximately 3,118 cubic yards of cement would be needed for construction of the Project and this volume of cement would require approximately 313 cement truck delivery trips, for a total of 626 one-way cement truck trips associated with construction of the Project.

Emissions of ozone precursors (ROG and NO_x) are generated primarily by mobile sources and largely vary as a function of vehicle trips per day and the type, quantity, intensity, and frequency of heavy-duty off-road equipment used. Construction-related fugitive dust emissions of particulate matter would vary from day-to-day depending on the level and type of activity, silt content of the soil, and the weather. Project construction activities could result in dust adversely affecting local visibility and PM_{10} concentrations on a temporary and intermittent basis. The BAAQMD takes a qualitative approach to assessing construction-related emissions of fugitive dust. According to the BAAQMD CEQA Guidelines, a project would be considered to have a less-than-significant impact

with respect to fugitive dust emissions if the project implements the BAAQMD Basic Construction Mitigation Measures.

Construction emissions that would result from the use of off-road equipment, haul trucks for exporting material, on-road worker vehicle use, and vendor delivery trips are reported and compared to the BAAQMD thresholds of significance in **Table AIR-1.**

TABLE AIR-1
PROJECT CONSTRUCTION EMISSIONS[1,2]

Construction Year	ROG (ppd)	NO_X (ppd)	PM_{10} exhaust (ppd)	$PM_{2.5}$ exhaust (ppd)
2022	0.36	4.85	0.10	0.07
2023	0.21	2.01	0.07	0.05
2024	0.15	1.07	0.06	0.05
2025	0.15	0.99	0.05	0.04
2026	0.14	0.98	0.05	0.04
BAAQMD Thresholds	54	54	82	54
Maximum Emissions	0.36	4.85	0.10	0.07
Significant (Yes or No)?	No	No	No	No

NOTES:
ppd = pounds per day; tpy = tons per year
1. Project construction emissions estimates were made using CalEEMod version 2020.0.4. See Appendix B for model outputs and more detailed assumptions.
2. Values in **bold** are in excess of the applicable BAAQMD significance threshold.

SOURCE: Appendix B.

As shown in Table AIR-1, average daily construction emissions of ozone precursors and PM would not exceed the BAAQMD thresholds of significance for construction. As discussed above, the BAAQMD has chosen to take a qualitative approach to the assessment of fugitive dust emissions from construction, and projects that implement the BAAQMD Basic Construction Mitigation Measures would be considered to have a less-than-significant impact with respect to construction-related fugitive dust emissions of $PM_{2.5}$ and PM_{10}. Projects that do not implement the BAAQMD Basic Construction Mitigation Measures would be considered to have a significant impact with respect to dust emissions. Therefore, implementation of **Mitigation Measure AIR-1: Implement BAAQMD Basic Construction Mitigation Measures** is recommended to mitigate the significant dust-related impact**.** With implementation of Mitigation Measure AIR-1, the BAAQMD Basic Construction Mitigation Measures would be implemented, and the Project impact with respect to construction emissions of criteria air pollutants would be less than significant.

Following construction, operation of the Project would generate criteria air pollutants from approximately two employee vehicle round-trips per month. These emissions would be nominal and would not exceed the BAAQMD thresholds of significance for criteria air

pollutants, as operational activity would be minimal. Therefore, operational criteria air pollutant emissions associated with the Project would be considered less than significant.

Mitigation Measure AIR-1: Implement BAAQMD Basic Construction Mitigation Measures. Marin Water shall implement the following measures during construction to mitigate fugitive dust emissions:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

8. Post a publicly visible sign with the telephone number and person to contact at Marin Water regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

c) **Less than Significant Impact.** During construction, the Project would generate on-site TAC emissions in the form of DPM from the use of heavy-duty, diesel-fueled construction equipment. In order to determine the excess lifetime cancer risk, chronic non-cancer hazard index, and $PM_{2.5}$ concentration that would result from construction of the Project, a screening-level health risk assessment (HRA) was prepared. The analysis evaluated the effect of the construction site emission source where heavy-duty construction equipment would be operated on the maximally exposed individual receptor (MEIR), which was assumed to be a resident located approximately 350 feet southwest of the construction site.

The HRA was prepared following the protocols outlined by the BAAQMD, the CARB, and the Office of Environmental Health Hazard Assessment (OEHHA). Consistent with

guidelines and recommendations from these agencies, the screening-level HRA evaluates the estimated incremental increase in lifetime cancer risks from exposure to DPM emissions, the chronic non-cancer hazard index, and the $PM_{2.5}$ concentration that would result from project-related on-site construction sources at the MEIR. Consistent with this guidance, the receptor at the MEIR location was assumed to be a child in the age group from third trimester fetus to nine years of age that conservatively represents the most sensitive receptor.

The screening-level HRA was conducted using the U.S. EPA AERSCREEN dispersion model (version 16216). AERSCREEN is the screening version of AERMOD (version 19191) and uses worst-case meteorology to predict conservative concentrations at distance increments in any direction from the source, as opposed to a specific location defined be a Cartesian coordinate system. The diesel construction equipment would be used during site preparation, grading, and construction of the two water storage tanks, vault, and pipeline, which would take place over an 0.7-acre area. A conservative representation of the on-site construction equipment within the Project site was modeled as a rectangular area source, based on the site location. The construction site modeling parameters used are as follows:

- Rectangular area source dimensions of 34.98 meters by 50.28 meters;
- Release height of 5.0 meters for construction equipment exhaust;
- Initial vertical dimension of 1.4 meters; and
- Receptor flagpole height of 1.8 meters.

The area sources were modeled with an emission rate of one gram per second to obtain a dispersion factor (unit concentration) at each receptor location. On-site emissions of exhaust PM_{10}, presented in Table AIR-1 under impact discussion b), above, were assumed to represent DPM. The lifetime excess cancer risk was calculated using the resulting DPM concentrations along with equations and factors from the OEHHA 2015 Risk Assessment Guidelines and the BAAQMD HRA Guidelines (OEHHA, 2015; BAAQMD, 2016).

Table AIR-2, below, presents the lifetime excess cancer risk, chronic non-cancer hazard index, and $PM_{2.5}$ concentration at the MEIR location, approximately 350 feet southwest of the project site. As presented in Table AIR-2, the Project would contribute cancer risks of up to 9.1 per million and a non-cancer hazard index of less than 0.01 for the MEIR. The Project would also result in a maximum $PM_{2.5}$ concentration of 0.05 $\mu m/m^3$ which would occur in 2022. The lifetime excess cancer risk, chronic non-cancer hazard index, and annual average $PM_{2.5}$ concentration associated with construction of the Project would not exceed the applicable BAAQMD thresholds of significance; and the impact from construction would be considered less than significant**.**

TABLE AIR-2
MODELED MAXIMUM EXCESS LIFETIME CANCER RISK

Sensitive Receptor	Unmitigated		
	Lifetime Excess Cancer Risk (per million)	Chronic Non-Cancer Hazard Index	Maximum Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)
Off-site Residence	9.10	<0.01	0.05
BAAQMD Threshold	10.0	1.0	0.3
Exceeds Threshold?	No	No	No

NOTE: See Appendix B for the Health Risk Assessment calculations.

As discussed above, during operation, the Project would generate emissions from two employee-vehicle round-trips per month for maintenance. These trips would likely be made by gasoline-fueled passenger vehicles that would not result in emissions of DPM that would negatively affect residential receptors in the vicinity of the project site. Therefore, the Project impact with respect to the exposure of sensitive receptors to substantial pollutant concentrations would be less than significant.

d) **Less than Significant Impact.** Odors are generally regarded as an annoyance rather than a health hazard, and an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. People can have different reactions to the same odor. Manifestations of a person's reaction to odors can range from psychological (e.g., irritation, anger, anxiety) to physiological (e.g., circulatory, and respiratory affects, nausea, vomiting, headache). The occurrence and severity of odor impacts depends on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors.

During construction, the use of diesel-powered vehicles and equipment could temporarily generate localized odors; however, any odorous emissions generated from construction of the Project would cease upon project completion and the odor impact would be less than significant.

The BAAQMD CEQA Guidelines identify land uses that have potential to generate continuous odorous impacts and odor complaints during operation. These land uses include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants (BAAQMD, 2017a). The Project would consist of two water storage tanks, and the Project would not include any of the land uses identified by the BAAQMD as common odor sources. Therefore, the Project impact with respect to odor sources from operations would be less than significant.

References

Bay Area Air Quality Management District (BAAQMD), 2016. *Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines*. January 2016. Available at http://www.baaqmd.gov/

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Office of Environmental Health Hazard Assessment (OEHHA), 2015. *Air Toxics Hot Spots Program – Risk Assessment* Guidelines. February 2015. Available at http://oehha.ca.gov/air/hot_spots/hotspots2015.html. Accessed August 2020.

3.2.4 Biological Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
IV. 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 Game 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 Game 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?	☐	☒	☐	☐
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?	☐	☐	☐	☒

Discussion

a) **Less than Significant with Mitigation.** Database searches of the California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) and U.S. Fish and Wildlife Service (USFWS) species list were conducted within a 5-mile radius of the Project site to identify previously reported occurrences of special-status species (See Figure 1) (CDFW, 2021; USFWS, 2021). A reconnaissance-level field survey was conducted by ESA biologists on July 9, 2021, to characterize existing conditions and determine the potential for the occurrence of special-status species. **Table BIO-1** summarizes the potential for special-status species to occur on the Project site. No special-status species were observed during the field visit. Detailed below is a summary of those findings and proposed mitigation measures to reduce potential significant impacts on special-status species to a less than significant level.

TABLE BIO-1
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PINE MOUNTAIN TUNNEL TANKS REPLACEMENT PROJECT AREA

Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
Invertebrates			
Western bumble bee (*Bombus occidentalis*)	--/--	Found in any area with sufficient flowers for nutrition, and underground burrows for nest for the queen.	**Low.** Rocky, forested area has limited suitable habitat for this species.
Monarch butterfly (*Danaus plexippus plexippus*) (overwintering sites)	FC/--	Monarch butterfly breeding and larval habitat is on milkweed plants in open fields and meadows. During winter it stays in colonies in eucalyptus, Monterey cypress and other trees in California and at high altitudes in Mexico.	**Low.** Lack of suitable habitat for wintering monarchs.
California freshwater shrimp (*Syncaris pacifica*)	FE/SE	Shallow pools away from main streamflow. Winter: undercut banks with exposed roots. Summer: leafy branches touching water.	**Absent.** Stream and pool habitat not found on-site.
Amphibians			
California giant salamander (*Dicamptodon ensatus*)	--/SSC	Vernal or temporary pools in annual grasslands, or open stages of woodlands. Typically adults use mammal burrows.	**Absent**. No suitable aquatic habitat present on-site.
California red-legged frog (*Rana draytonii*)	FT/SSC	Streams, freshwater pools, and ponds with overhanging vegetation. Also found in woods adjacent to streams. Requires permanent or ephemeral water sources such as reservoirs and slow-moving streams and pools of >0.5 m depth for breeding.	**Low**. No perennial aquatic habitat on-site or nearby for dispersal.
Foothill yellow-legged frog (*Rana boylii*)	--/SSC	Partly-shaded, shallow streams & riffles with a rocky substrate in a variety of habitats; requires at least some cobble-sized substrate for egg-laying.	**Low**. No suitable aquatic habitat present on-site. Recent occurrence in San Anselmo Creek headwaters 1 mile NW.
Reptiles			
Western pond turtle (*Actinemys marmorata*)	--/SSC	Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation <6,000' in elevation. Require basking area and upland habitat for egg laying (sandy banks and open, grassy fields).	**Low**. No perennial aquatic habitat present on-site or nearby for dispersal.
Birds			
Northern spotted owl (*Strix occidentalis caurina*)	FT/ST	In Marin County, northern spotted owls nest in secondary-growth redwood and fir forests, featuring dense canopy closure of mature trees, abundant logs, standing snags, and live trees with broken tops.	**Present.** Northern spotted owl activity centers throughout watershed, including near Concrete Pipe Rd. and Fairfax-Bolinas Rd.
Burrowing owl (*Athene cunicularia*)	--/SSC	Nests and forages in low-growing grasslands with burrowing mammals.	**Low**. Project area is too forested and steep to provide suitable habitat for this species.
Northern harrier (*Circus cyaneus*)	--/SSC	Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	**Low.** Marsh vegetation not found on-site.
White-tailed kite (*Elanus leucurus*)	--/CFP	Nests in shrubs and trees adjacent to grasslands, forages over grasslands and agricultural lands	**Low.** Project site is forested, but species may nest or forage in vicinity.

TABLE BIO-1 (CONTINUED)
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PINE MOUNTAIN TUNNEL TANKS REPLACEMENT PROJECT AREA

Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
American peregrine falcon (*Falco peregrinus anatum*)	BCC/CFP	Nest consists of a scrape or a depression on rock, cliff or building ledge over an open site.	**Low.** Suitable foraging habitat on-site, but nesting habitat is not present.
Black swift (*Cypseloides niger)*	BCC/SSC	Occur in wide range of habitats, but nest in specialized sites, in forested areas near rivers, often behind waterfalls or on damp cliffs.	**Low.** Species may fly over site but no nesting habitat is present.
California black rail (*Laterallus jamaicensis*)	BCC/ST/CFP	Found in salt, brackish and freshwater marsh with dense vegetation for nesting habitat.	**Absent.** Marsh vegetation not found on-site.
California Ridgway's rail (*Rallus obsoletus obsoletus)*	FE/SE/CFP	Found in salt and brackish marsh with well-defined tidal channels and dense growth of pickleweed; feeds on invertebrates in mud-bottomed sloughs.	**Absent.** Marsh vegetation not found on-site.
Western snowy plover (*Charadrius alexandrines nivosus*)	FT/SSC	Sandy beaches, salt pond levees & shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	**Absent.** Sandy, gravelly soil habitat not found on-site.
Salt-marsh common yellowthroat (*Geothylpis thrichas sinuosa*)	--/SSC	In brackish and saline tidal marsh habitat around San Francisco Bay, associated with a high percent cover of rushes (*Scirpus* spp.), Peppergrass (*Leipidium latifolium*), and *Juncus spp.*	**Absent.** Marsh vegetation not found on-site.
Bank swallow (*Riparia riparia*)	--/ST	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	**Absent.** Suitable bank habitat not found on-site.
Salt-marsh common yellowthroat (*Geothlypis trichas sinuosa*)	BCC/SSC	Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	**Absent.** Marsh vegetation not found on-site.
San Pablo song sparrow (*Melospiza melodia samuelis*)	BCC/SSC	Inhabits tidal sloughs in the *Salicornia* marshes; nests in *Grindelia* bordering slough channels.	**Absent.** Marsh vegetation not found on-site.
California least tern (*Sternula antillarum browni*)	FE/SE	Nest on beaches, mudflats, and sand dunes, usually near shallow estuaries and lagoons with access to open ocean.	**Absent.** Suitable beach and dune habitat is not present on-site.
Mammals			
Pallid bat (*Antrozous pallidus*)	--/SSC	Grasslands, shrublands, woodlands, and forests. Common in arid regions with rocky outcroppings, particularly near water. Roosts in rock crevices, buildings, and under bridges; may also roost in trees. Very sensitive to disturbance.	**Moderate**. May forage over site, but suitable roost habitat is limited.
Hoary bat (*Lasiurus cinereus*)	--/--/ WBWG Medium	Prefers open habitats or habitat mosaics, with access to trees for cover & open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths.	**Moderate**. Suitable tree roosting habitat present on-site and in the vicinity.
Townsend's big-eared bat (*Corynorhinus townsendii*)	--/SSC	Montane forests, herbaceous, shrub, and open stages of most habitats with dry, friable soils. Roosts in caves and cave-like settings; sensitive to disturbance.	**Moderate**. May forage over site but suitable roost habitat not present.

TABLE BIO-1 (CONTINUED)
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PINE MOUNTAIN TUNNEL TANKS REPLACEMENT PROJECT AREA

Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
Salt marsh harvest mouse (*Reithrodontomys raviventris*)	FE/SE/CFP	Pickleweed is primary habitat, but may occur in other marsh vegetation types and in adjacent upland areas. Does not burrow, builds loosely organized nests. Requires higher areas for flood escape.	**Absent.** No marsh vegetation on-site.
American badger (*Taxidea taxus*)	--/SSC	Herbaceous, shrub, and open stages of most habitats with dry, friable soils.	**Low.** Site is steep and rocky, lacking suitable habitat for badger burrows.
Point Reyes mountain beaver (*Aplodontia rufa phaea*)	--/SSC	Burrows in cool, moist, north-facing slopes in moderately dense coastal scrub in Point Reyes.	**Absent.** Project area outside of subspecies' known range.
Plants			
Napa false indigo (*Amorpha californica* var. *napensis*)	--/--/1B.2	Broadleafed upland forest, chaparral, or cismontane woodland. Blooms April - July. Elevation up to 2000 meters.	**High.** Recent CNDDB occurrence about 600 feet from the Project site within mixed evergreen forest.
Bent-flowered fiddleneck (*Amsinckia lunaris*)	--/--/1B.2	Cismontane woodland, valley and foothill grassland, and coastal bluff scrub. Blooms March – June. Elevation up to 500 meters.	**Moderate.** Nearby occurrence from 2002 lacks precise location; Project site contains suitable montane woodland habitat.
Mt. Tamalpais manzanita (*Arctostaphylos montana* subsp. *montana*)	--/--/1B.3	Serpentine chaparral. Blooms February - April. Elevation ranges from 250 – 800 meters.	**Low.** Site lacks serpentine chaparral habitat.
Marin manzanita (*Arctostaphylos virgata*)	--/--/1B.2	Sandstone, granite outcrops in chaparral, and conifer forests. Blooms December - March. Elevation up to 500 meters.	**Low.** Site lacks suitable chaparral habitat.
Coastal marsh milk-vetch (*Astragalus pycnostachyus* var. *pycnostachyus*)	--/--/1B.2	Coastal marshes, seeps, and adjacent sand. Blooms June – September. Elevation up to 150 meters.	**Absent.** Site lacks marsh habitat and is outside species' known distribution.
Thurber's reed grass (*Calamagrostis crassiglumis*)	--/--/2B.1	Mesic coastal scrub, freshwater marshes and swamps. Blooms May - August. Elevation ranges from 10 – 60 meters.	**Absent.** No marsh habitat on-site.
Seaside bittercress *Cardamine angulate*	--/--/2B.1	Wetland-riparian areas in mixed evergreen forest	**Low.** No wetland or riparian habitat on-site.
Lyngbye's sedge *Carex lyngbye*	--/--/1B.1	Found in coastal salt marsh habitat. Blooms April – August.	**Absent.** No marsh habitat on-site.
Tiburon paintbrush (*Castilleja affinis* var. *neglecta*)	FE/ST/1B.2	Open serpentine grassland slopes. Blooms April – June. Elevation ranges from 60 – 400 meters.	**Low.** Site lacks serpentine grassland habitat.
Nicasio ceanothus (*Ceanothus decornutus*)	--/--/1B.2	Open, rocky serpentine slopes and ridges Blooms March – May. Elevation ranges from 235 - 290 meters.	**Low.** Site lacks serpentine slopes and ridges.
Ceanothus masonii *Mason's cceanothus*	--/--/1B.2	Chaparral (openings, rocky, serpentinite). Elevation 230-500 meters. Blooms March – April.	**Low.** Site lacks serpentine chaparral.
Point Reyes bird's-beak (*Chloropyron maritimum* subsp. *palustre*)	--/--/1B.2	Coastal salt marsh. Blooms May – October. Elevation up to 10 meters.	**Absent.** No marsh habitat on-site.

TABLE BIO-1 (CONTINUED)
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PINE MOUNTAIN TUNNEL TANKS REPLACEMENT PROJECT AREA

Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
San Francisco Bay spineflower (*Chorizanthe cuspidata* var. *cuspidata*)	--/--/1B.2	Sand. Blooms April – July. Elevation up to 300 meters.	**Absent.** No sand habitat on-site.
Mt. Tamalpais thistle (*Cirsium hydrophilum* var. *vaseyi*)	--/--/1B.2	Serpentine seeps. Blooms June – September. Elevation ranges from 300 – 450 meters.	**Low.** Site is dry and lacks serpentine.
Round-headed Chinese houses (*Collinsia corymbosa*)	--/--/1B.2	Coastal sand dunes. Blooms April – June. Elevation up to 20 meters.	**Absent.** No sand dunes present on-site.
Western leatherwood (*Dirca occidentalis*)	--/--/1B.2	North or northeastern facing slopes, mixed-evergreen forest to chaparral, generally in fog belt. Blooms November to March. Elevation ranges from 50 – 400 meters.	**Low.** Site lacks chaparral and is outside fog belt.
Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*)	--/--/1B.2	Serpentine. Blooms May - September. Elevation up to 700 meters.	**Low.** Nearby occurrence from 1975; no serpentine habitat on-site.
Minute pocket moss (*Fissidens pauperculus*)	--/--/1B.2	Damp coastal soil within conifer forests. Elevation ranges from 10 - 1024 meters.	**Low.** No suitable soil present on-site
Fragrant fritillary (*Fritillaria liliacea*)	--/--/1B.2	Heavy soils on open hills and fields near the coast. Blooms from February - April. Elevation up to 400 meters.	**Low.** No suitable open coastal habitat present on-site.
Marin checker lily (*Fritillaria lanceolata* var. *tristulis*)	--/--/1B.1	Coastal scrub, prairie and woodland. Blooms February – May. Elevation ranges from 15-150 meters.	**Low.** Forest and non-native grassland on-site provide marginally suitable habitat.
Diablo helianthella (*Helianthella castanea*)	--/--/1B.2	Open, grassy areas. Blooms April – June. Elevation ranges from 60 – 1,300 meters.	**Low.** No suitable open habitat present on-site.
Congested-headed hayfield tarplant (*Hemizonia congesta* subsp. *congesta*)	--/--/1B.2	Grassy sites and marsh edges. Blooms April – November. Elevation up to 560 meters.	**Low.** No marsh habitat on-site.
Marin western flax (*Hesperolinon congestum*)	FT/ST/1B.1	Serpentine grassland. Blooms April – August. Elevation up to 200 meters.	**Low.** Site lacks serpentine soil habitat.
Santa Cruz tarplant (*Holocarpha macradenia*)	FT/SE/1B.1	Clay soils in grassy areas. Blooms June – November. Elevation up to 200 meters.	**Low.** Site lacks clay soil habitat.
Thin-lobed horkelia (*Horkelia tenuiloba*)	--/--/1B.2	Sandy soils within open chaparral. Blooms April – July. Elevation ranges from 50 – 500 meters.	**Low.** Site lacks sandy soil habitat.
Blue coast gilia (*Gilia capitata subsp. chamissonis*)	--/--/1B.1	Coastal sand hills. Blooms April – June. Elevation up to 185 meters.	**Absent.** No sand dune habitat on-site.
Woolly-headed gilia *Gilia capitata ssp. tomentosa*	--/--/1B.1	Coastal bluff scrub, valley and foothill grassland, rocky outcrops, serpentinite. Elevation 10 -220 m. Blooms May – July.	**Low.** Site lack scrub or grassland habitat.
Dark-eyed gilia (*Gilia millefoliata*)	--/--/1B.2	Stabilized coastal dunes. Blooms March – July. Elevation up to 10 meters.	**Absent.** No sand dune habitat on-site.

TABLE BIO-1 (CONTINUED)
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PINE MOUNTAIN TUNNEL TANKS REPLACEMENT PROJECT AREA

Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Project Area
Small groundcone (*Kopsiopsis hookeri*)	--/--/2B.3	Open woodland or mixed conifers, generally on *Gaultheria shallon*, and occasionally on either *Arbutus menziesii* or *Arctostaphylos uva-ursi*. Blooms April – August. Elevation ranges from 120 – 1,435 meters.	**Low.** Host plant species not present on-site.
Tamalpais lessingia (*Lessingia micradenia* var. *micradenia*)	--/--/1B.2	Thin, gravelly soils of serpentine outcrops and roadcuts. Blooms July – October. Elevation from 60 – 305 meters.	**Low.** Serpentine habitat not present on-site. Nearby undated occurrence.
Marsh microseris (*Microseris paludosa*)	--/--/1B.2	Moist grassland and open woodland. Blooms April – June. Elevation up to 300 meters.	**Low.** Moist grassland habitat not present on-site.
Marin County navarretia (*Navarretia rosulata*)	--/--/1B.2	Rocky serpentine areas. Blooms May – July. Elevation from 200 – 600 meters.	**Low.** Serpentine habitat not present on-site.
White-rayed pentachaeta (*Pentachaeta bellidiflora*)	FE/SE/1B.1	Valley grasslands. Blooms March – May. Elevation up to 620 meters.	**Low.** Site lacks suitable grassland habitat.
Hairless popcornflower (*Plagiobothrys glaber*)	--/--/1A	Wet, saline to alkaline soils in valleys and coastal marshes. Blooms March – May. Elevation up to 100 meters.	**Absent.** Presumed extinct in California.
North Coast semaphore grass (*Pleuropogon hooverianus*)	--/ST/1B.1	Wet grassy areas. Blooms March – June. Elevation up to 1,300 meters.	**Low.** No suitable wet grassy habitat on-site
Marin knotweed (*Polygonum marinense*)	--/--/3.1	Coastal salt and brackish marshes, swamps. Blooms April – August. Elevation up to 10 meters.	**Absent.** No marsh habitat on-site.
Tamalpais oak (*Quercus parvula* var. *tamalpaisensis*)	--/--/1B.3	Understory of conifer woodlands. Blooms March – April. Elevation from 100 – 750 meters.	**Low.** Not observed in site tree survey.
Point Reyes checkerbloom (*Sidalcea calycosa* subsp. *rhizomata*)	--/--/1B.2	Freshwater marshes. Blooms May – July. Elevation up to 30 meters.	**Low.** No marsh habitat on-site. Nearby occurrence from “San Anselmo Canyon” dated 1922.
Marin checkerbloom (*Sidalcea hickmanii* subsp. *viridis*)	--/--/1B.1	Dry ridges near coast in serpentine areas. Blooms May – June. Elevation ranges from 50 – 430 meters.	**Low.** No serpentine habitat present on-site
Santa Cruz microseris (*Stebbinsoseris decipiens*)	--/--/1B.2	Open, sandy, shale, or serpentine areas. Blooms April – May. Elevation ranges from 10 – 500 meters.	**Low.** No serpentine habitat present on-site.
Mt. Tamalpais jewelflower (*Streptanthus batrachopus*)	--/--/1B.3	Serpentine barrens and chaparral. Blooms April – July. Elevation ranges from 335 – 670 meters.	**Low.** No serpentine habitat present on-site.
Mt. Tamalpais bristly jewelflower (*Streptanthus glandulosus ssp. pulchellus*)	--/--/1B.2	Dry, open grassland, chaparral, open conifer/oak woodland; occasionally serpentine. Blooms May – August. Elevation ranges from 125 – 670 meters.	**Low.** Recent nearby occurrence, but no serpentine grassland habitat on-site.
Two-fork clover (*Trifolium amoenum*)	FE/--/1B.1	Moist, heavy soils in disturbed areas, coastal bluff scrub, and grassland. Blooms April – June. Elevation ranges from 5 – 415 meters.	**Low.** No suitable moist or coastal scrub habitat present.

TABLE BIO-1 (CONTINUED)
SPECIAL-STATUS SPECIES WITH POTENTIAL TO OCCUR IN THE PINE MOUNTAIN TUNNEL TANKS REPLACEMENT PROJECT AREA

Status Codes:

USFWS (U.S. Fish and Wildlife Service)
- FE = Listed as Endangered by the Federal Government
- FT = Listed as Threatened by the Federal Government.
- FC = Listed as Candidate
- BBC = USFWS Bird of Conservation Concern

CDFW (California Department of Fish and Wildlife)
- SE = Listed as Endangered by the State of California
- ST = Listed as Threatened by the State of California
- CaT = Candidate Threatened by the State of California
- CFP = California Fully Protected species
- SSC = Species of Special Concern
- WBWG = Western Bat Working Group

California Native Plant Society:

List 1A=Plants presumed extinct in California
List 1B=Plants rare, Threatened, or Endangered in California and elsewhere
List 2= Plants rare, Threatened, or Endangered in California but more common elsewhere
List 3= Plants about which more information is needed
List 4= Plants of limited distribution
An extension reflecting the level of threat to each species is appended to each rarity category as follows:
- .1 – Seriously endangered in California
- .2 – Fairly endangered in California
- .3 – Not very endangered in California

Potential to Occur Categories:

Absent = The Project and/or immediate vicinity does not support suitable habitat for a particular species. Project site may be outside of the species' known range.
Low Potential = The Project and/or immediate vicinity only provides limited habitat. In addition, the species' known range may be outside of the Project site.
Moderate Potential = The Project and/or immediate vicinity provides suitable habitat.
High Potential = The Project and/or immediate vicinity provides ideal habitat conditions or the species has been observed.
Present = Species has been recorded within the Project Site or immediate vicinity.

SOURCES: California Department of Fish and Wildlife (CDFW), California Natural Diversity Data Base, 2021, San Rafael, Bolinas, San Geronimo and Novato USGS 7.5 minute quads. Available online at http://dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp; California Native Plant Society, Inventory or Rare, Threatened and Endangered Plants of California, 2021. Available online at http://www.rareplants.cnps.org/; U.S. Fish and Wildlife Service (USFWS), iPac Information for Planning and Conservation. Online database powered by ECOS Environmental Conservation Online System, 2021. Available online at https://ecos.fws.gov/ipac/.

Special-Status Plant Species

Ten special-status plant species are documented within 2 miles of the Project site (**Figure 3-1**). The majority of these plants are restricted to specific habitats (e.g., vernal pools, chaparral or wetlands) which are not found within the Project site. Two special-status plant species listed in Table 3-3 were found to have a moderate or higher potential of occurring on the Project site, Napa false indigo (*Amorpha californica* var. *napensis*) and bent-flowered fiddleneck (*Amsinckia lunaris*). Both these species occur within montane woodland habitat, which is found on the Project site, and both have nearby occurrences in the CNDDB (see Figure 3-1); though the fiddleneck occurrence lacks a precise location (CDFW, 2021).

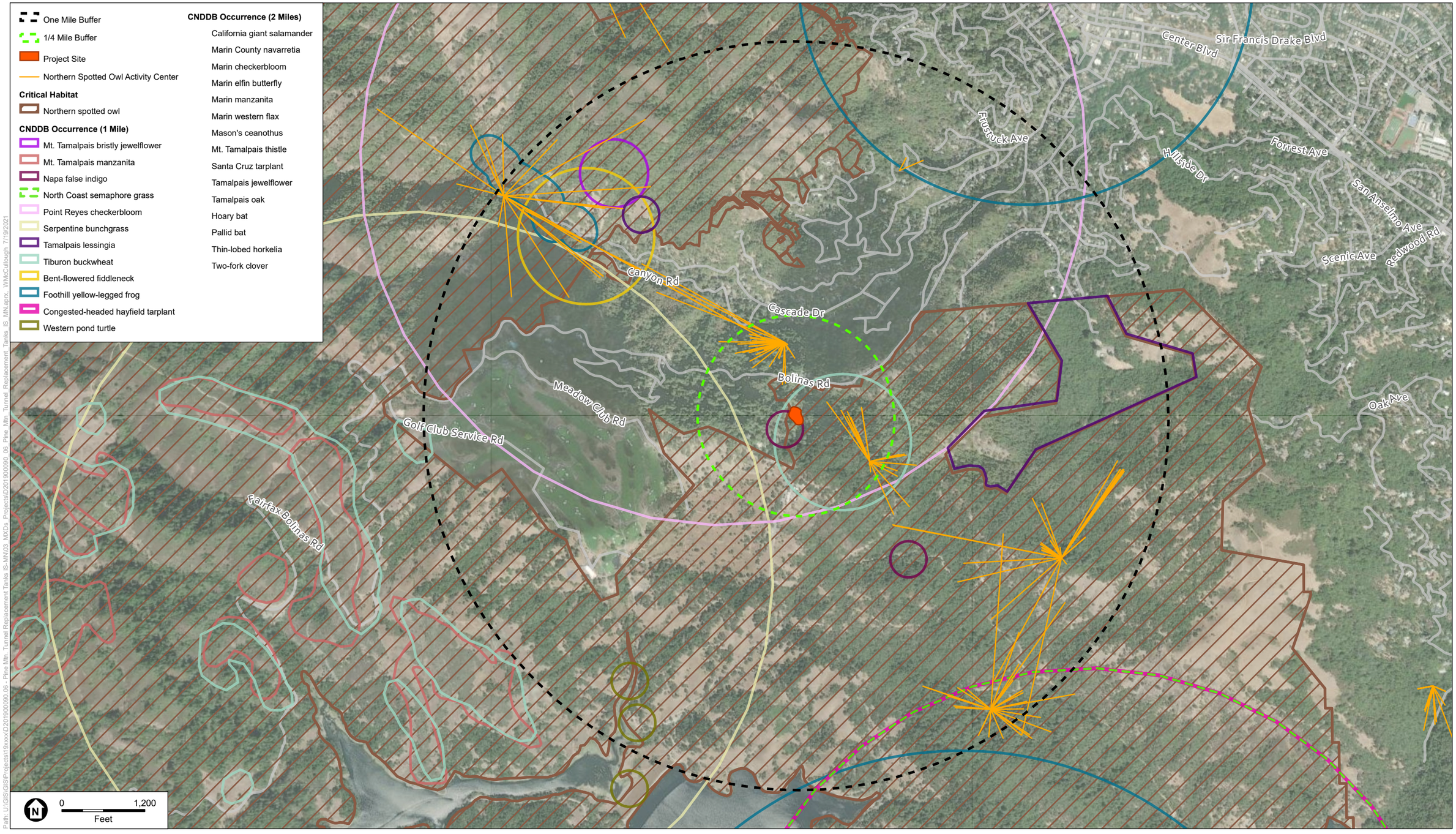
Ground disturbance for installation of the new water tanks, a temporary haul road or a retaining wall could result in the loss, damage, or removal of these special-status plants, if present on the Project site. The staging area does not have potential to host special-status plants, due to high levels of disturbance.

Damage or removal of Napa false indigo, bent-flowered fiddleneck, or other special-status plants due to construction would represent a potentially significant impact. The implementation of **Mitigation Measure BIO-1 (Protection of Rare Plants)** will ensure that potential impacts on special-status plants would be reduced to a less-than-significant level.

> **Mitigation Measure BIO-1: Protection of Rare Plants**. A qualified biologist shall conduct a focused survey for all rare plant species with potential to be present during their suitable blooming period, prior to ground disturbance. If no special-status plants are observed, no further action is required. If special-status plant species, including Napa false indigo or bent-flowered fiddleneck, are observed, the plants will be avoided with a suitable buffer, determined in coordination with CDFW. The buffer zone shall be clearly demarcated using exclusion fencing.
>
> If establishing an avoidance buffer is not feasible, individual plants shall be transplanted to an area with suitable physical and biological conditions outside of the work area, according to a Rare Plant Relocation Plan to be prepared by Marin Water or its contractor and reviewed and approved by CDFW. The Relocation Plan will include regular monitoring and weeding for a period of five years, as well as adaptive management criteria including additional monitoring, weeding, watering, or replanting, if success criteria are not met after the five-year management period.

Special-Status Wildlife Species

Northern spotted owl (NSO) (*Strix occidentalis caurina*) is present throughout the watershed surrounding the Project site. In 2021, one active pair of NSO nested in a stand of mature second-growth redwood approximately 300 feet from the Project site, and another pair nested nearby across Bolinas Road (see Figure 3-1). NSO will nest in different trees from year to year within their territories, known as activity centers. The observed activity centers of nearby pairs are shown on Figure 3-1. Numerous other migratory birds also have potential to nest on or near the Project site.



SOURCE: SanGIS; ESA, 2021.

Pine Mountain Tunnel Replacement Tanks IS-MN

Figure 3-1
CNDDB

ESA

Path: U:\GIS\Projects\19xxxx\D201900090_06 - Pine Mtn. Tunnel Replacement Tanks IS-MN\03_MXDs_Projects\D201900090_06_Pine_Mtn_Tunnel_Replacement_Tanks_IS_MN.aprx WMcCullough 7/19/2021

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In addition to NSO, three bat species have moderate potential to occur on the Project site (Table 3-3): Townsend's big-eared bat (*Corynorhinus townsendii),* pallid bat (*Antrozous pallidus)* and hoary bat (*Lasiurus cinereus)*. Hoary bat and pallid bat have been recorded within two miles of the Project site, are known to occur in Marin County, and may roost in trees. Tree-roosting bat species may be present in tree foliage, under exfoliating bark, or in tree cavities. The Project site is unlikely to host hibernation or maternity roosting sites but may contain night roosts for these special-status and other bat species.

The Project site does not contain suitable habitat for special-status amphibians or reptiles, such as foothill yellow-legged frog (*Rana boylii*) or western pond turtle (*Emys marmorata*), which have been recorded in the vicinity.

Impacts on Migratory Birds and NSO

The Migratory Bird Treaty Act protects nesting birds from direct take, and California Fish and Game Code Sections 3503 and 3503.5 protect migratory birds and their eggs and nests from both direct and incidental take. These protections apply to special-status birds identified in Table 3-3, as well as other birds that may occur at the Project site.

Migratory birds are likely to nest in trees, shrubs, or tall grasses within the Project site. If construction activities or removal and trimming of vegetation are scheduled at the Project site or in other areas (e.g., the staging area) during the bird nesting season (between February 1 and July 31), the implementation of **Mitigation Measure BIO-2a (Protection of Nesting Birds)**, will ensure that potential impacts on nesting birds (other than NSO) would be reduced to a less than significant level.

> **Mitigation Measure BIO-2a: Protection of Nesting Birds.** For construction activities that occur between February 1 and July 31, preconstruction nesting bird surveys shall be conducted by a qualified biologist familiar with bird behavior and knowledgeable of nest types prior to and within 14 days of any initial ground-disturbance activities. Surveys shall be conducted on foot within all suitable nesting habitat within 250 feet for songbirds, and 500 feet for raptors, to the extent access is feasible. If active nests are identified at the time of the survey, a minimum 50-foot radius exclusion zone for songbirds shall be established and flagged. Active raptor or special-status bird nests shall be protected by a buffer with a minimum radius of 250 feet. These distances may be adjusted depending on the level of surrounding ambient activity (i.e., if the Project site is adjacent to a road) and if an obstruction is within line-of-sight between the nest and construction. For bird species that are federally- and/or State-listed sensitive species (i.e., fully protected, endangered, threatened, species of special concern), the Applicant shall consult with the USFWS and/or CDFW regarding modifying nest buffers, prohibiting construction within the buffer, modifying construction, and removing or relocating active nests that are found on the site. Each exclusion zone will remain in place until the nest has successfully fledged or is otherwise inactive as determined by a qualified biologist.
>
> - Survey results are valid for 14 days from the survey date. Should ground disturbance commence later than 14 days from the survey date, surveys will be repeated. If no nesting birds are encountered, then work may proceed as planned.

- After commencement of work, if there is a period of no work activity of 14 days or longer during the bird breeding season, surveys will be repeated to ensure birds have not established nests during inactivity. If new nests are encountered, buffers shall be established.
- Any birds that begin nesting amid construction activities shall be assumed to be habituated to construction-related noise and disturbance levels, and minimum work exclusion zones of 25 feet shall be established around active nests in these cases.

Northern spotted owl (NSO) nest in secondary-growth redwood stands in the Mt. Tamalpais watershed on all sides of the Project site; the Project site is within 500 feet of two NSO pairs' territories, or activity centers (see Figure 3-1).

Construction activities performed during the bird nesting season (February 1 to July 31), especially those that involve the use of mechanized equipment (e.g., grading and excavation), could affect NSO within 0.25-mile of the Project site. The loss or failure of any active nest by direct (i.e., removing vegetation containing a nest) or indirect (nest abandonment caused by construction disturbance), would be a significant impact. Because of the active NSO activity centers in proximity to the Project site, if work in this area is conducted outside of the period from August 1 through January 31, construction could disturb nesting NSO, which would be in a significant impact. Implementation of **Mitigation Measure BIO-2b, Protection of NSO**, would reduce this impact to a less-than-significant level.

> **Mitigation Measure BIO-2b: Protection of NSO.** If construction activities are required at the Project site between February 1 and July 31, NSO surveys will be conducted by qualified NSO biologists following the U.S. Fish and Wildlife Service's (USFWS) Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls (2012). Periodic surveys will be conducted for all pairs within ¼ mile of the site as determined by the NSO biologists, to ascertain whether the pairs are raising young, and when young have fledged. Construction can begin once all young have fledged and are independent of the nest.

Impacts on Bat Species

Three special-status bat species have a moderate potential to occur at the Project site: pallid bat, hoary bat, and Townsend's big-eared bat (see Table BIO-1). These bats inhabit woodlands and forests and may roost in buildings, mines, caves, crevices, tunnels, or beneath tree bark. Bats are nocturnal feeders on insects in flight, generally in the vicinity of water. Large oak trees or redwood trees at the Project site may provide roosting habitat for special-status and common bat species. Removal of large trees as needed to complete the Project could result in injury or disturbance to roosting bats or destruction of occupied roosting habitat, which would be a significant impact.

Implementation of **Mitigation Measure BIO-3: Bat-Safe Tree Removal** would reduce these impacts to a less than significant level.

> **Mitigation Measure BIO-3: Bat-Safe Tree Removal.** A qualified biologist shall conduct a pre-construction survey for special-status bats in advance of tree

trimming to characterize potential bat habitat and identify active roost sites. Should potential roosting habitat or active bat roosts be found in trees to be disturbed, the following measures shall be implemented:

- Trimming or removal of trees shall occur outside of bat maternity roosting season (approximately April 15 to August 15) and outside of months of winter torpor (approximately October 15 to February 28).
- Trimming or removal of trees containing roost sites or potential bat roosting habitat shall be removed using the following two-day phased removal method under supervision of a qualified biologist. Branches and limbs not containing cavities or fissures in which bats could roost shall be cut on the first day, only using chainsaws. Branches or limbs containing roost sites shall be trimmed on the following day, under the supervision of the qualified biologist, also using chainsaws.

b) **No Impact.** The predominant vegetation community on the Project Site is mixed oak forest and woodland and is not considered sensitive by CFDW (Global and State rarity ranks G4 and S4). Predominant tree species on the site include Pacific madrone (*Arbutus menziesii*), coast live oak (*Quercus agrifolia*), black oak (*Quercus kelloggii),* valley oak (*Quercus lobata*), California buckeye (*Aesculus californica*), and California bay (*Umbellularia californica*). The coast redwood (*Sequoia sempervirens*) vegetation community downslope from the Project site (Global and State rarity ranks G3 and S3) is a sensitive natural community and will be avoided by Project design. The ephemeral channels on the Project site do not support riparian habitat; hence, no such habitat would be affected. Impacts on the ephemeral channels are separately discussed under Item c and impacts on trees are discussed under Item e. Thus, there would be no impact on sensitive natural communities from the Project.

c) **Less than Significant with Mitigation**. The Project site contains two ephemeral channels that converge and are culverted beneath Concrete Pipe Road. The channels carry water following storm events and were dry at the time of the survey (July 9, 2021). The combined channel had elements of a defined bed and bank. Although these ephemeral channels would not be considered waters of the U.S., they may be considered jurisdictional to the state and subject to permitting from the Regional Water Quality Control Board, and by CDFW as a streambed. Approximately 200 linear feet of channels would be permanently impacted by installation of the water tanks and retaining wall, would be re-routed outside the Project site, and culverted beneath Concrete Pipe Road to return the flow to the natural channel downstream. All required permits would be obtained by Marin Water following the jurisdictional determination. This impact to potential waters of the state would be significant. The implementation of **Mitigation Measure BIO-4: Habitat Restoration and Monitoring,** will ensure that potential impacts on jurisdictional waters would be reduced to a less-than-significant level.

Figure 3-2
Ephemeral stream on the Project site

Mitigation Measure BIO-4: Habitat Restoration and Monitoring. Marin Water or its contractor shall avoid or minimize impacts on potentially jurisdictional aquatic habitat and project design shall minimize the extent of temporary and permanent loss of such areas. Marin Water or its contractor shall prepare a Habitat Restoration and Monitoring Plan to mitigate for the permanent loss of approximately 200 linear feet of ephemeral drainage on the Project site. The Plan shall address the restoration of jurisdictional waters through the replacement or enhancement of a comparable amount of stream habitat area (i.e., a minimum 1:1 ratio based on linear feet of channel) at an agency-approved location within the watershed. Ephemeral channels that are temporarily impacted by construction-related activity shall be replanted or reseeded with native plants from the watershed, under guidance from a qualified biologist.

The Habitat Restoration and Monitoring Plan shall include protocols for replanting of native vegetation removed prior to or during construction, and management and monitoring of the plants for a five-year period to ensure replanting success. The Plan shall specify monitoring and performance criteria for the species planted, invasive species control criteria, as well as the best time of year for seeding to occur, pursuant to requirements of permits granted for the Project. Appropriate performance standards may include but are not limited to: a 75 percent survival rate of restoration plantings; absence of invasive plant species; and a viable, self-sustaining creek or wetland system at the end of the five-year monitoring period. The Plan shall include adaptive management strategies if success criteria are not being met. The Habitat Restoration and Monitoring Plan will include interim thresholds for replanting success and alternative management approaches, including weed control, supplementary watering, or additional replanting to undertake if performance thresholds are not met.

d) **Less than Significant**. The Project site occupies a small, steep area (less than one acre) within a large, heavily forested open space area on Marin Water's watershed lands. With no existing impediments to wildlife movement in the area, the Project site likely provides occasional movement opportunities for black-tailed deer (*Odocoileus hemionus columbianus*), bobcat (*Lynx rufus*), mountain lion (*Puma concolor*), and other large terrestrial species. Following construction, the Project would not impede the movement of these and other wildlife in the local vicinity, and the large surrounding open space areas would remain available for wildlife passage. The Project would not impact any critical corridors such as riparian habitat and is surrounded by open space on all sides. The site is approximately 500 ft. from Bolinas Road, which represents a partial barrier to wildlife movement. Because the Project site does not connect between habitat areas, there are no substantial wildlife corridor functions to this site. Furthermore, the Project impact area would be small, in relation to larger surrounding high quality wildlife habitat areas within the watershed. Impacts would be less than significant, and no mitigation is required.

e) **Less than Significant with Mitigation.** Marin County Code (Section 22.62.040, the Native Tree Protection and Preservation ordinance) defines protected trees as native trees larger than 6- or 10-inches in diameter at breast height (dbh) depending on the species, and heritage trees as trees greater than 18- or 30-inches dbh also depending on the species. Species covered by the Native Tree Protection and Preservation ordinance include coast live oak, black oak, madrone, coast redwood, valley oak, California bay and other native species (Marin County, undated).

The Project site contains numerous mature black oak, coast live oak, and bay trees that meet Marin County's definition of protected or heritage trees. A recent tree survey by Marin Water (June 30, 2021) identified 15 heritage coast live oaks and 10 heritage black oaks in the vicinity of the site. Because Marin Water is a municipal utility, it is exempt from the Native Tree Protection and Preservation ordinance. However, Marin Water strives to be consistent with the performance standards embodied in the ordinance wherever feasible.

Because the Project design has not been finalized, the number of trees proposed for removal has not yet been identified. If trees proposed for removal qualify as protected or heritage native species pursuant to the County tree ordinance described above, Marin Water will make a good-faith effort to comply with County code requirements, including tree replacement, sheltering existing trees within the watershed to meet tree protection guidance, or payment of an in-lieu fee to the County; or a combination of these strategies, according to **Mitigation Measure BIO-5, Minimize Impacts on Heritage Trees** below.

Adherence to County code tree removal/replacement performance standards wherever feasible would reduce the impact of tree removal to a less-than-significant level.

> **Mitigation Measure BIO-5: Minimize Impacts on Heritage Trees.** Prior to start of construction, Marin Water shall determine whether any heritage or protected trees are to be removed and minimize impacts on retained heritage trees. For heritage or protected trees removed from the Project area, tree

replacement shall be provided through one or more of the following options, consistent with the County Native Tree Protection and Preservation ordinance:

- Heritage and protected trees shall be replaced at an alternative site within the watershed on a 3:1 basis using 15-gallon trees (i.e., three 15-gallon trees will be planted for every tree removed). Heritage and protected trees shall be replaced with a tree of the same species wherever possible. Alternative species to the removed tree may be planted if more appropriate to the environmental conditions at the identified mitigation site.
- Plantings shall receive forage protection using a rigid tree tube, receive regular (i.e., bi-annual) weeding, weed mat/and or appropriate mulching, and may be subject to supplemental watering during an initial 2-year establishment period. Regular (e.g., bi-annual) monitoring shall be performed to review the vigor of plantings and provide maintenance as needed.
- As an alternative to planting trees, Marin Water may "shelter" native volunteer tree seedlings within the watershed on a 3:1 basis, with preference given to species and areas where the recruitment of young trees is problematic (e.g., some oak species) due to grazing or other factors. Plantings shall receive protection, maintenance, and watering as described above for heritage tree replacement plantings.
- As a third alternative to compensate for some or all removed heritage and protected trees, Marin Water may contribute to an in-lieu payment program in the amount of $500.00 per replacement tree to the Tree Preservation Fund managed by the Marin County Parks and Open Space Department for planting, maintenance, and management of trees and other vegetation.
- If replacement trees do not thrive 5 years following planting or sheltering, Marin Water may either replace unsuccessful trees using the methods described above; or contribute funds to the Tree Preservation Fund to meet the initial tree protection standard (i.e., 3:1).

Retained heritage and protected trees on the Project site shall be identified as preserved on site plans and clearly delineated by construction netting, which will remain in place for the duration of all work. To the extent possible, if site work must encroach upon the dripline of a preserved heritage or protected tree, excavation will be performed in a manner that causes only minimal root damage. The following will not occur within the dripline of any retained tree: parking; storage of vehicles, equipment, machinery, stockpiles of excavated soils, or construction materials; or dumping of oils or chemicals.

f) **No Impact.** There are no adopted Habitat Conservation Plans, Natural Conservation Community Plans, or other approved local, regional, or state habitat conservation plans that apply to the Project site. Therefore, no impact would occur.

References

California Department of Fish and Wildlife (CDFW), 2021. California Natural Diversity Data Base (CNDDB). https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data

California Native Plant Society (CNPS). 2021. Inventory or Rare, Threatened and Endangered Plants of California. http://www.rareplants.cnps.org/

Marin County, undated. Tree Removal Permit Fact Sheet. https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/factsheets/treeremoval_fs.pdf

Marin Water, June 30, 2021. Tree Survey of Project Tank Site on Concrete Pipe Road.

U.S. Fish and Wildlife Service (USFWS). 2021. Information for Planning and Conservation. USFWS Official Species List. https://ecos.fws.gov/ipac/

USFWS. 2012. Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls. https://www.fws.gov/yreka/ES/2012RevisedNSOprotocol-2-15-12.pdf

Xerces Society, 2018. Petition to the California State Fish and Game Commission. https://nrm.dfg.ca.gov/FileHandler.ashx

3.2.5 Cultural Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
V. CULTURAL RESOURCES — Would the project:				
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?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

Cultural resources staff with Environmental Science Associates (ESA) conducted a records search at the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS) on June 5, 2020 (File No. 19-2101) and June 29, 2021 (File No. 20-2666). The records searches included reviews of cultural resources and studies in the Project vicinity. The purpose of the records searches was to: (1) determine whether known cultural resources have been recorded within the Project site or a 0.5-mile radius; (2) assess the likelihood of unrecorded cultural resources based on historical references and the distribution of nearby sites; and (3) develop a context for the identification of historical themes.

ESA also reviewed the Built Environment Resources Directory (BERD) for Marin County, which contains information on resources of recognized historical significance—including those evaluated for listing in the National Register of Historic Places (National Register), the California Register of Historical Resources (California Register), the California Inventory of Historical Resources, California Historical Landmarks, and California Points of Historical Interest. Historic maps and aerial imagery were also examined.

Based on the NWIC records searches, there are no previously recorded cultural resources within the Project site. Two previous cultural resources studies completed for the Marin Water Biodiversity, Fire, and Fuels Integrated Plan did not identify any cultural resources in the Project site or nearby vicinity (Beard and Origer, 1995; Kent, 2012). The nearest cultural resource is a culturally-modified bedrock outcrop with a petroglyph, possibly representing a vulture (designated as P-21-000701). The resource is approximately 1.2 miles to the northwest of the Project site.

ESA completed a surface survey of the Project site on July 9, 2021. All areas of proposed ground disturbance were walked in narrow transects to provide an overall assessment of existing conditions. The Project site is undeveloped and surrounded by woodland and exposed bedrock from previous quarrying activities. The Project site is on a roughly 40-degree slope that extends steeply downward from west to east. All exposed bedrock was inspected for cultural modifications. No cultural materials or other evidence of past human use or occupation was identified within the Project site or associated staging area at Bullfrog Quarry.

Discussion

a) **Less than Significant Impact.** CEQA Guidelines Section 15064.5 requires the lead agency to consider the effects of a project on historical resources. A historical resource is defined as any building, structure, site, or object listed in or determined to be eligible for listing in the California Register, or determined by a lead agency to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California. The following discussion focuses on architectural and structural resources. Archaeological resources, including those that are potentially historical resources according to CEQA Guidelines Section 15064.5, are addressed below under issue b).

As a result of the records search, background research, and a site survey, it was determined that no historical resources are present within the Project site. As such, there are no architectural or structural resources on the Project site that qualify as historical resources, as defined in CEQA Guidelines Section 15064.5, and there would be no impact on historical resources.

b) **Less than Significant Impact with Mitigation.** CEQA Guidelines Section 15064.5 requires the lead agency to consider the effects of a project on archaeological resources. A significant impact would occur if a project would cause a substantial adverse change to an archaeological resource through physical demolition, destruction, relocation, or alteration of the resource.

As a result of the records search, background research, and a site survey, it was determined that no known archaeological resources are present within the Project site. Based on the survey results and environmental context, there is a low potential that unknown archaeological resources could be discovered during Project implementation.

In the unlikely event that a previously unrecorded archaeological resource is identified during Project ground-disturbing activities and found to qualify as a historical resource or a unique archaeological resource, any impacts on the resource resulting from the Project could be potentially significant.

Implementation of **Mitigation Measure CUL-1: Cultural Resources Awareness Training and Inadvertent Discovery of Archaeological Resources or Tribal Cultural Resources** would reduce potentially significant impacts to **less than significant**. In the event of an inadvertent discovery of an archaeological or tribal cultural resource, this mitigation will ensure that work is halted in the vicinity until a qualified archaeologist can make an assessment and provide additional recommendations if necessary, including contacting Native American tribes.

> **Mitigation Measure CUL-1: Cultural Resources Awareness Training and Inadvertent Discovery of Archaeological Resources or Tribal Cultural Resources.** Prior to authorization to proceed, a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archeology, will conduct a training program for all construction and field workers involved in site disturbance. On-site personnel

shall attend a mandatory pre-Project training that will outline the general archaeological sensitivity of the area and the procedures to follow in the event an archaeological resource and/or human remains are inadvertently discovered.

If pre-contact or historic-era archaeological resources are encountered during Project implementation, all construction activities within 100 feet shall halt, and a qualified archaeologist shall inspect the find within 24 hours of discovery and notify Marin Water of the initial assessment. Pre-contact archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-era materials might include building or structure footings and walls, and deposits of metal, glass, and/or ceramic refuse.

If Marin Water determines, based on recommendations from a qualified archaeologist and a Native American representative (if the resource is pre-contact indigenous related), that the resource may qualify as a historical resource or unique archaeological resource (as defined in CEQA Guidelines Section 15064.5) or a tribal cultural resource (as defined in Public Resources Code [PRC] Section 21080.3), the resource shall be avoided if feasible. Consistent with Section 15126.4(b)(3), this may be accomplished through planning construction to avoid the resource, incorporating the resource within open space, capping and covering the resource, or deeding the site into a permanent conservation easement.

If avoidance is not feasible, Marin Water shall consult with appropriate Native American tribes (if the resource is pre-contact indigenous related), and other appropriate interested parties to determine treatment measures to avoid, minimize, or mitigate any potential impacts to the resource pursuant to PRC Section 21083.2, and CEQA Guidelines Section 15126.4. This shall include documentation of the resource and may include data recovery (according to PRC Section 21083.2), if deemed appropriate, or other actions such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to PRC Section 21084.3).

c) **Less than Significant Impact with Mitigation.** The records search and background research determined that no human remains are known to exist within the Project site. Therefore, the Project is not anticipated to impact human remains, including those interred outside of formal cemeteries.

While unlikely, if any previously unknown human remains were encountered during ground-disturbing activities, impacts on the human remains resulting from the Project could be potentially significant.

Implementation of **Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains** would reduce potentially significant impacts to less than significant. This measure shall comply with applicable state laws, including Section 7050.5 of the Health and Safety Code. This would require work to halt in the vicinity of a find and the immediate notification of the County coroner. If the coroner determines that the human remains are Native American, they will notify the California Native American Heritage

Commission (NAHC), who shall appoint a Most Likely Descendant (PRC Section 5097.98).

Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains. If potential human remains are encountered, all work will halt within 100 feet of the find and Marin Water will be contacted by on-site construction crews. Marin Water will contact the Marin County coroner in accordance with PRC Section 5097.98 and Health and Safety Code Section 7050.5. If the coroner determines the remains are Native American, the coroner will contact the NAHC. As provided in PRC Section 5097.98, the NAHC will identify the person or persons believed to be the Most Likely Descendant (MLD). The MLD will make recommendations for the means of treating, with appropriate dignity, the human remains and any associated grave goods, as provided in PRC Section 5097.98.

References

Beard, Vicki, and Tom Origer, *A Cultural Resources Study for the Mount Tamalpais Vegetation Management Project, Marin County, California.* Prepared for MMWD, July 1995.

Kent, Julian, *An Archaeological Survey Report for the MMWD VMP*, Marin County, California. Prepared for MMWD, June 2012.

Northwest Information Center (NWIC). 2020. California Historical Resources Information System Database Search. File No. 19-2101, June 5, 2020. Confidential files at ESA.

NWIC, 2021. California Historical Resources Information System Database Search. File No. 20-2666, June 29, 2021. Confidential files at ESA.

3.2.6 Energy

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. 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?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

Discussion

a) **Less than Significant Impact.** Use of energy resources necessary to construct the Project would consist of fuel consumed by heavy equipment and vehicles used during construction. Fuel-use would be limited to that which is essential to excavation, building construction, and hauling for construction of the Project. Construction activity would be required to comply with all state and local requirements designed to minimize idling and associated energy use, including Title 13, Section 2485 of the California Code of Regulations, and Title 13, Section 2449 of the California Code of Regulations, which limits idling of commercial vehicles over 10,000 pounds and off-road equipment over 25 horsepower to two minutes. Due to the temporary nature of construction activity, and the Project's compliance with state and local energy efficiency requirements, construction of the Project would not result in a significant impact with respect to wasteful, inefficient, or unnecessary consumption of energy resources during project construction.

The Project would also result in long-term fuel use from two employee trips per month for maintenance. No electricity or pumps would be required for operations of the Project. Operational energy use associated with vehicle trips would not represent a significant regional net increase in fuel use, as the number of trips would be minimal. Furthermore, fuels used for vehicle trips resulting from the Project would be required to comply with the CAFE fuel economy standards, which would result in more efficient use of transportation fuels (lower consumption).

Overall, construction and operation of the Project would not result in a significant increase in energy use and energy use would not be conducted in a manner that would be wasteful, inefficient, or unnecessary. Therefore, impacts associated with increases in energy consumption would be less than significant and no mitigation is recommended.

b) **Less than Significant Impact.** The Project does not include any energy infrastructure; and, as discussed above, it would comply with state regulations including Title 13 idling limits during construction, and CAFE fuel economy standards that would result in increased energy efficiency. There would be no conflict with state or local plans for renewable energy or energy efficiency. Therefore, the Project would result in a less-than-significant impact and no mitigation is recommended.

3.2.7 Geology and Soils

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
VII. 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 Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) 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[3] 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?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐

Discussion

a.i) **No Impact**. The State Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) prohibits the development of structures for human occupancy across active fault traces. Under this Act, the California Geological Survey (CGS) has established "Zones of Required Investigation" on either side of an active fault that delimits areas susceptible to surface fault rupture. The zones are referred to as Earthquake Fault Zones (EFZs) and are shown on official maps published by the CGS (CGS, 2020). Surface rupture occurs when the ground surface is broken due to a fault movement during an earthquake; typically, these types of hazards occur within 50 feet of an active fault.

The Project site does not lie within any mapped EFZs according to the available data (CGS, 2020). Although the area could be affected by earthquakes or seismic ground shaking, there are no current data available indicating the presence of active faults within

[3] The CBC, based on the International Building Code and the now defunct Uniform Building Code, no longer includes a Table 18-1-B. Instead, Section 1803.5.3 of the CBC describes the criteria for analyzing expansive soils.

the Project site. The nearest EFZ is the San Andreas fault zone, approximately 5.8 miles to the southwest of the Project site. The Project does not include any habitable structures and would not expose people or structures to potential substantial adverse effects associated with rupture of a known earthquake fault. There would be no impact related to surface fault rupture.

a.ii) **Less than Significant**. The Project site is located in a historically seismically active region of California. The 2014 Working Group on California Earthquake Probabilities[4] (WGCEP) concluded that there is a 72 percent probability that a magnitude (M_W) 6.7 earthquake or higher will strike the San Francisco Bay Area before the year 2045 (Field et al., 2015). As discussed above, there are no known faults that intersect the Project site (CGS, 2010); however, there are three significant fault systems in the region: The San Andreas, Hayward, and Rogers Creek fault zones (CGS, 2010). The closest of these fault systems is the San Andreas fault zone, approximately 5.8 miles southwest of the Project site. According to the WGCEP, there is a 33 percent probability that an earthquake of magnitude 6.7 or greater, could occur over the next 30 years in the northern section of the San Andreas fault zone; as modeled by the United States Geological Survey (USGS) ShakeMap (USGS, 2016), with violent to severe ground shaking expected.

The Project site may be subject to potentially violent to severe seismic ground shaking due to the Project site's proximity to the San Andreas fault zone. Strong seismic ground shaking occurring at the Project site could result in potential damage to the proposed tanks and potential adverse effects to the surrounding residences.

The Project would be subject to the seismic design criteria of the California Building Code (CBC), which requires that all improvements be constructed to withstand anticipated ground shaking from regional fault sources. Prior to the issuance of grading permits, the Applicant would be required to retain a licensed geotechnical engineer to design the Project components to withstand probable seismically induced ground shaking. All construction on-site would adhere to the specifications and procedures contained in the final design-level geotechnical report, which would be fully compliant with the seismic recommendations of a California-registered, professional geotechnical engineer in accordance with the CBC. Adherence to the applicable CBC requirements would ensure the Project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts would be less than significant.

a.iii) **Less than Significant**. Liquefaction is a phenomenon in which unconsolidated, water saturated sediments become unstable because of strong seismic shaking. During an earthquake, these sediments can behave like a liquid, potentially causing severe damage to overlying structures. Lateral spreading is a variety of minor landslide that occurs when unconsolidated liquefiable material breaks and spreads because of gravity, usually down

[4] Also referred to as WGCEP 2014, this is a working group comprised of seismologists from the U.S. Geological Survey (USGS), California Geological Survey (CGS), Southern California Earthquake Center (SCEC), and California Earthquake Authority (CEA).

gentle slopes. Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore-pressure buildup or liquefaction in a shallow underlying deposit during an earthquake. The occurrence of this phenomenon is dependent on many complex factors, including the intensity and duration of ground shaking, particle-size distribution, and density of the soil.

The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving, and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (i.e., pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table, resulting in settlement of and possible damage to overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). Lateral spreading can move blocks of soil, placing strain on buried pipelines that can lead to leaks or pipe failure.

Geologic mapping by Blake Jr. et al. indicates that the deposits underlying the Project site are composed entirely of mélange[5] from the Franciscan Complex (Blake Jr. et al., 2000a). While mélange—in a geologic context—typically refers to deposits that are a mix of different rock types, the mélange described by Blake Jr. et al. consists of a mixture of shale and sandstone containing inclusions of greenstone, chert, graywacke (a variety of sandstone), serpentinite, and other metamorphic rocks (Blake Jr. et al., 2000b). As liquefaction-prone soils are typically loose and sandy soils, the deposits underlying the Project site are not likely to be subject to earthquake-induced liquefaction. Additionally, the Liquefaction Susceptibility map compiled by Witter et al., although small in scale (shows less detail), indicates that the Project site is within an area of low liquefaction susceptibility (Witter et al., 2006).

As noted above, the Applicant is required to design the proposed storage tanks in accordance with applicable CBC seismic design standards as recommended by a California-registered professional geotechnical engineer in the site-specific geotechnical review. As part of the final design-level geotechnical report identified in Impact a.ii, consistent with building code seismic design standards, the licensed geotechnical engineer would be required to consider potential liquefaction in the final design plans. Liquefaction hazards can generally be addressed through site preparation measures or foundation design measures such as removal and replacement of liquefiable soils, densification of these soils, or specific foundation design recommendations. Implementation of these measures in accordance with building code requirements can effectively reduce the hazard to minimize any potential for substantive damage.

Compliance with CBC requirements, including implementation of recommendations provided in the final design-level geotechnical report, and local agency enforcement

[5] A mélange is a mappable body of rock characterized both by the lack of internal continuity of contacts or strata and by the inclusion of fragments and blocks of all sizes, both exotic and native, embedded in a fragmented matrix of finer-grained material (Raymond, 2019).

would reduce or avoid impacts related to ground failure, including liquefaction. Project construction would not directly or indirectly result in adverse effects related to ground failure, including liquefaction, and the impact would be less than significant.

a.iv) **Less than Significant**. Landslides are one of the various types of downslope movements in which rock, soil, and other debris are displaced due to the effects of gravity. The potential for material to detach and move down slope depends on multiple factors including the type of material, water content, and steepness of terrain.

The deposits underlying the Project site are mapped as mélange from the Franciscan Complex, which is generally considered to be an unstable soil type and prone to slope failure (Wakabayashi, 2008). Geologic mapping supports this conclusion, as there are several historical landslides mapped in the region within similar mélange deposits (Blake Jr. et al., 2000a). The construction of the proposed water tanks would include clearing, grading, and excavation of the hillside to accommodate the proposed water tanks. Clearing for the Project would include the removal of several trees within the Project site; further, it is well-documented that tree removal exacerbates the landslide potential of a given area (Runyan & D'Ordirico, 2014; Cimini et al., 2016). Due to the susceptibility of mélange deposits to become unstable, coupled with the planned construction activities, including tree removal, the risk of landslides caused by Project construction or earthquake-induced landslides is possible. If appropriate structural and geotechnical engineering measures are not included in the design of the water tanks, this would be a significant impact.

As stated in Impact a.ii, the final design-level geotechnical report would include design requirements that would inform the structural and geotechnical engineering of the water tanks, as required by the CBC. Implementation of these measures in accordance with building code requirements can effectively reduce any potential hazard associated with earthquake-induced landslides.

Compliance with CBC requirements, including implementation of recommendations provided in the final design-level geotechnical report would reduce or avoid impacts related to landslides. Project construction would not directly or indirectly result in adverse effects related to landslides, and the impact would be less than significant.

b) **Less than Significant with Mitigation Incorporated**. During construction of the two water storage tanks, the Project would include ground-disturbing activities that could increase the risk of erosion or sediment transport, if not managed appropriately. Project construction would involve grading steep slopes and could result in soil erosion during excavation, grading, and soil stockpiling. Additionally, the excavation spoils that would be hauled to Bullfrog Quarry would be exposed to the elements and would be subject to erosion. As discussed in Section 2.5, *Project Construction*, construction activities would only occur from August through January in each of the Project's construction years to avoid conflicts with the Northern Spotted Owl nesting season. This scheduling means that construction activities would coincide with the Bay Area rainy season, which could potentially exacerbate soil erosion and sedimentation at the site.

As described in Section 2.4, *Proposed Project*, two naturally occurring drainages between Sky Oaks Road and Concrete Pipe Road would be re-routed around the new tanks, one or two new culverts would be constructed under Concrete Pipe Road, and storm flows would be discharged back into the natural drainage below the Project site. This component of the Project design would reduce any potential impacts associated with erosion and sedimentation.

For projects that would include soil disturbance during construction, and that would be subject to building and grading permits, the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) requires the preparation and submittal of an erosion and sediment control plan (ESCP), which would identify best management practices (BMPs) to control stormwater from construction works sites and to prevent disturbed soils from moving off-site. The BMPs may include, but are not limited to, physical barriers to prevent erosion and sedimentation; construction of sedimentation basins; limitations on work periods during storm events; use of infiltration swales; protection of stockpiled materials; and other measures identified by a qualified preparer that would substantially reduce or prevent erosion from occurring during construction.

As described in Chapter 2, *Project Description*, Marin Water would require the implementation of standard construction practices and BMPs for the contractor selected to construct the project. As noted in Marin Water Standards for Environmental Protection (see Appendix A), an environmental protection plan would also be required. Additional measures would be implemented consistent with Marin Water Standards for Erosion and Sediment Transport and Control.

Additionally, a Storm Water Pollution Prevention Plan (SWPPP) would be developed and implemented as part of the Project in accordance with a National Pollutant Discharge and Elimination System (NPDES) General Permit for Stormwater Discharge Associated with Construction and Land Disturbance Activities (Construction General Permit). This plan would include Best Management Practices (BMPs) designed to control and reduce soil erosion. The BMPs may include dewatering procedures, storm water runoff quality control measures, watering for dust control, and the construction of silt fences, as needed.

To further ensure that erosion and sedimentation is controlled at the Project site during construction, **Mitigation Measure HYD-1**: **Water Control, Drainage, and Discharge Plan** would be implemented. As discussed in Section 3.2.10, *Hydrology and Water Quality*, Mitigation Measure HYD-1 would include measures to prevent erosion, scouring of bank, nuisance, contamination, and otherwise limit excess sedimentation (please refer to Section 3.2.10, *Hydrology and Water Quality* for detailed description).

Compliance with Mitigation Measure HYD-1, the SWPPP, the MCSTPPPs ESCP, and implementation of the included soil and erosion control measures would ensure that impacts related to erosion and soil loss would be less than significant.

c) **Less than Significant**. As discussed in Impact a.iii, the Project site is in an area of low liquefaction susceptibility; this conclusion is supported by an understanding of the under

lying geology and the Liquefaction Susceptibility map for the Bay Area. However, as discussed in Impact a.iv, the Project site is in an area that is susceptible to landslides; this conclusion is supported by research that indicates mélange from the Franciscan Complex is susceptible to landslides, coupled with the activities associated with Project construction, include tree removal from the Project site.

Impacts a.iii and a.iv both conclude that compliance with the engineering designs included in the final design-level geotechnical report and the requirements of the CBC would reduce any potential hazards associated with liquefaction, landslides, and other hazards associated with unstable soils; therefore, this impact would be considered less than significant.

d) **Less than Significant**. Expansive soils are soils that possess a "shrink-swell" characteristic. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying; the volume change is reported as a percent change for the whole soil. This property is measured using the coefficient of linear extensibility (COLE) (NRCS, 2017). The Natural Resources Conservation Service (NRCS) relies on linear extensibility measurements to determine the shrink-swell potential of soils. If the linear extensibility percent is more than 3 percent (COLE=0.03), shrinking and swelling may cause damage to building, roads, and other structures (NRCS, 2017). NRCS Web Soil Survey data indicates the soil underlying the Project site has a 1.5 percent linear extensibility rating, which is considered a low linear extensibility rating (NRCS, 2020).

Based on the available data from the Web Soil Survey, the risk of encountering expansive soils at the Project site is low and would likely not affect the construction of the proposed water tanks. Although Web Soil Survey data suggests that expansive soils at the Project site would not be an issue, CBC would still require the preparation of a final, design-level geotechnical report, which would include soil testing. If these investigations find expansive soils at the Project site, the report will include recommendations to ensure that any structural impacts resulting from expansive soils on-site would be avoided, removed, or engineered to be suitable. Adherence to the requirements of the CBC and geotechnical investigation would avoid impacts resulting from potentially expansive soils on the Project site. The Project would not create substantial direct or indirect risks to life or property related to expansive soils, and impacts would be less than significant.

e) **No Impact**. The Project would not include the use of septic tanks or alternative waste water disposal system; and therefore, would not require the use of soils that are adequate for supporting such systems. There would be no impact associated with the Project having adequate soils for septic tanks or alternative waste water disposal systems.

f) **Less than Significant**. Paleontological resources are the fossilized remains of plants and animals, including vertebrates (animals with backbones; mammals, birds, fish, etc.), invertebrates (animals without backbones; starfish, clams, coral, etc.), and microscopic plants and animals (microfossils), and can include mineralized body parts, body

impressions, or footprints and burrows. They are valuable, non-renewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived. A significant impact would occur if a project would destroy a unique paleontological resource or site, or a unique geologic feature.

In its "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources," the Society of Vertebrate Paleontology (SVP) defines four categories of paleontological potential for rock units: high, low, undetermined, and no potential: **High Potential**, rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources; **Low Potential**, rock units that are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule; **Undetermined Potential**, rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment; and **No Potential**, rock units like high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites) that will not preserve fossil resources (SVP, 2010).

The Project site is mapped entirely within late Jurassic to early Cretaceous-age mélange of the Franciscan Complex (Blake Jr. et al., 2000a). Fossils in the Franciscan Complex are rare, but key microfossils, trace fossils, and occasional macrofossils (late Jurassic-age marine reptiles) have been discovered and found to be scientifically significant (Sub Terra Consulting, 2017).

The University of California Museum of Paleontology (UCMP) online fossil locality database contains records of three invertebrate fossil localities in Marin County (UCMP, 2021); one such fossil locality is recorded from the town of Corte Madera[6], approximately 5 miles southeast of the Project site (UCMP, 2021). While the microfossils and trace fossils have contributed to scientific study, these types of fossils are relatively common and have been studied extensively and would not be considered significant in this context. Furthermore, although vertebrate fossils are considered to be significant paleontological resources, their presence in the Franciscan Complex is exceedingly rare and are not expected to be found during Project construction. Taking this into consideration, the deposits underlying the Project site are considered to have a low potential to contain significant paleontological resources and impacts to significant paleontological resources and/or unique geological formation would be less than significant.

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3.2.8 Greenhouse Gas Emissions

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS — Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Greenhouse gases (GHGs) trap heat by preventing some of the solar radiation that hits the Earth from being reflected back into space. Some GHGs occur naturally and are needed to keep the earth's surface habitable. Over the past 100 years, human activity has substantially increased the concentration of GHGs in our atmosphere. This has intensified the greenhouse effect, increasing average global temperatures, and resulting in climate change.

Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are the principal GHGs associated with water infrastructure projects. CO_2, CH_4, and N_2O occur naturally and through human activity. Emissions of CO_2 are largely by-products of fossil fuel combustion, and CH_4 results from off-gassing associated with agricultural practices and landfills.

CO_2 is the reference gas for climate change because it is the predominant GHG emitted. The effect that each of the aforementioned gases can have on global warming is a combination of the mass of their emissions and their global warming potential (GWP). GWP indicates on a pound-for-pound basis, how much a gas contributes to global warming relative to how much warming would be predicted to be caused by the same mass of CO_2. CH_4 and N_2O are substantially more potent GHGs than CO_2, with 100-year GWPs of 25 and 298 times that of CO_2, respectively (CARB, 2021).

In emissions inventories, GHG emissions are typically reported in metric tons of CO_2 equivalents (MT CO_2e). CO_2e is calculated as the product of the mass emissions of a given GHG and its specific GWP. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in such vastly greater quantities that it accounts for the majority of GHG emissions in CO_2e.

Discussion

a) **Less than Significant Impact.** The Project is located in Marin County, which falls under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Although the BAAQMD has not adopted thresholds of significance for construction emissions, it has adopted a threshold of significance for operational emissions for projects other than stationary sources that is 1,100 MT CO_2e per year, in line with the goal of Assembly Bill (AB) 32 to reduce emissions 20 percent below 1990 levels by the year 2020. Since the horizon year of 2020 for AB 32 has already passed, this BAAQMD threshold of significance is no longer applicable for determining project-level significance with respect to emissions of GHGs; therefore, in the absence of applicable BAAQMD

significance thresholds this analysis applies the nearby Sacramento Metropolitan Air Quality Management District's (SMAQMD) GHG significance thresholds included in the SMAQMD Guide to Air Quality Assessment in Sacramento County (CEQA Guide). The SMAQMD CEQA Guide's thresholds of significance were updated in April 2020 in consideration of Senate Bill 32, including the statewide GHG reduction target of 40 percent below 1990 levels by year 2030. The SMAQMD significance thresholds include the following (SMAQMD, 2020):

- 1,100 MT CO_2e during construction;
- Demonstrate operational consistency with the Climate Change Scoping Plan by implementing applicable BMPs or equivalent on-site or off-site mitigation.
  - All projects must implement Tier 1 BMPs (BMP 1 & 2)
    - BMP 1: Projects shall be designed and constructed without natural gas infrastructure.
    - BMP 2: Projects shall meet the current CalGreen Tier 2 standards, except all electric vehicle capable spaces shall instead be electric vehicle ready.
  - Projects that exceed 1,100 metric tons/year after implementation of Tier 1 BMPs must implement Tier 2 BMPs (BMP 3):
    - BMP 3: Residential projects shall achieve a 15 percent reduction in vehicle miles traveled per resident and office projects shall achieve a 15 percent reduction in vehicle miles traveled per worker compared to existing average vehicle miles traveled or the county, and retail projects shall achieve a no net increase in total vehicle miles traveled to show consistency with SB 743.

The Project consists of construction of two water-storage tanks and related infrastructure, and due to the nature of the Project, the SMAQMD operational GHG thresholds of significance are not directly applicable. However, the SMAQMD construction significance threshold is considered generally applicable to the Project due to the Sacramento region's proximity to the Bay Area. Construction of the Project would generate GHG emissions from a variety of sources, including off-road construction equipment and on-road worker, vendor, and hauling vehicles. For this analysis, on-site GHG emissions from construction equipment were estimated using the California Emissions Estimator Model (CalEEMod), version 2020.0.4, while GHG emissions from worker, vendor, and hauling vehicle trips were calculated using the on-road mobile source emission factor model, EMFAC2021. EMFAC2021 was used because CalEEMod has EMFAC2017, an older version of EMFAC than the most recent 2021 version, embedded within the model to estimate on-road vehicle emissions. Therefore, mobile source emissions were calculated outside of the CalEEMod model runs. Maximum annual GHG emissions associated with construction of the Project were estimated to be approximately 77 MT CO_2e and would occur in 2022. These emissions are well below the SMAQMD threshold of 1,100 MT CO_2e per year; therefore, the Project's impact with respect to construction GHG emissions would be less than significant and no mitigation is recommended.

Following construction, operation of the Project would generate GHG emissions from approximately two employee vehicle round-trips per month. The GHG emissions associated with these trips would be nominal and would be expected to be less than 1 MT CO_2e per year. Therefore, operational GHG emissions associated with the Project would be less than significant.

b) **Less than Significant Impact.** CEQA Guidelines Section 15183.5 allows for public agencies to analyze and mitigate GHG emissions as part of a larger plan for the reduction of GHGs. As described below, the project would be consistent with the following plans and regulations:

- The 2017 Scoping Plan Update;
- The GHG-related policies and programs included in the Marin Countywide Plan;
- The applicable strategies included in the Marin County 2030 CAP; and
- The applicable regulations included in the Marin County Municipal Code.

The 2017 Scoping Plan Update establishes the framework for achieving the 2030 statewide GHG reduction target of 40 percent below 1990 levels, established by SB 32. The plan update details local actions that land-use development projects and municipalities can implement to support the statewide goal. For project-level CEQA analyzes, the 2017 Scoping Plan Update states that projects should implement feasible mitigation, preferably measures that can be implemented on-site. The Scoping Plan Update incorporates a broad array of regulations, policies, and state plans designed to reduce GHG emissions (CARB, 2017). However, the Scoping Plan Update does not include measures that are applicable to construction activities. Furthermore, as discussed above, long-term operational activities would consist of two maintenance trips per month. These trips would be made by vehicles that would comply with the Advanced Clean Cars Program and the Mobile Source Strategy. Therefore, the Project would not conflict with the regulations and policies included in the Scoping Plan Update to reduce GHG emissions and the Project would be consistent with the Scoping Plan Update.

The Marin Countywide Plan includes goals and recommended programs and policies to reduce GHG emissions generated within the County. Those policies that may be applicable to construction and operation of the Project include (Marin County, 2007):

- Program AIR-4.h: Evaluate the Carbon Emissions Impacts of Proposed Developments. Incorporate a carbon emissions assessment into land use plans and the environmental impact report for Projects;

- Program AIR-4.o: Implement Proposed State Programs to Reduce Greenhouse Gas Emissions. Implement proposed State programs to reduce greenhouse gas emissions, including the RPS, CAFE standards, and the carbon cap and trade programs;

- Program EN-3.c: Divert Construction Waste. Continue to implement and improve the Construction and Demolition Waste Recovery Ordinance, requiring building projects to recycle or reuse a minimum of 50 percent of unused or leftover building materials.

The Project would be consistent with the aforementioned programs included in the Marin Countywide Plan to reduce GHG emissions. Construction of the Project would be consistent with Program EN-3.c, because the Project would divert construction waste in compliance with the Construction and Demolition Waste Recovery Ordinance. The Project would also be consistent with Program AIR-4.h, because GHG emissions that would result from construction and operation of the Project were evaluated and determined to have a less-than-significant impact (see discussion Item a, above) and would not hinder the implementation of applicable plans, policies, and regulations developed for the purposes of reducing GHG emissions. The Project would also be consistent with Program AIR-4o, because employee vehicles would be required to comply with the CAFE standards as well as the Advanced Clean Cars Program and the Mobile Source Strategy. Therefore, the Project would be consistent and would not hinder the implementation of the applicable Policies included in the Marin Countywide Plan.

The Marin County 2030 Climate Action Plan (County CAP) also includes strategies to reduce GHG emissions from within the County. County CAP measure WR-C3, Construction & Demolition Debris and Self-Haul Waste Goal would be applicable to the Project and requires that all loads of construction and demolition debris, and self-haul waste is processed for recovery of materials as feasible (Marin County, 2020). The Project would comply with the Construction and Demolition Waste Recovery Ordinance and construction waste would be processed for recovery; therefore, the Project would be consistent with the applicable measures included in the County CAP. The impact would be less than significant.

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3.2.9 Hazards and Hazardous Materials

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
IX. HAZARDS AND HAZARDOUS MATERIALS — Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☒	☐

Discussion

a) **Less than Significant**. During the construction phase, construction equipment and materials would include fuel, oils and lubricants, hydraulic fluid, paints and thinners, and cleaning solvents to maintain vehicles and motorized equipment, which are all commonly used in the construction industry. Routine uses of any of these substances could pose a hazard to people or the environment and would be considered potentially significant.

In accordance with requirements contained in the Health and Safety Code and the California Code of Regulations, the Applicant would prepare a Hazardous Materials Business Plan/Spill Prevention, Control, and Countermeasures Plan (HMBP/SPCC) prior to construction. The HMBP would include best management practices (BMPs) for the transport, storage, use, and disposal of hazardous materials and waste. The HMBP would also include information regarding construction activities, worker training procedures, and hazardous materials inventory procedures. Prior to operation, the Applicant would update the HMBP (including the BMPs) with information about the types of hazardous materials that would be used during operation.

Fuel tanks would be maintained and operated according to all local, state, and federal regulations during construction and operation, and hazardous material storage would be detailed in the Spill Prevention, Countermeasure, and Control (SPCC) Plan. Refueling and general maintenance for construction equipment, such as changing fluids and lubricating parts, would also be subject to sufficient containment capabilities and according to measures outlined in the SPCC Plan.

During construction, waste disposal and collection receptacles would be located onsite to ensure proper disposal of hazardous materials in accordance with regulatory requirements. Project construction activity would be subject to the Construction General Permit and its required SWPPP, which include BMPs to control hazardous materials used for construction.

Operation and maintenance of the Project would result in the transportation, storage, use or disposal of fewer hazardous materials compared to construction. During operation, relatively limited quantities of hazardous materials would be stored onsite in accordance with regulatory requirements and the HMBP. Compliance with applicable federal, state, and local regulations and the applicable BMPs and HMBP would ensure that any potential impact would be less than significant during Project operation and maintenance.

Compliance with applicable federal, state, and local requirements, and related BMPs and plans would ensure that the Project does not create a significant hazard to the public through the routine transport, use, or disposal of hazardous materials. Therefore, this impact would be less than significant.

b) **Less than Significant**. During all Project phases, activities may involve the transportation, storage, use, or disposal of a variety of hazardous materials, including batteries, hydraulic fluid, diesel fuel, gasoline, grease, lubricants, paints, solvents, and adhesives.

The HMBP/SPCC would include BMPs for these activities as well as spill control and spill response measures. In the unlikely event that a spill did occur, the SPCC would include appropriate measures to ensure that workers cease work activities to contain any release and enact the protocols for cleanup including the notification of appropriate agencies and the use of materials stored onsite such as absorbent pads to minimize the spread or exposure.

Accidents or mechanical failure involving heavy equipment could result in the accidental release of fuel, lubricants, hydraulic fluid, or other hazardous substances. These types of spills on construction sites are typically in small quantities, localized, and cleaned up in a timely manner. Construction contractors are contractually responsible for their hazardous materials and are required under their contract to properly store and dispose of these materials in compliance with state and federal laws, including implementing a HMBP/ SPCC. As discussed, the Project would require coverage under the Construction General Permit, and so would be subject to the protections included in a SWPPP, which would outline BMPs to contain a potential release and to prevent any such release from reaching an adjacent waterway or stormwater collection system (e.g., erosion control, sediment control, and waste management). Therefore, implementation of the SWPPP would

minimize potential adverse effects to the environment. Compliance with applicable federal, state, and local regulations and the applicable BMPs and HMBP/SPCC plan would ensure that the Project would not result in significant hazards to the public or environment related to accidental release of hazardous materials the impact would be less than significant.

c) **No Impact**. The Project site is not located within 0.25-mile of a school. The nearest school is the Ross Valley Charter School, approximately 1.5 miles northeast of the Project site. The Project would not emit hazardous emission or handle hazardous materials within 0.25-mile of a school; there would be no impact.

d) **No Impact**. The search for hazardous materials sites compiled pursuant to Government Code Section 65962.5 (referred to as the "Cortese List") is based on the results of regulatory agency database searches using the California State Water Resources Control Board (SWRCB) GeoTracker database and the California Department of Toxic Substances Control (DTSC) EnviroStor database. The GeoTracker database includes the following hazardous materials site lists: leaking underground storage tank (LUST) cleanup sites; spills, leaks, investigation and cleanup (SLIC) sites; permitted underground storage tank (UST) facilities; land disposal sites; military cleanup sites; and other cleanup sites. The EnviroStor database includes federal Superfund, state response, voluntary cleanup, school cleanup, and hazardous waste corrective action. Nearby landfill facilities were identified by the database searches. The DTSC and SWRCB are also agencies that are responsible for updating the Hazardous Waste and Substances Site List (Cortese List). The list is a planning document used by state and local agencies and developers to comply with CEQA requirements by providing location information for hazardous material release sites.

An independent review of the EnviroStor and GeoTracker hazardous materials databases confirms there are no active or closed hazardous materials sites within the Project site boundary (DTSC, 2021; SWRCB, 2021a). The closest hazardous materials site is a LUST Cleanup Site located at 1001 Bolinas Road (Meadows Club Golf Course), approximately 0.7-mile northwest of the Project site. The site was closed as of April 25, 1997 (SWRCB, 2021b); any contamination associated with this site has been remediated and would not affect the Project. Therefore, the Project would not create a significant hazard to the public or the environment; there would be **no impact** under this criterion.

e) **No Impact**. The Project site is not located within 2 miles of a public or public use airport. The nearest airport is the San Rafael Airport, approximately 5.22 miles northeast of the Project site. The Project would not result in a safety hazard or excessive noise for people residing or working in the area; there would be no impact.

f) **Less than Significant**. The Marin County Fire Service created the Mt. Tamalpais Mutual Threat Zone Plan (MTZ Plan) for wildland urban interface fires on and around Mt. Tamalpais. Included in the MTZ Plan are maps for areas that include Structural Protection Zones and evacuation routes. The Project site is included on the Ross Valley –

South Area map, on which Bolinas Road is delineated as a primary evacuation route (Marin County, 2018).

Section 2.5.5, *Vehicle Trips and Haul Routes*, in the *Project Description*, states that Bolinas Road will be used as a truck and worker commute route. Additionally, spoils excavated from the Project site would be hauled to Bullfrog Quarry via Sky Oaks Road, Bon Tempe Dam Trail, and Bullfrog Road. At the Project site, a temporary access road would provide direct access to Sky Oaks Road to the north, and west of the site. When the temporary access road would not be available, haul trucks would use Bolinas Road (via Concrete Pipe Road) to reach Sky Oaks Road.

While Bolinas Road would be utilized as a commute and haul route, the Project would not require any road closures on Bolinas Road and traffic generated by the Project is not expected to cause congestion such that the Project would impair or physically interfere with the MTZ Plan. Impacts related to impairment or physical interference of an emergency response or evacuation plan would be less than significant.

g) **Less than Significant**. Based on mapping by the California Department of Forestry and Fire Protection (CAL FIRE) Forest Resource Assessment Program (FRAP) the Project site is mapped within a moderate Fire Hazard Severity Zone (CAL FIRE, 2007). The use of construction equipment and the possible temporary on-site storage of fuels and/or other flammable construction chemicals could pose an increased fire risk resulting in injury to workers or the public during construction. However, contractors would be required to comply with hazardous materials storage and fire protection regulations, which would minimize potential for fire creation, and ensure that the risk of wildland fires during construction would be less than significant.

References

California Department of Forestry and Fire Protection (CAL FIRE), 2007. Fire Hazard Severity Zones in State Responsibility Areas (SRA). Adopted by CAL FIRE on November 7, 2007. Forest Resource Assessment Program. Map. Scale 1:100,000.

Department of Toxic Substances Control (DTSC), 2021. EnviroStor database. Hazardous materials sites in Marin County.

Marin County, 2018. Ross Valley – South Area, Marin Mutual Threat Zone Plan. Version 9.

State Water Resources Control Board (SWRCB) 2021a. GeoTracker database. Hazardous materials sites in Marin County.

SWRCB, 2021b. GeoTracker database. Record for Meadows Club Golf Course. Available online at: https://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0604100075. Accessed on July 15, 2021.

3.2.10 Hydrology and Water Quality

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. 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?	☐	☒	☐	☐
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:				
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?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☒	☐	☐

Regional and Local Hydrology

The Project would be located south of Fairfax within the Mt. Tamalpais watershed upon lands owned by Marin Water. There are no defined surface waters in the vicinity of the Project. Two unnamed ephemeral channels are located within the Project site, which is located on the west (upslope) side of Concrete Pipe Road near Bolinas Road at an elevation of approximately 500 feet above mean sea level. Site topography is a hillside slope. Drainage would occur from Concrete Pipe Road down-gradient of the proposed Project site into the forested canyon toward the east-northeast. The Project site is north of Bon Tempe Lake, a water body managed by Marin Water, which is listed as impaired for mercury (SFRWQCB, 2018). Beneficial uses for Bon Tempe Lake, as defined by the San Francisco Bay Water Quality Control Plan (Basin Plan) include Municipal, Commercial, Cold Water, Spawning, Warm Water, Wildlife, and Recreation[7] (SFRWQCB, 2018). Additional water bodies in the vicinity of the Project, beyond the area of direct effect, include Alpine Lake, located approximately 0.5 miles south of Bullfrog Quarry near the headwaters of Lagunitas Creek.

[7] Note: public access is limited by Marin Water for this use.

The Project is not in a location subject to flooding, tsunami, or seiche. Limited groundwater information was available due to the remote location of the proposed Project.

Discussion

a) **Less than Significant with Mitigation.**

Construction

The Project is located within lands under the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (RWQCB), an agency tasked with implementing water quality requirements of the State of California. Construction of the Project would require grading, excavation, and other soil-disturbing activities on the 0.7-acre Project site, potentially delivering sediment and other pollutants to receiving waters. To prepare the site for tank foundations and vault installation, approximately 45,000 CY of soil would be excavated from the site, some of which would be reused onsite or otherwise removed from the site through off-hauling, as described in Chapter 2, *Project Description*. The proposed construction activities could result in pollutants being mobilized into the surrounding area through stormwater run-off (nonpoint-source pollution), potentially degrading the quality of receiving waters. Soil-disturbing activities, such as tree removal, excavation, and site clearing, could result in soil erosion and the mobilization of debris and soil in the form of stormwater run-off to downstream water bodies and storm drains. If not properly managed, stockpiled spoils could migrate offsite during storm events and increase sedimentation in downstream receiving waters. Fuels, lubricants, and other hazardous materials associated with the Project's use of construction equipment could also adversely affect water quality if spilled or stored improperly. To limit inadvertent release of contaminants during construction, a Spill Prevention, Control, and Countermeasures Plan, would be prepared for the Project, as noted in Section 3.2.9, *Hazards and Hazardous Materials*.

Because the Project's construction would disturb more than 1 acre of total land area (accounting for the 0.7 acre of Project excavation and grading at the tank site plus the use or disturbance of approximately 1 acre at the proposed Bullfrog Quarry staging/laydown area), coverage under the National Pollutant Discharge Elimination System (NPDES) *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ) (commonly referred to as the Construction General Permit) would be required (SWRCB, 2013). The Construction General Permit requires development and implementation of a stormwater pollution prevention plan (SWPPP) during construction to control site runoff and otherwise limit a project's contribution of contaminants into stormwater.

As described in the Project Description, Marin Water would require its contractor to implement standard construction practices and best management practices (BMPs) (refer to Appendix A). As noted in the Marin Water Standards for Environmental Protection, an environmental protection plan would be required to be prepared by the contractor selected to construct the Project. General Protection of Natural Resources (part 3.1) for

example, stipulates that "natural resources within the project boundaries and outside the limits of permanent work … be preserved in their existing conditions or be restored to an equivalent or improved condition upon completion of work". Additional erosion control measures (guidance noted in Appendix A, Standard S18000, part 3.5) would be implemented to control construction runoff, consistent with Marin Water Standards for Erosion and Sediment Transport and Control (Marin Water, 2021).

Due to the scope and extent of proposed site alteration the Project has the potential to greatly increase the volume and velocity of runoff. The existing corrugated pipe culvert is proposed for removal and replacement to accommodate and redirect existing drainage under Concrete Pipe Road. Retiring the existing Pine Mountain Tunnel for use as water storage would simply involve opening the tunnel to allow for conveyance from the tunnel through to the existing water transmission pipeline. No structural alteration or disturbance is proposed for the existing Pine Mountain Tunnel.

The Project would be designed to accommodate drainage from the cut slope which would be prepared as a soil nail wall stabilized with shotcrete and concrete. Because this prepared (hardened) surface presents a very different substrate that differs hydrologically from the existing forested terrain, flashy conditions would be expected to occur during rain events when stormwater moves across the site. Such alteration may result in potentially concentrated, erosive flows. Therefore, the design for drainage improvements would need to consider and include energy dissipation to ensure that unanticipated new areas of erosion do not result from the Project's site alteration. Given the combined factors of slope steepness, proposed use of heavy equipment, and tree removal, there is the potential for areas of erosion to also form head-cuts, which could progress into debris flows or landslides in the absence of measures to prevent such events. In addition to generating potentially hazardous conditions, erosion and sedimentation could be mobilized into receiving waters, which would be significant water quality impact.

To reduce impacts and provide for the careful planning for water control, site drainage and discharge during construction, implementation of **Mitigation Measure HYD-1, Water Control, Drainage, and Discharge Plan** would be required.

> **Mitigation Measure HYD-1: Water Control, Drainage, and Discharge Plan.** Prior to (or at the time of) final design, the contractor selected to construct the Project shall prepare and submit to Marin Water, Marin County, and the RQWCB (as applicable) a Water Control, Drainage, and Discharge Plan. The plan shall contain provisions for energy dissipation and describe measures to prevent erosion, scouring of bank, nuisance, contamination, and otherwise limit the project's contribution of silt and sediment into receiving waters. An assessment of the downstream/down gradient drainage shall be conducted to allow for appropriate planning for rerouting existing site drainage to accommodate the proposed Project such that erosion is not allowed to occur in the vicinity of the Project on- or off-site;
>
> A detailed plan for drainage control shall be prepared (subject to agency/County review and approval) based on the results of the design-level geotechnical report

and project hydrological conditions assessment. Proposed measures shall conform with requirements of all applicable discharge permits. Measures shall include, but not be limited to the following:

- To the extent feasible, construction during moderate to heavy rain events shall cease;
- The use of heavy equipment at the site at all phases of the Project shall be limited during rain events, and the site shall be allowed to dry out prior to heavy equipment use upon sloping terrain;
- Water used for dust control or other purposes during construction shall not be applied in a manner that results in ponding or runoff (on- or off-site);
- Straw wattles, sand bags, and other erosion control devices shall be installed, periodically checked, and maintained in a manner that allows for optimal functionality to prevent contamination of stormwater;
- Good housekeeping measures shall include covering spoils piles and removing trash from the site daily;
- Adaptive management shall be incorporated into drainage planning to ensure the adequacy or functionality of installed erosion control measures. In the event of redundant or overlapping erosion control measures or BMPs, the more effectual measures shall be utilized;
- Design for grading, drainage, and stormwater control to support proposed site structures shall conform to all applicable requirements of the California Building Code, Marin County, and Regional Water Quality stormwater and/ or waste discharge requirements (as applicable);
- Site hydrology shall be considered with energy dissipation structures (or other measures) installed at strategic locations where stormwater is discharged into the natural drainages such that runoff and erosion are controlled on- and off-site;
- Concrete residues shall not be allowed to enter waterways or stormwater infrastructure. Measures to limit migration of residues may include the use of silt fencing or on-site containment, subject to review and approval by Marin Water;
- Bio-retention and/or measures for source control of silt, sediment, and other pollutants shall be incorporated into the drainage design, as appropriate;
- Revegetation of disturbed areas and downstream drainages, as appropriate, shall utilize plantings or reseeding with ecologically appropriate, native plant materials;
- In the event that dewatering is required during construction, such activities shall be conducted in a manner that conforms to applicable Marin Water standards, waste discharge requirements or general permit for dewatering provisions.

The Project's conformance with applicable water quality requirements, adherence to Marin Water standards, along with implementation of Mitigation Measure HYD-1, Water

Control Drainage and Discharge Plan, construction-related impacts would be reduced to less-than-significant levels.

Operation and Maintenance

Following construction, the site would be managed and maintained by Marin Water in a manner consistent with existing operations and maintenance protocols. Maintenance would likely include periodic monitoring of water systems to assess the soundness and functional integrity of tanks, valves, water conveyance pipes, and culverts. It is anticipated that periodic repairs would take place and that regular vegetation tree trimming along the access routes would occur, on an as-needed basis. The site would be managed in a manner protective of water quality, consistent with Marin Water standards. Therefore, impacts associated with operation and maintenance of the Project would be considered less than significant.

b) **Less than Significant.** Water resources are likely to be used for dust control, concrete work, and other purposes during construction, some of which may be sourced from groundwater resources. Marin Water proposes to increase storage of water resources (some of which may also be sourced from groundwater); however, no increase in use of groundwater resources is proposed following construction. This analysis, therefore, focuses on the addition of impervious surfaces and the change in groundwater recharge potential at the site.

As proposed, approximately 20,000 SF of additional impervious surfaces would be added to the site, which would alter conditions for groundwater recharge. However, rainwater falling on the new impervious surface would be collected, conveyed under Concrete Pipe Road and discharged into the natural channel downslope from the Project site. In addition, the Project is not located in a groundwater basin subject to conditions of critical overdraft, nor would the Project be constructed in a medium or high-priority groundwater basin defined by the California Department of Water Resources for purposes of the Sustainable Groundwater Management Act. The vast majority of the lands in the vicinity of the Project are undeveloped forests and would not be altered by the Project. Therefore, the Project's additional impervious surfaces would not constitute a significant change with respect to overall groundwater recharge area. Moreover, the Project would not increase demand of groundwater resources or otherwise deplete resources in the basin. Impacts during construction and operation of the Project would be considered less than significant.

c.i) **Less than Significant with Mitigation.**

Construction

The Project would alter the terrain and drainage patterns of the existing (approximately) 40-percent slope using heavy equipment to prepare the site to support two 2-MG water tanks, piping, vaults, and associated infrastructure. Grading and substantial excavation (of approximately 45,000 CY of soils) would be required to prepare the Project site and accommodate the tanks, as described in Chapter 2, *Project Description*. Because the Project would include soil-disturbing activities upon approximately 1.7 acres, compliance

with the terms of the Construction General Permit and SWPPP would be needed, as previously discussed. The contractor selected to construct the Project would be responsible for preparation of the SWPPP, which would outline procedures to be followed to ensure effective stormwater/non-stormwater management with respect to site conditions. Grading and building permits and associated engineering review from Marin County are also anticipated to be required.

As noted in Section 3.2.7 Geology and Soils, the Project would be subject to California Building Code design criteria and all construction would be required to adhere to specifications and procedures within the final geotechnical report. However, due to the extreme slope of the site combined with other factors such as the use of heavy equipment and the timing of construction (within the rainy season), even with the implementation of design specifications and a SWPPP, construction of the Project could still result in substantial erosion, siltation of ephemeral waterways proximal to the site, and/or contribute to conditions of landslides or debris flows. To reduce potential impacts and ensure the appropriate water control, drainage, and discharge within and from the site, **Mitigation Measure HYD-1 (Water Control, Drainage, and Discharge Plan)** would be implemented. Refer to question a) for text of mitigation measure.

Operation and Maintenance

With implementation of the Project, site drainage would be captured and conveyed into stormwater infrastructure. Once constructed, the Project would not result in substantial erosion. Post construction monitoring would take place as part of the SWPPP requirements, and the site would be maintained and monitored by Marin Water to ensure the functionality of the water storage system. Once operational, impacts would be less than significant.

c.ii-iv) **Less than Significant Impact with Mitigation.**

Construction

To accommodate the Project's proposed concrete foundations, water tanks, vaults, and associated piping, additional stormwater infrastructure would be required to be incorporated into the Project's design, as described in Chapter 2, *Project Description*. Because the preliminary design of the Project is currently in development and not yet completed, a general description is provided in Chapter 2. Site design would be subject to modification per the pending results of the geotechnical evaluation, hydrology and hydraulics calculations, required for overall site engineering. The final design of the Project stormwater infrastructure would be sized to accommodate the capacity needed to drain the site without generating erosion, conform to Marin County requirements for stormwater pollution prevention (MCSTOPP), and be constructed and maintained consistent with Marin County erosion control planning requirements (refer to Section 3.2.7, *Geology and Soils*).

As described in Chapter 2, *Project Description*, and Section 3.2.4, *Biological Resources*, there are two natural drainages occurring between Sky Oaks Road and Concrete Pipe.

As described in Chapter 2, *Project Description*, 200 linear feet of ephemeral channels would be realigned or otherwise impacted by the Project. The channels would be re-routed outside the Project site, one or two new culverts would be constructed under Concrete Pipe Road, and flows would be discharged into the natural channel downstream. As noted under question a) various measures including a SWPPP and an Environmental Protection Plan (per Marin Water standards) would be implemented to reduce or otherwise control runoff. Even with the implementation of these measures, given the extreme alteration of the existing contours and additional impervious surfaces, the Project could exceed stormwater conveyance capacity, which has the potential to overrun the existing system and generate secondary effects. This would be considered a significant impact.

To reduce these potential effects and ensure that ongoing stormwater capacity exceedances do not occur, **Mitigation Measures HYD-1, Water Control, Drainage, and Discharge Plan** (described above, under question a) and **BIO-4, Habitat Restoration and Monitoring** (described in Section 3.2.4, *Biological Resources*) would be implemented.

Significance with implementation of Mitigation Measures HYD-1 and BIO-4 would be less than significant.

d) **No Impact.** The Project site is not located in an area subject to tsunami or seiche hazards; nor is the site in a special flood hazard area nor other areas of flood hazard, as defined by the Federal Emergency Management Agency (FEMA, 2014). The Project site is in a location identified by FEMA as "Zone X" an area determined to be outside of the 0.2 percent annual chance floodway. Therefore, construction of the Project would have no impact associated with these hazards. The Project's water tanks would be placed at an elevation that would not become inundated, nor cause inundation of surrounding off-site areas. Therefore, operation-related alteration of local drainage patterns would not result in flooding, and there would be no impact.

e) **Less than Significant with Mitigation.**

Construction

Activities involving soil disturbance during construction, such as grading, excavation into the slope of the hillside, movement and stockpiling of soils could result in erosion, siltation of waterways. If precautions are not taken to contain contaminants, construction could contribute to water quality degradation including through the generation of stormwater run-off, a form of nonpoint-source pollution. In addition, because construction equipment would require the use of fuels, lubricants, and other hazardous materials, soil contamination and water quality violations could occur if these materials are stored improperly during Project construction. These effects would conflict with the requirements of the Water Quality Control Plan (Basin Plan).

However, because the Project would disturb more than 1 acre, coverage under the General Construction Permit and development of a SWPPP would be required, as previously discussed. The requirements of the General Construction Permit are enhanced and made more specific by Mitigation Measures HYD-1 which would provide for site-

specific drainage plan and control of discharge. Such measures would be implemented to reduce impacts and protect surface and groundwater quality (refer to question a, for text of mitigation). With implementation of Mitigation Measures HYD-1, the Project would not conflict with or obstruct implementation of a water quality control plan.

Operation

The Project site is not located in a defined groundwater basin. Once operational, the Project would add approximately 20,000 SF of impervious surfaces, essentially as concrete foundations to support the two tanks upon the site. However, rainwater falling on the new impervious surface would be captured and discharged into the natural channel downstream of the Project site and recharge the underlying groundwater supply, as it does now. There is no groundwater sustainability plan within the vicinity of the Project because the Project is not located within a groundwater basin identified as being in conditions of critical overdraft. Abundant natural permeable surface area that is present in the forest surrounding the site would allow for adequate recharge. Therefore, the Project would not present significant impacts or conflict with sustainable management of the groundwater basin. Operational impacts would be less than significant.

References

California State Water Quality Control Board (SWQCB), 2013. NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities, Order 2009-0009-DWQ as amended by Order 2010-0014-DWQ and 2012-0006-DWQ. Available online: https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf. Accessed August 10, 2021.

Federal Emergency Management Agency (FEMA) Flood Map Service Center. Flood Insurance Rate Map (FIRM) Number 06041C0451E, effective 03/17/2014. Marin County 060173. https://msc.fema.gov/portal/search#searchresultsanchor.

Marin Water, 2021. Construction Specifications and Standards Section 02200, Earthwork and Section 1800 Environmental Protection Measures.

3.2.11 Land Use and Planning

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XI. LAND USE AND PLANNING — Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
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?	☐	☐	☐	☒

Discussion

a) **No Impact.** The project would include the construction of two water storage tanks on undeveloped land and does not propose any components that would physically divide an established community. As described in Chapter 2, *Project Description*, there are single-family residences approximately 700 feet to the north of the Project site and on large lots approximately 400 to 750 feet to the west-southwest of the Project site. Project construction, staging, and operation would not physically divide this established community. Therefore, there would be no impact.

b) **No Impact.** The Project site is classified as Open Area (OA) (Marin County, 2021) and would not substantially conflict with the Open Space, and Agricultural and Conservation land use categories in the Countywide Marin Plan (Marin County Code, 2017). Project construction and operation would not conflict with any of Marin County's Open Space District's land use management policies, plans, or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The Project would not cause a significant environmental impact due to a conflict with any other land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. Project consistency with applicable plans, policies, and regulations of agencies with jurisdiction would continue to be analyzed and considered as part of the respective agencies' approval process required for the project, independent of CEQA review. Any such potential conflicts would also be considered by decision-makers during their deliberations on the merits of the Project and as part of their actions to approve, modify, or disapprove the Project. For these reasons, there would be no impact.

References

Marin County Code. 2017. Marin County Code – Title 22 Development Code, Article II Zoning Districts and Allowable Land Use. Available: https://www.marincounty.org/~/media/files/departments/cd/planning/currentplanning/development-code-amendments-2017/devcode2016_artii_prd.pdf?la=en. Accessed August 11, 2021.

Marin Countywide Plan. 2014. Marin Countywide Plan 2014 Update. Available: https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/cwp_2015_update.pdf. Accessed August 11, 2021.

Marin County. 2021. MarinMap Map Viewer. Available: https://www.marinmap.org/Html5Viewer/Index.html?viewer=smmdataviewer. Accessed August 11, 2021.

3.2.12 Mineral Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XII. 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?	☐	☐	☐	☒
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?	☐	☐	☐	☒

Discussion

a,b) **No Impact**. Multiple sources of information were consulted to determine the potential presence of mineral resources at the Project site, and whether Project activities would result in the loss of availability of any mineral resources.

The Mineral Resources Data System (MRDS), administered by the U.S. Geological Survey (USGS), which provides data describing mineral resources, including deposit name, location, commodity, deposit description, production status and references and which can be used to confirm the presence/absence of existing surface mines, closed mines, occurrences/prospects, and unknown/undefined mineral resources. According to the available MRDS data, there are no significant mineral resources at the Project site or in the area (USGS, 2021).

The California Geological Survey (CGS) maps and regulates the locations of potential mineral resources in California consistent with the Surface Mining and Reclamation Act (SMARA). In order to protect these potential mineral resources, the CGS has classified the regional significance of mineral resources into mineral resource zones (MRZs) and mapped them. The Project site is mapped in an area that is classified as MRZ-3, which indicates the area contains mineral occurrences of undetermined significance (Miller & Busch, 2013).

The California Geologic Energy Management Division (CalGEM) provides oversight of the oil, natural gas, and geothermal industries, and regulates the drilling, operation, and permanent closure of energy resource wells. CalGEM's online mapping application, Well Finder, was reviewed to determine the presence of any oil, gas, or geothermal resources in and around the Project site. Well Finder data indicates there are no significant resources at the Project site or in the immediate vicinity (CalGEM, 2021).

Additionally, the Built Environment Element of the Marin Countywide Plan, which provides information about locally important, significant mineral resources within Marin County, does not indicate the presence of any significant mineral resources at or near the Project site (Marin County, 2007).

According to the review of available data from the USGS, CGS, CalGEM, and Marin County, there are no significant mineral resources at the Project site or in the area. Additionally, Project activities would not result in the loss of availability of any known mineral resources or locally important mineral resources. Therefore, there would be no impact on mineral resources.

References

California Geologic Energy Management Division (CalGEM), 2021. Well Finder online tool. Available online at: https://www.conservation.ca.gov/calgem/Pages/WellFinder.aspx. Accessed on: August 9, 2021.

Marin County, 2007. Marin Countywide Plan. Built Environment Element. Marin County Community Development Agency. November 6, 2007.

Miller, Russell V. and Lawrence L. Busch, (Miller & Busch), 2013. Updated Mineral Land Classification Map for Class II Base-Grade Aggregate in the North San Francisco Bay Production-Consumption Region, Marin, Napa, Sonoma, and Southwestern Solano Counties, California. Special Report 205 – Place 1C. California Geological Survey. Map. Scale 1:150,000.

United States Geological Survey (USGS), 2021. Mineral Resources Data System (MRDS) database. Available online at: https://mrdata.usgs.gov/mrds/map-graded.html. Accessed on August 9, 2021.

3.2.13 Noise

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XIII. 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?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with 0 dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. Therefore, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead focusing on the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). All sound pressure levels and sound power levels reported below are A-weighted.

Noise Exposure and Ambient Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. In fact, noise varies continuously with time with respect to the contributing sources in the noise environment. Noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens) makes noise constantly variable throughout a day.

These successive additions of sound to the noise environment vary the noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a noise environment and evaluate noise impacts. This time-varying characteristic of

environmental noise is described using statistical noise descriptors. Different noise descriptors used in this analysis to characterize environmental noise are summarized below:

L_{eq}: The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: The instantaneous maximum noise level measured during the period of interest.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning; and
- physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels that one has adapted to, which is referred to as the "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. Regarding increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

These relationships occur in part because of the logarithmic[8] nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence, the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather they combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not

[8] Unlike a linear scale, in a *logarithmic* scale, the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1; 10; 100; 1,000; 10,000; etc., doubling the variable plotted on the x-axis.

100 dBA. However, where ambient noise levels are high in comparison to a new noise source, there will be a small change in noise levels. For example, when 70.0 dBA ambient noise levels are combined with a 60.0 dBA noise source, the resulting noise level equals 70.4 dBA.

Noise Attenuation

Sound level naturally decreases with more distance from the source. This basic attenuation rate is referred to as the *geometric spreading loss*. The basic rate of geometric spreading loss depends on whether a given noise source can be characterized as a point source or a line source. Point sources of noise, including stationary mobile sources such as idling vehicles or on-site construction equipment, attenuate (lessen) at a rate of 6.0 dBA per doubling of distance from the source. In many cases, noise attenuation from a point source increases to 7.5 dBA for each doubling of distance due to ground absorption and reflective wave canceling. These factors are collectively referred to as *excess ground attenuation*. The basic geometric spreading loss rate is used where the ground surface between a noise source and a receiver is reflective, such as parking lots or a smooth body of water. The excess ground attenuation rate (7.5 dBA per doubling of distance) is used where the ground surface is absorptive, such as soft dirt, grass, or scattered bushes and trees.

Widely distributed noises such as a street with moving vehicles (a "line" source) would typically attenuate at a lower rate of approximately 3.0 dBA for each doubling of distance between the source and the receiver. If the ground surface between source and receiver is absorptive rather than reflective, the nominal rate increases to 4.5 dBA for each doubling of distance. Atmospheric effects, such as wind and temperature gradients, can also influence noise attenuation rates from both line and point sources of noise. However, unlike ground attenuation, atmospheric effects are constantly changing and difficult to predict.

Trees and vegetation, buildings, and barriers reduce the noise level that would otherwise occur at a given receptor distance. However, for a vegetative strip to have a noticeable effect on noise levels, it must be dense and wide. For example, a stand of trees must be at least 100 feet wide and dense enough to completely obstruct a visual path to the roadway to attenuate traffic noise by 5 dBA (Caltrans, 2009). A row of structures can shield more distant receivers depending upon the size and spacing of the intervening structures and site geometry. Similar to vegetative strips discussed above, noise barriers, which include natural topography and soundwalls, reduce noise by blocking the line of sight between the source and receiver. Generally, a simple noise barrier that breaks the line of sight between source and receiver will provide at least a 5-dBA reduction in noise.

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal and is typically expressed in units of inches per second (in/sec). The PPV is most frequently used to describe vibration impacts on buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to measure RMS. The decibel notation acts to

compress the range of numbers required to describe vibration (Federal Transit Administration [FTA], 2018). Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration.

Some common sources of ground-borne vibration are trains, heavy trucks traveling on rough roads, and construction activities such as blasting, pile driving, and operation of heavy earth-moving equipment. The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. In residential areas, the background vibration velocity level is usually around 50 VdB.

Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, and can cause stress and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. In general, residences, schools, hotels, hospitals, and nursing homes are considered to be the most sensitive to noise. Places such as churches, libraries, and cemeteries, where people tend to pray, study, and/or contemplate are also sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive.

The Project site is undeveloped and surrounded by woodland. Sensitive receptors in the vicinity include single-family residences located between Sky Oaks Road and Scott Tank Road approximately 350 to 750 feet to the west-southwest of the Project site. Single-family residences are also located approximately 700 feet to the north of the Project site, across and north of Bolinas Road.

Regulatory Setting

Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans tend to identify general principles intended to guide and influence development plans; local ordinances establish standards and procedures for addressing specific noise sources and activities.

Federal

Truck Operations. Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations, Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters (approximately 50 feet) from the vehicle pathway centerline. These regulatory controls are implemented on truck manufacturers.

Vibration. The FTA has adopted vibration standards that are used to evaluate potential building damage impacts related to construction activities. The vibration damage criteria adopted by the FTA are shown in **Table NOI-1**.

TABLE NOI-1
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

SOURCE: FTA, 2018

State

Vehicle Operations. The State of California establishes noise limits for vehicles licensed to operate on public roads. The pass-by standard for heavy trucks is consistent with the federal limit of 80 dBA. The pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanctions on vehicle operators by State and local law enforcement officials.

Vibration. The California Department of Transportation (Caltrans) has developed guidance on addressing vibration issues associated with construction, operation, and maintenance of transportation projects (Caltrans, 2013). **Table NOI-2** shows the Caltrans criteria for human response to transient vibration.

TABLE NOI-2
HUMAN RESPONSE TO TRANSIENT VIBRATION

Human Response	PPV (in/sec)
Severe	2.0
Strongly Perceptible	0.9
Distinctly Perceptible	0.24
Barely Perceptible	0.035

SOURCE: Caltrans, 2013.

Local

Marin Countywide Plan

Noise is addressed in the Marin Countywide Plan (Plan) within the Built Environment Element (Marin County, 2014). The goal, policy, and implementation program that would be applicable to construction noise and vibration generated by the Project are listed below.

> **Goal NO-1:** Protection from Excessive Noise. Ensure that new land uses, transportation activities, and construction do not create noise levels that impair human health or quality of life.

Policy NO-1.3: Regulate noise generating activities. Require measures to minimize noise exposure to neighboring properties, open space, and wildlife habitat from construction-related activities, yard maintenance equipment, and other noise sources, such as amplified music.

Implementing program NO-1.a enforces allowable noise levels through CEQA and County discretionary review requiring new developments to comply with allowable noise levels. The Plan provides acceptable noise levels for determining the appropriate type of new development in relation to its ambient noise environment that applies primarily to proposed development exposed to transportation generated noise and to existing development exposed to increases in transportation generated noise due to proposed development. The Plan also provides benchmarks for allowable noise exposure from stationary noise sources that apply to new residential projects and other noise-sensitive land uses proposed near stationary noise sources as well as new stationary noise-generating development proposed near existing residential or other noise-sensitive land uses. The plan however, does not specify any standards for construction noise.

Marin County Municipal Code

Section 6.70.030 of the Marin County Municipal Code addresses noise from construction activities. The section limits construction activities and related noise to the hours of 7 a.m. to 6 p.m., Monday through Friday and from 9 a.m. to 5 p.m. on Saturdays. Construction activities are prohibited on Sundays and Holidays (New Year's Day, President's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.) In addition, loud noise-generating construction-related equipment (e.g., backhoes, generators, jackhammers) can be operated at a construction site for permits administered by the community development agency from 8 a.m. to 5 p.m. Monday through Friday only. The section allows for exceptions to these limitations for emergency work provided written notice is given to the community development director within 48 hours of commencing work; construction projects of city, county, state, other public agency, or other public utility; when written permission of the community development director has been obtained, for showing of sufficient cause; for minor jobs (e.g., painting, hand sanding, sweeping) with minimal/no noise impacts on surrounding properties; and for modifications required by the review authority as a discretionary permit condition of approval.

Marin Water Environmental Protection Standards

Marin Water nuisance abatement noise control environmental protection standards that would be implemented as part of the Project are described below (see also Appendix A).

3.2.A.1, Location:

- Maximum noise levels within 1,000 feet of any residence, business, or other populated area: Noise levels for trenchers, pavers, graders and trucks shall not exceed 90 dB at 50 feet as measured under the noisiest operating conditions. For all other equipment, noise levels shall not exceed 85 dB at 50 feet.

3.2.A.2, Equipment:

- Electrically powered equipment instead of pneumatic or internal combustion powered equipment shall be used, where feasible.

- Jack hammers shall be equipped with exhaust mufflers and steel muffling sleeves. Air compressors should be of a quiet type such as a "whisperized" compressor.

- All noise-producing project equipment and vehicles using internal combustion engines (including haul trucks) shall be fitted with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features. These devices shall be maintained in good operating condition so as to meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

- All mobile or fixed noise-producing equipment used on the project, which is regulated for noise output by a local, state, or federal agency, shall comply with such regulations while in the course of project activities.

3.2.A.3, Operations:

- Keep noisy equipment as far as possible from noise-sensitive site boundaries. Machines should not be left idling. Use electric power in lieu of internal combustion engine power wherever possible. Maintain equipment properly to reduce noise from excessive vibration, faulty mufflers, or other sources. All engines shall have mufflers.

- The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning purposes only.

3.2.A.4, Scheduling:

- Schedule noisy operations so as to minimize their duration at any given location.

3.2.A.5, Monitoring:

- To determine whether the above noise limits are being met and whether noise barriers are needed, the Contractor shall use a portable sound level meter meeting the requirements of American National Standards Institute Specification S1.4 for Type 2 sound level meters. If non-complying noise levels are found, the Contractor shall be responsible for monitoring and correction of excessive noise levels.

Discussion

a) **Less than Significant Impact.** The Project would generate noise primarily during construction as discussed below. Once operational, the Project would not include any stationary noise sources or additional vehicle trips for maintenance. The only operation-related noise levels would be associated with two workers vehicles commuting to the Project site once a month for maintenance purposes. There would be no operational noise impact.

Construction of the Project would take place from January 2022 to December 2026. Construction activities associated with the Project are detailed in Section 2.5 of the Project Description and would include:

- Site preparation, clearing, grading, demolition, and establishing staging areas (153 days);
- Tank, vault, and pipeline construction (459 days); and
- Site clean-up, paving and restoration (23 days).

Construction would involve the use of equipment that would generate substantial noise at and adjacent to construction areas. Noise impacts from construction would depend on the type of activity being undertaken and the distance to the receptor location. Construction noise impacts are most severe if construction activities take place during noise-sensitive hours (i.e., early morning, evening, or nighttime hours), in areas immediately adjoining noise-sensitive land uses, and/or when construction duration lasts over extended periods of time.

Table NOI-3 shows typical noise levels produced by the types of construction equipment that are expected to be used for Project construction.

TABLE NOI-3
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Type of Equipment	L_{max} at 50 feet, dBA	Acoustical Usage factor (%)
Auger Drill Rig	84	20
Compactor	83	20
Concrete Mixer Truck	79	40
Concrete Pump Truck	81	20
Crane	81	16
Dump Truck	76	40
Excavator	81	40
Front End Loader	79	40
Grader	85	40
Paver	77	50
Pickup Truck	75	40
Roller	80	20

SOURCE: FHWA, 2017.

The operation of each piece of off-road equipment at the proposed Project site would not be constant throughout the day, as equipment would be turned off when not in use. This is accounted for in the acoustical usage factor for each equipment type, also shown in Table NOI-3. Over a typical workday, equipment would operate at different locations on the proposed Project site and would not always be operating concurrently. Though the County's municipal code allows for exceptions from construction hour restrictions for construction projects conducted by a public utility, such as the proposed Project, the Project's construction activities would generally be restricted to the less noise-sensitive daytime hours between 8 a.m. and 5 p.m., Monday through Friday, consistent with the Marin County noise ordinance (Chapter 6.70.030). However, extended hours of construction beyond those allowed in the County's municipal code are anticipated for an estimated 16 workdays to accommodate concrete placement that must take place continuously. On such days, work would start at 7 a.m. and could go on beyond 6 p.m. until the concrete pour is completed. Usually, concrete pours are planned to be completed within a 12-hour window and therefore, nighttime impacts are not anticipated. These 16 extended workdays would be

spread out over many months and likely over two seasons of construction. Therefore, noise impacts from construction occurring beyond the allowed construction hours would be intermittent and minimal. No work on weekends and holidays is anticipated.

To estimate daytime construction noise levels that the closest sensitive receptors would be exposed to, consistent with the methodology recommended by the FTA in its *Transit Noise and Vibration Assessment Manual*, the two noisiest pieces of equipment used for Project construction are assumed to be operating simultaneously at the center of the Project construction area, approximately 400 feet from the nearest residential receptors. Taking into account the acoustical usage factors, simultaneous operation of a drill rig and a grader at the same location would generate a combined daytime noise level of approximately 64.5 dBA L_{eq} at the nearest sensitive receptors. During extended construction hours for concrete pour, the operation of a concrete mixer and concrete truck would generate a combined noise level of 59.6 dBA, L_{eq} at the nearest residences. These estimated noise levels do not account for the additional attenuation that would result due to woodland screening that would occur. Project construction noise during extended hours would be more noticeable at the nearest receptors due to the lower background ambient noise level and increased sensitivity for noise at these hours. There are no quantitative standards for construction noise specified by either the Marin Countywide Plan or the municipal code and construction projects of public agencies and utilities such as the Project are qualified to be exempt from construction hour restrictions specified by the code. The FTA's Transit Noise and Vibration Impact Assessment has identified a daytime 1-hour L_{eq} level of 90 dBA as a noise level where adverse community reaction could occur at residential land uses (FTA, 2018). Construction noise generated by the Project would be well below this level. In addition, construction contractors would be required to comply with Marin Water's Environmental Standards for noise control during construction, which specifies maximum allowed noise levels for equipment used as well as best management practices to manage noise impacts to neighboring receptors. Therefore, noise impacts from construction equipment at the Project site would be less than significant.

In addition to construction equipment, noise would also be generated from construction vehicles transporting workers and materials to and from the Project site. Construction workers would generate approximately 16 trips per day with an additional construction materials delivery truck trip per day over the course of the construction period. Off-hauling of the excavated spoils would generate 340 one-truck trips between the Project site and the Redwood Landfill, and 4,040 one-way truck trips between the Project site and Bullfrog Quarry. In addition, there would be approximately 313 concrete deliveries to the Project site, representing 626 one-way trips. These trips would be spread out over the 459 workdays of tank, vault, and pipeline construction, but on extended workdays during a concrete pour event, there could be as many as 27 concrete deliveries generating 54 truck trips over the workday. Construction traffic trips to and from the Project site would occur during the less noise-sensitive, daytime hours of 8 a.m. to 5 p.m. on weekdays, except concrete deliveries during "continuous pour" events, when concrete deliveries could take place beyond 6 p.m.

Trucks would travel on U.S. Highway 101 to Sir Francis Drake Boulevard, Bolinas Road, and Concrete Pipe Road to access the Project site. Excluding the Concrete Pipe Road, all these roadways are well-traveled routes in the area and the increase in noise from the addition of Project traffic would not be perceptible. Trucks hauling spoils to the Bullfrog Quarry would follow Sky Oaks Road, Bon Tempe Dam Trail, and Bullfrog Road. The scattered residential receptors in the vicinity of the Project site would experience a temporary increase in roadside noise level due to the addition of Project construction traffic. But this increase would not be substantial since Project construction would average less than five trips per hour. Given the absence of quantitative construction noise standards in the Marin Countywide General Plan or the municipal code, and the exemption allowed for public agencies and utilities by the code for construction projects such as the Project, this impact would be less than significant.

Upon completion of Project construction, and after the tanks are commissioned and operational, the Project would require minimal maintenance, which is expected to generate approximately two visits (four trips) per month from existing staff. The associated increase in vehicle noise would not be perceptible. Noise generated by Project maintenance would therefore result in a less-than-significant impact.

The Project would not generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance. This impact would be less than significant.

b) **Less than Significant Impact.** Construction activity can result in varying degrees of ground-borne vibration, depending on the type of soil, equipment, and methods employed. Operation of construction equipment can cause ground vibrations that spread through the ground and diminish in strength with distance. Buildings on the soil near the construction site respond to these vibrations with varying results, ranging from no perceptible effects at the lowest levels, low rumbling sounds and perceptible vibrations at moderate levels, and slight damage at the highest levels. While ground vibrations from construction activities do not often reach the levels that can damage structures, fragile buildings must receive special consideration.

Equipment expected to be used for Project construction are shown in Table NOI-3. Construction vibration may generate perceptible vibration when impact equipment or heavy earth moving equipment are used; however, there are no structures of historical significance on or in the vicinity of the Project (refer to the Section 3.2.5, *Cultural Resources* for additional details about historic resources). Nearest structures are located 350 feet from the edge of the Project site.

As shown in Tables NOI-1 and NOI-2, the FTA and Caltrans have adopted vibration standards that are used to evaluate potential impacts related to sensitive receiving land uses from vibration. The FTA identifies 0.2 in/sec PPV as the level at which potential damage could result to buildings of conventional construction. Caltrans identifies 0.24 in/sec PPV as the level at which vibration is distinctly perceivable to humans.

Of the equipment shown in Table NOI-3, the bore drill would be the highest vibration generating equipment used for Project construction. Using ground-borne vibration levels for standard types of construction equipment provided by the FTA, vibration levels from the operation of a drill rig would attenuate to 0.002 in/sec PPV at the nearest sensitive receptors 350 feet from construction activities (FTA, 2018). The attenuated vibration level at the nearest receptor would be well below the building damage and human annoyance vibration thresholds of 0.2 in/sec and 0.24 in/sec, respectively. Therefore, operation of construction equipment would result in less-than-significant vibration impacts at nearby residences. Vibration impacts from other equipment used would be lower. Further, the operation and location of each piece of construction equipment at the Project site would not be constant throughout the day, equipment would be operating at different locations within the Project site and would not always be operating concurrently. Consequently, vibration levels during the majority of the construction period at the nearest off-site residences would be much lower. Therefore, ground-borne vibration impacts during construction would be less than significant.

Once operational, the Project would not include any new sources of vibration. Therefore, the Project would have no operational impacts resulting from ground-borne noise and vibration.

c) **No Impact.** The Project site is not within two miles of a private airstrip or a public use airport. Therefore, the Project would not expose people working in the Project area to excessive noise levels from aircraft operations.

References

California Department of Transportation (Caltrans), 2009. *Technical Noise Supplement*, November 2009. Available: https://www.gsweventcenter.com/Draft_SEIR_References/2013_0709_DOT_Technical_Noise_2009.pdf.

———, 2013. *Transportation and Construction Vibration Guidance Manual*, September 2013.

Federal Highway Administration (FHWA), 2017. *Default Noise Emission Reference Levels and Usage Factors*, last updated August 24, 2017. Available: https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm.

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3.2.14 Population and Housing

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XIV. 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)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

a) **No Impact.** The Project proposes to construct two new water storage tanks to replace existing storage that would be decommissioned. Project construction and operation would not include any element that would directly result in new population growth like residences, businesses, or indirectly by the extension of roads and other infrastructure. For these reasons, there would no impact.

b) **No Impact.** The Project location is outside of Fairfax in unincorporated Marin County on undeveloped land. While there are residences approximately 700 feet to the north of the Project site and 450-700 feet west-southwest of the site as described in Chapter 2, *Project Description*, the Project does not propose to displace any existing people or housing. For this reason, there would be no impact.

3.2.15 Public Services

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XV. PUBLIC SERVICES —				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
i) Fire protection?	☐	☐	☐	☒
ii) Police protection?	☐	☐	☐	☒
iii) Schools?	☐	☐	☐	☒
iv) Parks?	☐	☐	☐	☒
v) Other public facilities?	☐	☐	☐	☒

Emergency fire protection and paramedic services in unincorporated Marin County are administered by the Marin County Fire Department in Woodacre, CA (Marin LAFCo, 2021). The fire department consists of 185 personnel, with 88 permanent employees, 70 seasonal employees, and 31 volunteer personnel (MCFD 2017). It serves Woodacre, Nicasio, Lucas Valley, Forest Knolls, Lagunitas, San Geronimo Valley, and provides mutual aid to the community of Fairfax (County of Marin 2021).

The Marin County Sheriff's Office provides law enforcement services to unincorporated communities in Marin County (MCSO 2021). The office is divided into three bureaus: Detention Services, Field Services, and Administrative and Support. Overall, the sheriff's office supports 200 sworn personnel and over 300 personnel in total.

The County of Marin has 18 school districts and over 80 schools serving more than 40,000 PreK-12 students (MCOE 2019). The Marin County Office of Education collaborates with 17 of the school districts to provide financial oversight and centralized services (MCOE 2021).

Marin County Parks is responsible for managing over 17,900 acres of parks and open space in the county. The county has 43 parks and facilities and 34 preserves, with most visitors being Marin residents (MCP 2017). Park property is governed by Marin Municipal code, and open space preserves are regulated by Marin County Open Space District Code. (MCP 2021)

Discussions

a.i) **No Impact.** Project construction would be temporary and intermittent, with three phases over the course of four calendar years. Because of the presence of Northern Spotted Owl, construction would only occur for six months per year, between August 1 and January 31

of the following year. There will be approximately eight workers on any given day during Project construction. Workers would be sourced from the local workforce and would not relocate to communities nearby the Project site for Project construction. Operations and maintenance would be conducted by existing staff. Because Project construction and operation would not increase the local population, the Project would not result in a need for altered or new governmental fire protection facilities. The Project is not anticipated to impact the County of Marin's ability to maintain acceptable service ratios, response times, and other fire-fighting performance objectives. Therefore, the Project would have no impact on fire services**.**

a.ii) **No Impact.** The Project would consist of eight construction workers on any given day during Project construction, and no new employees would be required for operations and maintenance. The Project is not anticipated to impact the Marin County Sheriff's Office's ability to maintain acceptable service ratios, response times, or rother performance objectives. For this reason, the Project would not result in a need for new or altered governmental police protection facilities and the Project would have no impact on police services**.**

a.iii) **No impact.** The Project would not require new or the altering of existing school facilities. There would only be eight construction workers, who would be sourced locally, as stated in a.i, and no new operations and maintenance employees would be required. Therefore, the proposed Project would not result in a permanent increase in employees. For these reasons, the Project would have no impact on schools.

a.iv) **No impact***.* The Project would not result in an increased population or the use of existing recreation facilities such that there would be demand for additional or expansion of park facilities. Project operations would be consistent with existing conditions. For this reason, the Project would have no impact on parks.

a.v) **No Impact.** The Project would not require the need for additional permanent employees and would not increase the use of other public facilities. For this reason, the Project would have no impact on other public facilities**.**

References

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Marin County Sherriff's Office (MCSO). 2021. About Us - Marin County Sheriff's Office (marinsheriff.org). Available: https://www.marinsheriff.org/about-us. Accessed August 2021.

3.2.16 Recreation

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XVI. RECREATION —				
a) Would the project 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?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion

a) **No Impact.** The Mt. Tamalpais Watershed offers over 150 miles of trails and unpaved roads for hiking, over 90 miles of fire roads for cycling. Marin Water also allows horses on unpaved roads and designated trails on the watershed. The Sky Oaks Watershed HQ Office is on Sky Oaks Road, located upslope and south of the Project site. The Taylor Trail originates at the Watershed HQ Office and becomes Concrete Pipe Road for a short distance as the Taylor Trail transitions to the Canyon Trail, about ½ mile south of the Project site. Recreationists sometimes use Concrete Pipe Road as a trail, or to access either the Taylor Trail or the Canyon Trail. While recreation access to Concrete Pipe Road would be limited during construction, the Project would not increase the use of, and would have no impact on existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

b) **No Impact.** The Project would not include recreational facilities or require the construction or expansion of recreational facilities, resulting in no impact on the environment.

References

Marin Water. https://www.marinwater.org/recreation. Accessed August 16, 2021.

3.2.17 Transportation

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XVII. TRANSPORTATION — Would the project:				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Would the project 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)?	☐	☒	☐	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

Discussion

a) **Less than Significant Impact.**

Local and Regional Roadways

Construction of the Project would temporarily increase local traffic due to the transport and delivery of construction equipment and materials, as well as from daily worker trips. Regional access to the Project site would occur from U.S. 101, with local access occurring via Sir Francis Drake Boulevard and Bolinas Road. Additionally, internal watershed property roads would be used to move materials and equipment to and from Bullfrog Quarry and any other watershed sites used for storage or staging. Existing average daily traffic (ADT) on regional and local roadways that would provide access to the Project site is provided in **Table TRA-1**.

TABLE TRA-1
EXISTING ADT ON STUDY AREA ROADWAYS

Roadway Segment	ADT
U.S. 101 @ Larkspur	183,000
U.S. 101 @ San Rafael	212,000
Sir Francis Drake Blvd from Butterfield Rd to Willow Ave	21,890
Bolinas Road at Project site	1,610

SOURCES: ESA, 2021; Caltrans 2019; Transportation Authority of Marin, 2016.

As described in Chapter 2.5, *Project Construction*, Project construction is anticipated to occur over the course of approximately 635 workdays that would begin in January 2022 and would be completed by December 2026. Construction activity would only take place August through January to avoid the Northern Spotted Owl nesting season. Construction would generally occur only during normal working hours, or 8 a.m. to 5 p.m., Monday through Friday. There would be up to sixteen extended workdays to accommodate

concrete placement that must not be interrupted. No work on weekends (Saturday/ Sunday) and holidays (e.g., Thanksgiving, Christmas) is anticipated. Construction activities would generate offsite traffic associated with the delivery of construction vehicles and equipment to the Project site, the daily arrival and departure of construction workers, and the delivery of materials throughout the construction period. A detailed traffic plan would be required by County of Marin for overweight vehicles. Construction staging would occur entirely within the Project site and would not require any temporary lane closures on adjacent roadways (i.e., Bolinas Road).

The Project would require up to eight workers at the Project site at any given time, which includes equipment operators, a construction foreman, truck drivers, and laborers. Eight workers would generate approximately 16 one-way vehicle trips per day. In addition, there would be approximately one truck delivery (two one-way vehicle trips) at the Project site per day, ranging from equipment and materials deliveries, to daily deliveries of parts and tools.

The following truck hauling activities that would occur during Project construction would generate additional truck trips:

- Spoils off-hauling would require 170 truck trips (340 one-way trips) between the Project site and the Redwood Landfill, and 2,020 truck trips (4,040 one-way trips) between the Project site and Bullfrog Quarry over the course of approximately 459 workdays.
- There would be approximately 313 concrete deliveries, representing a total of 626 one-way trips. On extended workdays during a continuous pour event, which could occur on up to 16 workdays spread out over many months and likely over two seasons of construction, there could be as many as 27 concrete deliveries generating 54 one-way truck trips over the course of a 12-hour workday.

Since truck trips between the Project site and Bullfrog Quarry would generally occur on internal watershed property roads (see Figure 2-5, Haul Routes), those vehicle trips are not included in the transportation analysis because they would not generate traffic on the public roadways that would be used to access the Project site (i.e., U.S. 101, Sir Francis Drake Boulevard, and Bolinas Road). Spoils off-hauling to the Redwood Landfill would generate approximately two one-way truck trips/day, while concrete deliveries during a continuous concrete pour event would generate approximately 54 one-way truck trips/ day. While it is unlikely that truck trips to/from the Redwood Landfill would occur on the same days as the continuous concrete pours, the transportation analysis conservatively assumes that both activities could occur simultaneously. In total, these 16 days of peak construction activity could generate approximately 74 one-way vehicle trips to/from the Project site (16 worker trips, two truck delivery trips, two spoils off-haul truck trips, and 54 concrete truck trips).

Based on the existing ADT volumes on study area roadways shown in Table TRA-1 and the estimated number of construction-related project trips described above (74 one-way trips), construction activities would increase the ADT volume on study area roadways by

no more than 4.6 percent (i.e., too small of a change to be perceived by the average motorist). These changes in daily traffic would be within the typical daily fluctuations experienced on roadways (plus or minus 5 percent) and therefore, do not represent a substantial increase in traffic. The percentage increase in traffic on U.S. 101 would be even smaller, considering that volumes on freeways are much higher than those on local roadways.

Once the Project is in operation, it is anticipated that no new staff would be employed specifically to operate or perform routine maintenance on the new facilities. Maintenance is dependent on seasonal needs, but for the purposes of the transportation analysis it is anticipated maintenance would occur up to two days per month and would mostly involve water quality sampling, instrument checks, pipe inspection, tank cleaning, and site mowing. Such activities would generate very few (i.e., less than five) worker and truck trips per month. Major repair activities would be episodic and occur only as-needed and cannot be reliably anticipated or scheduled. Therefore, additional truck trips resulting from maintenance of the Project would be minimal.

Based on the above discussion, construction and operation of the Project would result in less-than-significant impacts on roadways.

Congestion Management Plan Facilities

Congestion management programs and level of service (LOS) standards established by congestion management agencies are intended to monitor and address long-term traffic conditions related to future development that generate permanent (on-going) traffic increases, and do not apply to temporary impacts associated with construction projects. Updated every two years, Marin County's Congestion Management Program (CMP) monitors the local multi-modal transportation networks level of service on roadways, bicycle and pedestrian facilities and transit services, and identifies improvements to the performance of these multi-modal system.

As described above, following construction, traffic increases associated with Project operation and maintenance would be minimal and would only occur up to two days per month. The Project would be operated and maintained by existing staff and would not require additional workers. Thus, there would not be a substantial increase in vehicle trips resulting from the Project. The impact on CMP facilities would be less than significant.

Public Transit, Bicycle, and Pedestrian Facilities

Due to the rural nature of the Project site, there are no transit stops located nearby. The nearest bus stop is located approximately 1.5 miles north of the Project site in the Town of Fairfax, which is served by several Marin Transit routes. There is an existing Class III bicycle facility on Bolinas Road that terminates at Porteous Avenue, approximately 1.0-mile north of the Project site. There are no sidewalks on Bolinas Road adjacent to the Project site.

The Project would neither directly nor indirectly eliminate existing or planned alternative transportation corridors or facilities (e.g., bike paths, lanes, etc.), including changes in policies or programs that support alternative transportation, nor construct facilities in locations for which future alternative transportation facilities may be planned. The Project would not conflict with the policies set forth in the Town of Fairfax General Plan (Town of Fairfax, 2012) or the Marin Countywide Plan (County of Marin, 2007) supporting alternative transportation. As described above, construction activities associated with the Project would not generate traffic volume increases that would significantly affect traffic flow on area roadways. The performance of public transit, bicycle and pedestrian facilities in the area likewise would not be adversely affected. This impact would be less than significant.

b) **Less than Significant Impact.** In accordance with Senate Bill (SB) 743, the new CEQA Guidelines Section 15064.3, subdivision (b) was adopted in December 2018 by the California Natural Resources Agency. These revisions to the CEQA Guidelines criteria for determining the significance of transportation impacts are primarily focused on projects within transit priority areas and shifts the focus from driver delay to a reduction of greenhouse gas emissions, creation of multimodal networks, and promotion of a mix of land uses. Vehicle miles traveled, or VMT, is a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person.

The County has not yet adopted VMT screening criteria and thresholds and, therefore, the statewide guidance as documented in the *Technical Advisory on Evaluating Transportation Impacts in CEQA* (Technical Guidelines) would apply to the Project. According to the Technical Guidelines, absent substantial evidence indicating that a project would generate a potentially significant level of VMT or inconsistency with a Sustainable Communities Strategy or general plan, projects that generate fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact.

Taking the information discussed above into account, the Project would not conflict with or be inconsistent with CEQA Guidelines Section 15064.3(b) during construction. Construction-generated trips would be temporary and would result in fewer than 110 trips per day during the peak construction traffic period, when there would be as many as 16 daily construction worker trips and 58 daily truck trips. Furthermore, no changes to existing operation and maintenance activities are anticipated. For these reasons, VMT generated by the Project would be less than significant, and no mitigation is required.

c) **Less than Significant Impact with Mitigation.** The Project would not introduce any new intersections or adjusted roadway geometry that would have the potential to introduce a hazardous driving condition. Additionally, as noted in Question a) above, the Project would not introduce a substantial number of large construction or delivery vehicles to area roadways during the construction phase.

However, as shown in Figure 2-5, Haul Routes, and described in Chapter 2.5, *Project Description*, haul trucks transporting soil between the Project site and Bullfrog Quarry may need to use Bolinas Road (via Concrete Pipe Road) to reach Sky Oaks Road if, for some reason, the temporary access road providing direct access to Sky Oaks Road is not available. In this case, haul trucks making turns onto and off of Bolinas Road within the relatively short distance between Concrete Pipe Road and Sky Oaks Road (approximately 80 feet) may introduce hazardous conditions for people driving, bicycling, or walking on Bolinas Road. This impact, which is potentially significant, would be addressed through implementation of the following mitigation measure:

> **Mitigation Measure TRA-1: Construction Traffic Control Plan.** Prior to the issuance of construction permits, the construction contractor shall prepare and submit a Construction Traffic Control Plan to the County of Marin Public Works Department for approval. The Construction Traffic Control Plan must be prepared in accordance with the California Department of Transportation Manual on Uniform Traffic Control Devices and must address, at a minimum, the following issues:
>
> 1) Placing temporary signing, lighting, and traffic control devices if required, including, but not limited to, appropriate signage along access routes to indicate the presence of heavy vehicles and construction traffic.
> 2) Provision of construction personnel at the Bolinas Road intersections of Concrete Pipe Road and Sky Oaks Road to direct traffic, pedestrians, and bicyclists while trucks are turning onto and off of Bolinas Road.

With implementation of Mitigation Measure TRA-1, potentially hazardous conditions associated with haul trucks traveling between the Project site and the Bullfrog Quarry by way of Bolinas Road would be minimized. Therefore, the impact would be reduced to a less-than-significant level.

d) **Less than Significant Impact.** The Project would not change the configuration of the Project area's road network, and would not require temporary lane closures which would create reduced traffic capacity issues. As described in Question a) above, construction would cause a less-than-significant increase in congestion on area roadways, though slow-moving construction-related vehicles could temporarily interfere with emergency response to the Project site (e.g., emergency service vehicles traveling behind the slow-moving truck). However, all vehicles are required by law to yield to responding emergency vehicles that have warning apparatus in operation, and it is not considered likely that heavy construction-related traffic would result in inadequate emergency access. Adherence to existing traffic rules-of-the-road would ensure that the Project's construction impacts to emergency access would be less than significant.

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3.2.18 Tribal Cultural Resources

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. TRIBAL CULTURAL RESOURCES —				
a) 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:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources. Code Section 5020.1(k), or	☐	☒	☐	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

The cultural, archaeological, and historical resources are discussed above in Section 3.2.5, *Cultural Resources*.

Discussion

a.i) **Less than Significant with Mitigation.** Tribal cultural resources are: (1) sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are listed, or determined to be eligible for listing, in the California Register of Historical Resources (California Register), or local register of historical resources, as defined in PRC Section 5020.1(k); or (2) a resource determined by the CEQA lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in PRC Section 5024.1(c). For a cultural landscape to be considered a tribal cultural resource, it must be geographically defined in terms of the size and scope of the landscape (PRC Section 21074[b]). A historical resource, as defined in PRC Section 21084.1, unique archaeological resource, as defined in PRC Section 21083.2(g), or non-unique archaeological resource, as defined in PRC Section 21083.2(h), may also be a tribal cultural resource.

Through background research at the Northwest Information Center of the California Historical Resources Information System, no known archaeological resources that could be considered tribal cultural resources, are listed or determined eligible for listing in the California Register, or included in a local register of historical resources as defined in PRC Section 5020.1(k), pursuant to PRC Section 21074(a)(1), would be impacted by the Project.

According to the requirements of PRC Section 21080.3.1(b), one tribe, the Federated Indians of Graton Rancheria, has previously requested consultation regarding projects in the vicinity of lands under the jurisdiction of Marin Water. On June 22, 2021, ESA sent a request to the Native American Heritage Commission (NAHC) for a sacred lands file search and list of culturally-affiliated Native American tribes in reference to the Project. The NAHC responded on July 14, 2021, that the results were negative for sacred sites and provided a list of tribes to contact who might provide additional information about the Project site and vicinity. On July 15, 2021, Marin Water sent letters to the Federated Indians of Graton Rancheria and the Guidiville Indian Rancheria. By letter dated August 19, 2021, the Federated Indians of Graton Rancheria notified Marin Water of their formal request for tribal consultation.

Based on the above discussion, Marin Water did not identify any tribal cultural resources listed or eligible for listing in the California Register, nor did they determine any resources to be significant pursuant to criteria set forth in Subdivision (c) of PRC Section 5024.1. In the event that cultural materials are identified during Project implementation that are determined to be tribal cultural resources, implementation of **Mitigation Measure CUL-1: Cultural Resources Awareness Training and Inadvertent Discovery of Archaeological Resources or Tribal Cultural Resources**, outlined above in Section 3.2.5, *Cultural Resources*, would reduce potentially significant impacts to less than significant. This mitigation would ensure that work is halted in the vicinity of a find until a qualified archaeologist and a Native American tribal representative can make an assessment and provide additional recommendations.

a.ii) **Less than Significant with Mitigation**. For the same reasons stated in the analysis of potential impacts on tribal cultural resources above for issue a.i, impacts would be potentially significant, but implementation of Mitigation Measure CUL-1 would reduce impacts to less than significant.

3.2.19 Utilities and Service Systems

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XIX. 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?	☐	☒	☐	☐
b) 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?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

Discussion

a) **Less than Significant with Mitigation.** The Project site lies within Marin Water's jurisdiction (Marin Map 2021), with 75% of water supply coming from Mt. Tamalpais and West Marin, and the rest coming from the Russian River water system in Sonoma County (Marin Water 2020). The Project includes Marin Water's relocation of water storage facilities. New storage would include the construction of two, 2-MG storage tanks, which would replace the storage currently provided by the existing Pine Mountain Tunnel; storage at the existing Pine Mountain Tunnel would be discontinued. The two new tanks would be connected to an existing 30-inch diameter pipeline that passes by the tank site under Concrete Pipe Road, and conveys water from uphill to fill the tanks, and conveys water downhill to customers. No other water facilities would be affected, and new or expanded water facilities would not be needed to serve the Project during construction or operation; there would be no impact.

Wastewater treatment at the Project site is provided by the Ross Valley Sanitary District (RVSD) (RVSD,2021). Solid waste services are regulated by the Waste Management Division of the Marin County Department of Public Works (Marin County 2021) and provided by Marin Sanitary Service (Marin Sanitary Service 2021). Construction activities would be staffed from the existing regional workforce. The Project would not require additional staff to operate. Therefore, new or expanded wastewater or solid waste facilities would not be needed during construction or operation; there would be no impact.

The Project includes stormwater collection; two naturally occurring drainages exist on the Project site between Sky Oaks and Concrete Pipe Road and would be re-routed around the two storage tanks. Stormwater would be conveyed to one or two newly constructed culverts underneath Concrete Pipe Road and the discharge would be designed to dissipate energy prior to being released into the natural drainage downstream of the Project site. Additional new or expanded stormwater collection facilities would not be required during construction and operation; there would be no impact.

Telecommunication services at the Project site are regulated by the California Public Utilities Commission (CPUC 2021) (The Marin County Community Development Agency 1998) and provided by various private companies. Electricity at the site is provided by PG&E and an overhead electrical line crosses the Project site. No PG&E gas transmission pipelines are mapped in the project vicinity (PGE 2021). The Project would not require additional staff or otherwise increase demand for utilities once operational. Therefore, Project operations would not require or result in the construction of new or expanded utilities; there would be no impact.

However, Project construction could result in the temporary or permanent need to relocate an overhead electrical line, and could require the relocation of other utilities, if present. As described in Chapter 2, *Project Description*, the Project proposes to construct an underground concrete vault with piping that would connect the new tanks to an existing pipe in Concrete Pipe Road, and one or two new culverts would be constructed under Concrete Pipe Road to convey storm flows into the natural drainage below the Project site. Concrete Pipe Road is within the RVSD service area and sewer pipelines may be present in the road in the vicinity of the Project (Personal Communication, August 26, 2021). While the construction contractor is required by State law to conform to applicable Cal OSHA Construction Safety orders, including a requirement to contact USA North at least two working days prior to initiation of ground-disturbing construction activities, the implementation of **Mitigation Measure UT-1, Coordinate with Utility Providers, and Develop Utility Avoidance Plan** would avoid potential impacts by requiring Marin Water to locate and avoid utilities in Concrete Pipe Road during construction, reducing impacts to a less-than-significant level.

> **Mitigation Measure UT-6: Coordination with Utility Providers and Develop Utility Avoidance Plan:** Prior to start of construction, Marin Water shall coordinate with appropriate utility providers to determine the location of utilities and incorporate into construction specifications the requirement that the contractor develop a plan to avoid utilities during construction. The Plan shall be approved by Marin Water and submitted to the appropriate utility providers, to include but may not be limited to: sewer, gas, electricity, telephone, and cable. If it is determined that no utilities are present, additional avoidance measures shall not be needed.

The Project would not generate an increase in demand for any utility, and new facilities or the expansion of existing facilities would not be required; there would be no impact. However, the Project may require the temporary or permanent relocation of utilities,

which could result in a potentially significant impact. Implementation of Mitigation Measure UT-1, Coordination with Utility Providers and Develop Utility Avoidance Plan, would reduce the impact on utilities to less than significant with mitigation.

b) **No Impact.** The Project is a water supply storage project and would not in and of itself generate demand for water. Intermittent use of potable water for sanitary and drinking needs would be required for the 8 onsite construction workers, but the Project would have sufficient water supplies to serve their needs. Because the Project would not result in a change in water use or consumption, the Project would not affect water supplies or the availability to serve reasonably foreseeable future development during normal, dry, and multiple dry years. For this reason, the Project would have no impact on water supplies.

c) **No Impact.** The Project would not generate wastewater or disrupt wastewater services during construction or operation. Temporary wastewater facilities would be provided for the 8 on-site construction workers for the duration of construction, and there would not be a new source of wastewater discharge. The Project would not generate wastewater or affect the RVSD's ability to provide wastewater treatment capacity to their existing customers. For these reasons, the project would have no impact on wastewater capacity.

d) **Less than Significant.** The California Integrated Waste Management Act of 1989 established the goal of diverting at least 75 percent of generated waste (based on per capita disposal rates) in California by 2020. In addition, the 2019 California Green Building Code (adopted by reference by Marin County) requires all construction and demolition projects to reuse or recycle at least 65 percent of materials generated, and Zero Waste Marin[9] ensures Marin County's compliance with state recycling mandates and provides residents and businesses with information on household hazardous waste collection, recycling, composting, and waste disposal.

Solid waste would be recycled or disposed to a landfill and comply with local management and reduction statutes related to solid waste. As described in Chapter 2, *Project Description*, 2,700 CY of spoils would be recycled or disposed of at the Redwood Landfill in Novato, over 52 construction days. The landfill is permitted to accept 2,310 CY materials daily (Redwood Landfill, 2021) and is permitted for all types of waste generated by project construction. Redwood Landfill accepts and recycles concrete and asphalt, clean soil, construction and demolition debris, and other materials (Waste Management, 2021). Given the volume and type of solid waste generated during construction, the Project would not generate solid waste more than State or local standards, or in excess of the capacity of local infrastructure, or otherwise impairing attainment of solid waste reduction goals. For these reasons, the Project impact would be less than significant.

e) **Less than Significant.** As stated above, approximately 2,700 CY of soil would be disposed of at the Redwood Landfill during construction, and the Project would not

[9] Zero Waste Marin is the formal name for the Marin Hazardous and Solid Waste Joint Powers Authority (JPA), which provides education and information to residents and businesses about recycling and reducing solid waste (Zero Waste Marin, 2021). The Authority also ensures compliance with California Integrated Waste Management Act.

generate solid waste during operations. The types of solid waste generated from Project construction would be consistent with Redwood Landfill permit requirements and could be recycled; the remaining volume of solid waste would be negligible and would not reduce Redwood Landfill's capacity. For these reasons, Project construction and operation would comply with goals set by Zero Waste Marin, federal, and state reduction statutes and regulations related to solid waste and the Project's impact would be less than significant.

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3.2.20 Wildfire

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. 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?	☐	☐	☒	☐
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?	☐	☐	☒	☐
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?	☐	☐	☒	☐

Discussion

a) **Less than Significant**. The Marin County Fire Service created the Mt. Tamalpais Mutual Threat Zone Plan (MTZ Plan) for wildland urban interface fires on and around Mt. Tamalpais. Included in the MTZ Plan are maps for areas that include Structural Protection Zones and evacuation routes. The Project site is included on the Ross Valley – South Area map, on which Bolinas Road is delineated as a primary evacuation route (Marin County, 2018).

Section 2.5.5, *Vehicle Trips and Haul Routes*, in the *Project Description*, states that Bolinas Road would be used as a truck and worker commute route. Additionally, spoils excavated from the Project site would be hauled to Bullfrog Quarry via Sky Oaks Road, Bon Tempe Dam Trail, and Bullfrog Road. At the Project site, a temporary access road would provide direct access to Sky Oaks Road to the north, and west of the site. When the temporary access road would not be available, haul trucks would use Bolinas Road (via Concrete Pipe Road) to reach Sky Oaks Road.

While Bolinas Road would be utilized as a commute and haul route, the Project would not require any road closures on Bolinas Road and traffic generated by the Project is not expected to cause congestion such that the Project would impair or physically interfere with the MTZ Plan. Impacts related to impairment or physical interference of an emergency response or evacuation plan would be less than significant.

b) **Less than Significant**. The Project does not include the addition of structures that are intended for, and would not be used for, occupation and therefore, would not expose occupants to increased risks associated with wildfire. However, there are single-family residences within 700 feet to the north and west-southwest of the Project site. Therefore,

the following analysis focuses on the potential for Project construction and operation to increase the exposure of these communities to wildfire risks.

Although the Project site is in a moderate Fire Hazard Severity Zone, it is surrounded by areas classified as high or very high Fire Hazard Severity Zones (CAL FIRE, 2007) and the Project site is adjacent to an Urban Wildland Interface area (Marin County, 2021). Additionally, the Project site is along a steep slope and is subject to high winds (Marin County Fire Department, 2020), which can exacerbate wildfire risks. Further, construction will take place between August and January; these months coincide with the occasional Northern California Diablo winds conditions, which affect Marin County and exacerbate wildfire risks (Marin County Fire Department, 2020).

The use of construction equipment and the possible temporary on-site storage of fuels and/or other flammable construction chemicals could pose an increased fire risk resulting in injury to workers or the public during construction.

As stated in Chapter 2, *Project Description*, Marin Water's standard specifications for Environmental Protection (Section 18000)) and High Fire Danger Alerts and Closures (Section 01000) will be complied with and are included as Appendix A. Fire prevention standards are included in the standard specifications for Environmental Protection and include the requirement for spark arrestors on all internal combustion engines, storage and handling of flammable liquids to be in accordance with the Flammable and combustible Liquids Code, and fire extinguishers are to be provided at hazardous locations or operations. The High Fire Danger Alerts and Closures standards requires the suspension of work in the watershed upon notification from the County Fire Department that a "Red Flag Warning - High Fire Danger Alert" exists for Marin County, and provides guidance for the safe operation of vehicles, equipment, and tools as well as for grass and brush mowing, and welding. Additionally, Chapter 7A of the California Building Code (CBC) specifically addresses the wildland fire threat to structures by requiring the use of fire-resistant materials and construction techniques; New buildings, additions and exterior remodels to buildings located in any Fire Hazard Severity Zones or any Urban Wildland Interface fire area designated by the enforcing are subject to the CBC regulations.

Contractors would be required to comply with hazardous materials storage and the aforementioned fire protection regulations, which would minimize potential for fire creation, and ensure that the risk of wildland fires during construction would be less than significant.

c) **Less than Significant**. As stated in Section 2.2, *Project Objectives*, one purpose of the Project is to provide emergency storage on Marin Water's watershed to aid in firefighting. However, the installation of the storage tanks would not exacerbate fire risk or result in temporary or ongoing impacts to the environment. Additionally, the Project does not include any other installation or maintenance of associated infrastructure. As stated in Question b, above, the Project would be required to implement fire prevention measures, including Marin Water's standard specifications. Compliance with all applicable fire

prevention requirements would reduce the fire risk, and this impact would be less than significant.

d) **Less than Significant**. As discussed in Section 3.2.7, *Geology and Soils*, the Project site is along a steep slope and in an area that could be susceptible to landslide. However, Sections 3.2.7 (*Geology and Soils)* and 3.2.10 (*Hydrology and Water Quality*) identify several erosion and sedimentation control measures, compliance of which would be required during construction (i.e., an erosion and sediment control plan, a Stormwater Pollution Prevention Plan [SWPPP], and Marin Water's standard construction practices). Further, the Project design features include re-routing two naturally occurring drainages at the Project site via one or two new culverts that will redirect storm flows discharge back into the natural drainage below the Project site.

The Project design features, in conjunction with the required erosion and sedimentation control measures, would reduce any potential impact related to runoff and drainage changes. Therefore, the Project would not result in changes to runoff or drainage patterns which could exacerbate downslope or downstream flooding and thereby expose people or structures to associated risks, and the impact would be less than significant.

References

California Department of Forestry and Fire Protection (CAL FIRE), 2007. Fire Hazard Severity Zones in State Responsibility Areas (SRA). Adopted by CAL FIRE on November 7, 2007. Forest Resource Assessment Program. Map. Scale 1:100,000.

Marin County Fire Department (MCFD), 2020. Marin Community Wildfire Protection Plan. December 2020.

Marin County, 2021. Interactive Wildland Urban Interface Zone Map. Available online: https://www.marincounty.org/depts/fr/divisions/fire-prevention-investigation/prevention-documents. Accessed on August 10, 2021.

3.2.21 Mandatory Findings of Significance

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XXI. 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?	☐	☒	☐	☐
b) Does the project 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 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?	☐	☒	☐	☐

Discussion

a) **Less Than Significant Impact with Mitigation.** The Project has the potential to degrade the quality of the environment. As described above in Sections 3.2.1 through 3.2.20, the Project has the potential to cause significant impacts related to Biological Resources, Cultural Resources and Tribal Cultural Resources, Geology and Soils, and Hydrology and Water Quality. Mitigation measures have been identified to reduce these potential impacts to less than significant levels. No further mitigation would be required, and the Project would not degrade the quality of the environment (see sections 3.2.1 through 3.2.20 above, for detailed analysis).

The Project has the potential to impact biological resources. As discussed above in Section 3.2.4, Biological Resources, the Project could result in impacts during construction on rare plants, nesting birds, Northern Spotted Owl, special status bats, and existing heritage and protected trees. However, implementation of the following mitigation measures would ensure that all impacts to biological resources would be less than significant:

- BIO-1: Protection of Rare Plants,
- BIO-2a: Protection of Nesting Birds
- BIO-2b: Protection of Northern Spotted Owl
- BIO-3: Bat-Safe Tree Removal
- BIO-4: Habitat Restoration and Monitoring
- BIO-5: Minimize Impacts on Heritage Trees

No other biological resources would be substantially affected, and the Project would not 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, or reduce the number or restrict the range of a rare or endangered plant or animal. For additional discussion, please refer to Section 3.2.4, Biological Resources.

The Project has the potential to impact Cultural and Tribal Cultural resources. As discussed in Section 3.2.5, Cultural Resources, and Section 3.2.18, Tribal Cultural Resources, there are no documented historical resources, archaeological or tribal cultural resources in the Project area. However, implementation of the following mitigation measures would ensure that all inadvertent impacts on cultural and tribal cultural resources would be less-than-significant, and the Project would not eliminate important examples of the major periods of California history or prehistory.

- CUL-1: Cultural Resources Awareness Training and Inadvertent Discovery of Archaeological Resources or Tribal Cultural Resources
- CUL-2: Inadvertent Discovery of Human Remains

For additional discussion, please refer to Section 3.2.5, Cultural Resources and Section 3.2.18, Tribal Cultural Resources.

The Project has the potential to result in soil erosion during excavation and grading on steep slopes, and from soil stockpiling. As discussed in Section 3.2.7, Geology and Soils, the Project has the potential to increase erosion, scouring of bank, contamination of water courses, and otherwise increase sedimentation. However, implementation of Mitigation Measure HYD-1, Water Control, Drainage, and Discharge Plan, would ensure that all erosion impacts would be less-than-significant. For additional discussion, please refer to Section 3.2.7, Geology ad Soils.

The Project has the potential to violate water quality standards, degrade surface water quality, result in erosion or siltation on- or off-site, increase the rate or amount of surface runoff, or contribute to runoff that would exceed storm drain system capacities. Implementation of Mitigation Measure HYD-1, Water Control, Drainage and Discharge Plan, would ensure that all surface water impacts would be less-than-significant. For additional discussion, please refer to Section 3.2.10, Hydrology and Water Quality.

b) **No Impact.** As described in Sections 3.2.1 through 3.2.20, the Project has the potential to cause significant impacts related to Biological Resources, Cultural Resources and Tribal Cultural Resources, Geology and Soils, and Hydrology and Water Quality. Mitigation measures have been identified to reduce these potential impacts to less than significant levels.

Cumulative environmental effects are multiple individual effects that, when considered together are considerable, or compound or increase other environmental impacts. The individual effects may result from a single project or several separate projects and may

occur at the same place and point in time or at different locations and over extended periods of time.

As discussed in Sections 3.2.1 through 3.2.20, individual project-related potentially significant impacts have been identified for the Project, all of which would be mitigated to less-than-significant levels through implementation of the identified mitigation measures. The Project would have limited impacts on the physical environment and the impacts associated with implementation of the Project would occur during construction, and thus would be short-term.

The potential for Project-generated impacts to contribute to a significant cumulative impact would arise if they would be located within the same geographic area as other projects. In addition to the geographic scope, cumulative impacts can be determined by timing of the other projects relative to the Project. Schedule is particularly important for construction-related impacts. For a group of projects to generate cumulative construction impacts, they must be temporally as well as spatially proximate.

However, Marin Water has not identified any known past, present or future projects in or near the Project site. Therefore, the Project does not have the potential to contribute to cumulative effects. There would be no impact.

c) **Less Than Significant Impact with Mitigation.** As described in a) above, the Project has the potential to cause potentially significant impacts related to Biological Resources, Cultural Resources and Tribal Cultural Resources, Geology and Soils, and Hydrology and Water Quality. Mitigation measures have been identified to reduce these potential impacts to less than significant levels. Impacts on air quality (i.e., fugitive dust during construction), water quality (i.e., release of pollutants due to Project construction), hazardous materials (i.e., exposure to hazardous materials), and transportation (hazardous conditions for people driving, bicycling, or walking on Bolinas Road) resulting from the Project could directly affect human beings, and all CEQA impacts discussed above could indirectly affect human beings. Mitigation measures discussed in Sections 3.2.1 through 3.2.20 would ensure that impacts would be reduced to less than significant and would not cause substantial adverse effects on human beings, either directly or indirectly. No further mitigation would be required.

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CHAPTER 4
Lead Agency and Consultants

4.1 Lead Agency

Marin Municipal Water District (Marin Water)

Alex Anaya
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Corte Madera, CA 94925
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4.2 Consultants

Environmental Science Associates (ESA)

Dave Davis, Project Director

Eric Zigas, Project Manager

Brandon Carrol, Geology and Soils, Hazards and Hazardous Materials, Minerals, Wildfire

Maria Hensel, Hydrology and Water Quality

Jyothi Iyer, Noise

Heidi Koenig, Cultural Resources, Tribal Cultural Resources

Alisa Moore, Aesthetics

Deja Newton, Agriculture and Forestry, Land Use and Planning, Public Services, Population and Housing, Utilities

Shadde Rosenblum, Transportation

Liza Ryan, Biological Resources

Bailey Setzler, Air Quality, Energy, Greenhouse Gas Emissions

Eric Zigas, Recreation

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Appendix A

Marin Water's Standard Specifications for Earthwork, Environmental Protection, and High Fire Danger Alerts and Closures

ESA

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

This section includes specifications for furnishing, placing and performing earthwork for excavations, shoring, dewatering, backfilling, compaction and grading, at the required lines and grades, as shown on the drawings. The excavation shall include, without classification, the removal and disposal of all materials of whatever nature encountered, except hazardous waste. Water and all other obstructions, that would interfere with the proper construction and completion of the required work shall be removed and disposed of in accordance with the requirements of Section 18000 - ENVIRONMENTAL PROTECTION.

1.2 RELATED SECTIONS

A. Section 02713 - DISTRIBUTION PIPING SYSTEM

B. Section 03400 - CONTROL DENSITY FILL

1.3 REFERENCES

A. ASTM D1557 - Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb rammer and 18 inch drop.

B. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures

C. ASTM D2419 – Sand Equivalent Value of Soils and Fine Aggregates

D. ASTM D2487 - Classification of Soils for Engineering Purposes

E. ASTM D2844 - Resistance R Value and Expansion Pressure of Compacted Soils

F. ASTM D2922 - Density of Soil and Soil-Aggregate in place by Nuclear Methods (Shallow Depth)

G. ASTM D3017 - Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.4 SUBMITTALS

A. Sheeting and Shoring Plan: Refer to General Specifications, Article 11.

B. Samples and Test Results: Furnish, without additional cost to the District, such quantities of import materials as may be required by the Engineer for test

purposes. The Contractor shall cooperate with the Engineer and furnish necessary facilities for sampling and testing of all materials and workmanship. Submit test results for import materials. All material furnished and all work performed shall be subject to rigid inspection, and no material shall be delivered to the site until it has been favorably reviewed by the Engineer, or used in the construction work until it has been inspected in the field by the Engineer.

1.5 DUST CONTROL

Refer to Section 18000, Paragraph 3.2B.

1.6 SITE ACCESS

Access to the site will be over public and private roads. The Contractor shall exercise care in the use of such roads and shall repair at his own expense any damage thereto caused by his operations. Such repair shall be to the satisfaction of the owner or agency having jurisdiction over the road. The Contractor shall take whatever means are necessary to prevent tracking of mud onto existing roads.

1.7 SOILS TESTING

Listed below are the standard test methods to be employed by the District or by the Contractor's soils testing firm. The intent of these tests is to insure the quality of backfill material and the workmanship, methods and final product of the Contractor.

A. In determining the in-place Density of Soil and Soil-Aggregate by nuclear methods, testing shall conform to ASTM D2922 or California Test Method No. 216.

B. In determining laboratory moisture-density relationships of soils, testing shall conform to by ASTM D1557 or California test method No. 216.

C. In determining the in-place moisture content of soils, testing shall follow ASTM D3017, ASTM D2216, California Test Method No. 226.

D. In determining the Sand Equivalent, ASTM D2419 or California Test method No. 217 shall be used.

E. In determining the resistance value, testing shall conform to ASTM D2844 or California Test Method No. 301.

F. Classification of soils for Engineering Purposes shall be in accordance with ASTM D2487.

PART 2 - MATERIALS

2.1 EARTHWORK BACKFILL

The types of backfill material indicated below may be used for backfilling trenches as indicated in the specifications, shown on the Drawings or directed by the Engineer.

A. CLASS 2 AGGREGATE BASE

This material shall conform to the requirements set forth in Section 26 of the most recent CALTRANS Standard Specifications for the ¾" maximum size aggregate. Aggregate grading and quality requirements shall conform to the moving average criteria unless otherwise specified by the Engineer, and shall apply to material both before and after compaction.

Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material may account for up to 100% of the total volume of the aggregate used. Reclaimed material shall conform to the grading and quality requirements set forth in Section 26 of the most recent CALTRANS Standard Specifications for the ¾" maximum size aggregate." The Contractor shall be required to demonstrate that the recycled Class 2 aggregate base material meets CALTRANS standards. See the following link to the CALTRANS web site:

https://dot.ca.gov/programs/design/standard-plans-and-standard-specifications

B. SELECT SAND

This material shall be a clean material free of organic or other deleterious substances and of such gradation that a minimum of 90% will pass a No. 4 sieve and not more than 5% will pass a No. 200 sieve. If low chloride sand is required, the chloride content shall not exceed 30 parts per million by weight.

C. PEA GRAVEL

This material shall be a clean material free of organic or other deleterious substances and shall consist of smooth rock with no facets or sharp edges. Stones shall have a maximum size of 3/8 inch, and not more than 5% will pass a No. 16 sieve.

D. CONTROL DENSITY FILL

If CDF is used, see Section 03400 - Control Density Fill.

E. NATIVE BACKFILL

Where use of native soil is directed, prepare native soil as necessary to be free from clods or rocks larger than 3 inches in greatest dimension, and free from organic material and as approved by the Engineer.

F. DRAIN ROCK OR GRAVEL

If drain rock or gravel is required, river run or crushed rock with a maximum dimension of ¾ inch, with no more than 10 percent passing the No. 200 sieve, and with a durability index of 40 or higher shall be used.

2.2 UNACCEPTABLE MATERIAL

Unless otherwise specified, backfill material shall not contain quarry waste, quarry fines, pea gravel, recycled materials and like material. In addition, any material not conforming to the specifications of Section 2.1 or failing performance testing shall also be unacceptable.

2.3 TRENCHLESS TOOLS

The following is a list of manufacturers that supply equipment relevant to the trenchless techniques described elsewhere in this section.

1. “Ditch Witch” by Charles Machine Works, Inc. (Perry OK) 800-654-6481.

2. “Pow-R Mole” by Petersen Underground Equipment, Inc. (Murray UT) 800-325-6419.

3. “Hole-Hog” or “Red Hog Express” by Allied Construction Products (Cleveland, OH), 216-431-2600.

4. “Ferret” by Footage Tools (Weston, Ontario Canada), 416- 746-2911.

5. “GRUNDOMAT” and “GRUNDORAM” by TT Technologies, available from Plank, (Petaluma CA), 707-763-7070.

6. LTA Corporation (Columbia Heights, MN) 612-781-4292.

7. Hacker Industries (Henderson TX) 908-657-3546.

8. ACCU-PUNCH by Vibra King, Inc. (Mankato, MN), 507-387-6574.

9. “Mighty Mole” by McLaughlin Boring Systems (Greenville, SC) 800-435-9360.

10. Grice Industries, 541-341-4644

PART 3 - EXECUTION

3.1 USA NOTIFICATION AND UTILITY FIELD MEETING

The Contractor shall contact Underground Service Alert (USA) (1-800-642-2444) seven (7) calendar days prior to start of each section and shall be responsible for maintaining a valid USA location tag through renewal during the construction. The Contractor shall schedule a utility field meeting prior to any excavation. This shall be so stated in the USA Notification. The Contractor shall be responsible to coordinate the utility field meeting at which time he shall explain the limits and impacts to USA member utilities.

See CA Government Code 4215

3.2 EXISTING UTILITIES

The Contractor shall expose all existing utilities along the trench alignment and at connections prior to commencement of the work on the project for the pipeline installation. This is to be done in order to determine the line and grade of existing utilities, possible conflicts and mismarks. At connections, the Contractor shall expose the existing pipeline to determine the depth at which the connection is to be made and verify existing pipe material and sizes.

If the contractor damages any existing utilities, the contractor shall immediately notify that utility and make repairs satisfactory to that utility.

3.3 PROTECTION OF EXISTING SURVEY MONUMENTS

The Contractor shall not disturb, remove, alter or destroy any existing land survey monument. In the event that the contractor believes that a monument will be thus impacted, the Contractor shall notify the Engineer. The Contractor shall allow 10 working days for the Engineer to establish sufficient data to reset the monument after the completion of the construction.

3.4 SITE GRADING

A. Rough Grading: After completion of stripping, the Contractor shall rough grade cut areas to the lines, grades and contours shown on the Drawings.

B. Proof-Rolling: After rough grading, the Contractor shall proof-roll the areas where on-grade structures are to be constructed in order to detect soft zones. Proof-roll shall consist of passing over all required areas with a loaded scraper, front-end loader with loaded bucket, or other heavy rubber tired vehicle with high tire pressure, in the presence of the Engineer. The Engineer will determine which areas tested by proof-rolling are soft zones that require the Contractor to complete following corrective work.

1. Soft Zone Corrective Work: Remove all soft material as indicated by the Engineer from all soft zones exposed by proof-rolling. Properly dispose of unsuitable material off site.

2. Fill the resulting voids with moisture-conditioned Native Backfill, in level 8-inch uniform layers measured before compaction. Compact with appropriate equipment to at least 95 percent relative compaction.

3. Soft zone corrective work will be considered a change in the scope of project work and will be paid for in accordance with Article 47 "Changed Conditions" of the General Conditions.

C. Scarifying: The Contractor shall scarify, to a minimum 6-inch depth, all areas where fills are required. Moisture condition the scarified surface to within two percent of optimum water content, and compact to minimum 95 percent relative compaction.

D. Fills:

1. Do not place any fill until the Engineer has inspected, tested to his satisfaction, and favorably reviewed the prepared subgrade.

2. Construct fills as shown on the Drawings, true to line, grade and cross-section. Construct fills of Native Backfill unless otherwise indicated. Place material in approximately 8-inch thick horizontal layers measured before compaction, and carried across the entire width to the required slopes. Compact all fills to a relative compaction of at least 90% unless otherwise specified. Properly moisture condition before compaction.

3. The Contractor may be required to overbuild slopes and trim back to the compacted core to achieve adequate compaction of slope faces.

E. Compaction requirements shall be 90% relative compaction. Material shall be moistened as required to aid compaction.

F. Ditches: Cut ditches accurately to the cross sections and grades shown. Take care not to overexcavate ditches, and backfill excessive excavation to grade. Trim all roots, stumps, rock and other foreign matter from the sides and bottom of the ditches. Compact the surfaces of ditch slopes and bottom.

3.5 PAVEMENT REMOVAL

A. GENERAL

Excavation for the pipe installation shall be open cut and shall include the removal of all paving, concrete, soils, abandoned utilities, water, or other objects of any nature that would interfere with the performance of the work.

B. SAWCUTTING

In locations where the pipe is to be installed by open cut method under asphaltic concrete or concrete pavement sections, the outline of all pavement areas to be removed shall be cut prior to removal as required by the local jurisdiction in which the work is being performed. Any cutting that requires water shall be done with a vacuum system that collects all the water and does not allow any water or cutting products to flow into the storm drain. Cuts shall be neat and true, shall be cut completely through the existing pavement section to subgrade and shall be done without damaging adjacent pavement that is not to be removed. No jack-hammer, "drop hammer," or similar equipment will be allowed to cut the pavement. Grinding that results in cuts wider than 0.5 inch shall not be considered as sawcuts. The Contractor shall anticipate that variations in the thickness of paving exist.

C. DISPOSAL

Pavement removed from the pipeline trench shall be hauled from the job and disposed at a County approved disposal site.

3.6 TRENCH EXCAVATION

A. GENERAL

Trench excavation for pipelines shall be open cut, except that service piping may be installed using either open cut or trenchless methods defined later in this section.

The trench shall be excavated to the lines and grades shown on the drawings and in accordance with trench details. If the trench is excavated below the required grade, the Contractor shall refill the trench excavated below the grade with compacted Class II Aggregate Base at no additional cost to the District.

The Contractor shall perform all excavation regardless of the type, nature, or condition of the material encountered to accomplish the construction. No blasting shall be permitted.

B. TRANSPORT OF SPOILS

Backfill stockpiles and excavation spoils which are not immediately loaded and hauled away shall have local approval from local jurisdiction. This material shall be placed on the site away from trenches, street corners, and active work areas and shall be placed in such a manner as to minimize obstruction to traffic. Gutters and ditches shall be kept clear, or other provisions shall be made for the handling of drainage.

C. EXCAVATION FOR VALVE PLACEMENT

Mains shall be lowered below required minimum depths in the vicinity of gate valves 10-inches and larger in size. To accommodate the valve stem, the main shall be lowered as necessary to achieve the following minimum covers:

- For 10" valves, minimum cover of 36 inches
- For 12" valves, minimum cover of 38 inches

D. ALIGNMENT

The Contractor shall conform, as nearly as possible, to the pipeline alignment indicated on the plans unless modified by the Engineer. Whenever vertical or horizontal deflection of the pipe is required to avoid obstructions or where long radius curves are permitted, the degree of deflection at joints shall be approved by the Engineer.

E. EXCAVATION AT BELL HOLES

When bell holes are required they shall be excavated at each point where pipe ends are to be joined. Bell holes shall be adequately sized to permit ease in making the joint. When necessary, bell holes shall be shored and protected in conformance with CAL/OSHA requirements.

F. SHORING

The Contractor shall at all times comply with Safety Regulations set forth in the State of California, Construction Safety Orders and Trench Construction Safety Orders, issued by CAL/OSHA's Division of Industrial Safety. No excavation shall start until the Engineer has received 1) a copy of the Contractor's permit for the project from the State Division of Industrial Safety and 2) a copy of all project notification forms and/or letters that he has forwarded to the CAL/OSHA District office.

Shoring shall follow a District approved shoring plan submitted by the Contractor. In order to prevent cave-ins and protect adjacent areas, excavation in unstable material shall be adequately shored and braced. Shoring shall remain in place until the pipeline has been installed, inspected and the earth compacted around and over the top of the pipe. Upon completion of the work the Contractor shall remove all shoring unless otherwise specified by the Engineer.

G. ROCK EXCAVATION

Wherever the word "Rock" appears in these Specifications, it shall be interpreted to mean any of the following: (1) material in ledges, bedding deposits of unstratified masses which cannot be removed without the use of hydraulic or pneumatic hammers or continuous drilling and blasting, (2) boulders larger than

one cubic yard which, when first exposed, cannot be broken down from their original state with a modern ¾ cubic yard backhoe power excavator or a Caterpillar D8 with a single tooth ripper, in good condition, and cannot be safely transported in a vehicle for disposal, (3) concrete, asphalt or masonry structures which have been abandoned and cannot be broken down from their original state with a modern ¾ cubic yard backhoe power excavator and (4) conglomerate deposits which are so firmly cemented that they possess the characteristics of solid rock and cannot be removed without systematic drilling.

H. TRENCHLESS INSTALLATION OF PIPELINES

Trenchless installation of pipelines shall be defined as installation of pipe using a technique that does not require open cut excavation along the length of the pipe installed. Examples of typical equipment include a pneumatic "mole" or directional bore. Specific techniques may be required in certain areas as indicated on the Drawings.

3.7 DEWATERING AND DRAINAGE

The Contractor shall provide all equipment and labor adequate to keep all trenches and excavations free of water. The Contractor shall keep excavated areas free of standing or flowing water during pipe installation, concrete placement, and backfilling operations by draining or pumping from a point that is outside the structural limits of work and below that of the excavation. The Contractor shall also provide a positive means to assure that no water will enter previously installed pipe. The Contractor is responsible for obtaining and complying with any discharge permits required by any appropriate regulatory authority and shall not direct drainage effluent in such a manner that damage to adjacent property or natural watercourses occurs.

3.8 REFILLING TRENCHES

A. GENERAL

The Contractor shall place backfill material around structures and in other areas, including overexcavation areas, as shown on the plans and as specified by the Engineer. Backfill shall be placed immediately subsequent to installation of the pipeline and appurtenances, and shall be installed in loose lifts not exceeding eight inches in depth. Compaction requirements shall be 95% relative compaction for Class II Aggregate Base Rock and 90% for native backfill to a depth of 18 inches below the bottom of the required paving and 90% relative compaction below that level. Material shall be moistened as required to aid compaction. No foreign materials (blocking) shall be left in the trench.

B. GEOTECHNICAL TESTING

1. TESTING BY ENGINEER

a. The District shall conduct all soils testing. Soils compaction tests will be taken on a random basis, approximately one test per 100 feet (location determined by the Engineer). Where testing is done, one test shall be taken on the lower lift and one on the upper lift of the base rock.

b Testing shall be accomplished in accordance with ASTM D2922 or California Test Method No. 216.

c. The District will bear all costs of testing except that of a failed retest. The cost of $100 per each retest shall be deducted from any payment due to the Contractor.

C. STEEL PLATES

Steel traffic plates shall not be used without the expressed written approval of the Engineer and the local jurisdiction in control of street openings and encroachments. It is the Contractor's responsibility to contact and secure permission for steel plate use prior to construction within each specific jurisdiction. Steel traffic plates, where approved, shall have a non-skid surface. The determination for use shall be made by the Engineer and shall be final.

D. COMPACTION EQUIPMENT, METHODS, AND REQUIREMENTS

1. GENERAL

Care shall be exercised in any method of backfilling to avoid damage to the protective coating or mortar lining of the pipe. It is important that proper precautions be taken to prevent floating of the pipe. The Contractor shall be wholly responsible for any damage resulting from failure to take necessary precautions when placing and compacting backfill. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or which may damage nearby structures, shall not be used. Use of a hydraulic hammer for compaction will not be allowed.

Backfilling shall conform to the requirements of the applicable local jurisdiction or those included in these specifications, whichever is more stringent. In the case of conflict between the requirements, the Engineer shall determine which shall prevail.

The Contractor should note that he shall be required to install impermeable dikes in areas where existing grades are 10% or greater. The Contractor shall be responsible to determine grades. Impermeable dikes shall be made of Type II concrete, or native clay soils compacted to 95%. Each impermeable dike shall be as wide as the trench, a minimum of six inches in thickness and extend from the bottom of the trench to a point 12

inches above the pipe. Dikes shall be located every 50 feet where required.

2. PAVED AREAS

Backfill materials shall be moistened to near optimum moisture content and shall be placed in the trench on both sides of the pipe for the full width of the trench. Sand shall be brought up evenly on both sides of the pipe. Said materials shall be placed into the trench by hand or by approved mechanical methods, and be compacted to provide solid backing against the external surface of the pipe. The Contractor shall not place or compact backfill above springline until the Engineer has inspected and approved the lower portion of backfill. Flooding of this lower portion of backfill will not be permitted.

The remaining backfill shall be placed in uniform horizontal layers not to exceed eight inches in loose thickness before compaction. Each layer shall be dampened sufficiently and uniformly tamped, rolled with a vibratory compactor or otherwise compacted throughout until the relative compaction is satisfactory. Non-uniform compacted surfaces may be rejected. Inundation of this upper portion of backfill will not be permitted. The material between the bottom of pavement and a plane 18 inches below that, shall be worked until a minimum relative compaction of 95% throughout is reached. Material below that plane shall be compacted to a minimum of 90% relative compaction throughout.

Backfill within 10 feet of any mainline valve shall be placed and compacted in 6-inch lift thicknesses. Backfill shall be compacted to within one inch of finished grade prior to placement of temporary pavement. The Contractor shall compact temporary pavement as required in Section 02500 daily on all surfaces where paving has been removed.

Impact compaction machines, such as a “Hydra Hammer”, and backhoe mounted compaction machines, such as a HedShaker, shall not be used. The Contractor shall compact all backfill to the specified relative compaction as it is being installed. Wheel-rolling will not be allowed.

All excavations shall be restored to the elevation of surrounding pavement prior to completion of each day’s work. If any sections of restored trench settles below the surrounding pavement, the Contractor shall re-work the trench to the same elevation as the surrounding pavement each day.

Any backfill material which cannot be compacted to the specified degree will be rejected. Any backfill material which pumps or is not firm will be rejected even if compaction requirements are satisfied. The Contractor, at his expense, shall remove the rejected material and replace it with suitable material.

Particular care shall be taken in the backfilling and compaction of the area around the taps to the main. Hand tamping will be required rather than equipment tamping or rolling.

3.9 FINISH GRADING

Except where shown otherwise in the Drawings, restore the finish grade to the original contours and to the original drainage patterns. Grade surfaces to drain away from structures. The finished surfaces of the tank pad and access road shall be smooth and compacted. The graded surfaces to receive slope protection shall be furrowed to better match the surface of the undisturbed natural areas adjacent to the project site.

3.10 DISPOSAL OF MATERIAL

Any excess backfill material or material rejected by the Engineer shall be removed from the job site by the Contractor. He shall make all necessary arrangements for the proper and legal disposal of excess material, at his cost, and upon request shall provide written evidence indicating approval to use the disposal site.

END OF SECTION

SECTION 18000

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SCOPE

A. The requirements of Division 1 form a part of this section.

B. During the progress of the work, keep the premises occupied in a neat and clean condition and protect the environment both on site and off site, throughout and upon completion of the construction project.

1.2 SUBMITTALS

Contractor shall develop an Environmental Protection Plan in detail and submit to the Engineer within seven (7) days from the date of the Notice to Proceed. Distribute the plan to all employees and to all subcontractors and their employees.

The Environmental Protection Plan shall include, but not be limited to, the following items:

A. Copies of required permits.

B. Proposed sanitary landfill site.

C. Other proposed disposal sites.

D. Copies of any agreements with public or private landowners regarding equipment, materials storage, borrow sites, fill sites, or disposal sites. Any such agreement made by the Contractor shall be invalid if its execution causes violation of local or regional grading or land use regulations.

E. Proposed project site winterization plan.

1.3 ENVIRONMENTAL REQUIREMENTS

All operations shall comply with all federal, state and local regulations pertaining to water, air, solid waste and noise pollution.

1.4 DEFINITIONS

Sediment - Soil and other debris that have been eroded and transported by runoff water.

Solid Waste - Rubbish, debris, garbage and other discarded solid materials resulting from construction activities, including a variety of

combustible and non-combustible wastes, such as ashes, waste materials that result from construction or maintenance and repair work, leaves and tree trimmings.

Chemical Waste - Includes petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, disinfectants, organic chemicals and inorganic wastes. Some of the above may be classified as "hazardous."

Sanitary Wastes-

Sewage - That which is considered as domestic sanitary sewage.

Garbage - Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food.

Hazardous Mat'ls - As defined by applicable laws and regulations. Undisclosed hazardous material contamination, if encountered will constitute a changed site condition. The District may retain a separate contractor to dispose of undisclosed hazardous material encountered.

PART 2 - PRODUCTS

(None)

PART 3 - EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

A. GENERAL

It is intended that the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their existing condition or be restored to an equivalent or improved condition upon completion of the work. Confine construction activities to areas defined by the public roads, easements, and work area limits shown on the Drawings. Return construction areas to their pre-construction elevations except where surface elevations are otherwise noted to be changed. Maintain natural drainage patterns. Conduct construction activities such that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.

B. LAND RESOURCES

1. Contractor Responsibility

Do not remove, cut, deface, injure or destroy trees, grapevines or shrubs outside the work area limits. Do not remove, deface, injure or destroy trees within the work area without permission from the Engineer. Such improvements shall be removed and replaced, if required, by the Contractor at his own expense.

2. Protection

Protect trees that are located near the limits of the Contractor's work areas which may possibly be defaced, bruised or injured or otherwise damaged by the Contractor's operations. No ropes, cables or guys shall be fastened to or attached to any existing nearby trees, grapevines or shrubs for anchorages unless specifically authorized. Where such special emergency use is permitted, the Contractor shall be responsible for any damage resulting from such use.

3. Trimming

Trim tree limbs overhanging the line of the work and in danger of being damaged by the Contractor's operations in accordance with recognized standards for such work. Remove other tree limbs under the direction of the Engineer, so that the tree will present a balanced appearance.

4. Treatment of Roots

Do not cut roots unnecessarily during excavating or trenching operations. Expose major roots encountered in the course of excavation and do not sever. Wrap them in burlap as a protective measure while exposed. Neatly trim all other roots (one inch in diameter and larger) that are severed in the course of excavation at the edge of the excavation or trench and paint them with a heavy coat of an approved tree seal as directed by the Engineer.

5. Repair or Restoration

Repair or replace any trees or other landscape features scarred or damaged by equipment or construction operations as specified below. The repair and/or restoration plan shall be favorably reviewed prior to its initiation.

6. Temporary Construction

Obliterate all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Engineer. Level all temporary roads, parking areas and any other areas that have become compacted or shaped. Any unpaved areas where

vehicles are operated shall receive a suitable surface treatment or shall be periodically wetted down to prevent construction operations from producing dust damage and nuisance to persons and property, at no additional cost to the Owner. Keep haul roads clear at all times of any object which creates an unsafe condition. Promptly remove any contaminants or construction material dropped from construction vehicles. Do not drop mud and debris from construction equipment on public streets. Sweep clean turning areas and pavement entrances as necessary.

C. WATER RESOURCES

Investigate and comply with all applicable federal, state and local regulations concerning the discharge (directly or indirectly) of pollutants to the underground and natural waters. Perform all work under this Contract in such a manner that any adverse environmental impacts are reduced to a level that is acceptable to the Engineer and regulatory agencies. Refer to Section 02200, EARTHWORK, paragraph on control of water for "dewatering" water disposal requirements.

1. Oily Substances

At all times, special measures shall be taken to prevent oily or other hazardous substances from entering the ground, drainage areas or local bodies of water in such quantities as to affect normal use, aesthetics or produce a measurable impact upon the area. Any soil or water which is contaminated with oily substances due to the Contractor's operations shall be disposed of in accordance with applicable regulations.

2. Chlorinated Water

Take special measures to prevent chlorinated water from entering the ground or surface waters. Dechlorinate chlorinated water prior to discharge.

D. FISH AND WILDLIFE RESOURCES

Perform all work and take such steps required to prevent any interference or disturbance to fish and wildlife. The Contractor will not be permitted to alter water flows or otherwise significantly disturb native habitat adjacent to the project area which are critical to fish and wildlife except as may be indicated or specified.

E. CULTURAL RESOURCES

The project does not pass through any known archaeological sites. However, it is conceivable that unrecorded archaeological sites could be discovered during the construction. In the event that artifacts, human remains, or other cultural

resources are discovered during subsurface excavations at locations of the work, the Contractor shall protect the discovered items, notify the Engineer, and comply with applicable law.

3.2 NUISANCE ABATEMENT

A. NOISE CONTROL

1. Location – <u>except as modified in Section 09870 – Coating Systems</u>

Maximum Noise Levels within 1,000 Feet of any Residence, Business, or Other Populated Area: Noise levels for trenchers, pavers, graders and trucks shall not exceed 90 dB at 50 feet as measured under the noisiest operating conditions. For all other equipment, noise levels shall not exceed 85 dB at 50 feet.

2. Equipment

Electrically powered equipment instead of pneumatic or internal combustion powered equipment shall be used, where feasible.

Jack hammers shall be equipped with exhaust mufflers and steel muffling sleeves. Air compressors should be of a quiet type such as a "whisperized" compressor.

All noise-producing project equipment and vehicles using internal combustion engines (including haul trucks) shall be fitted with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features. These devices shall be maintained in good operating condition so as to meet or exceed original factory specifications. Mobile or fixed “package” equipment (e.g., air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

All mobile or fixed noise-producing equipment used on the project, which is regulated for noise output by a local, state, or federal agency, shall comply with such regulations while in the course of project activities.

3. Operations

Keep noisy equipment as far as possible from noise-sensitive site boundaries. Machines should not be left idling. Use electric power in lieu of internal combustion engine power wherever possible. Maintain equipment properly to reduce noise from excessive vibration, faulty mufflers, or other sources. All engines shall have mufflers.

The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning purposes only.

4. Scheduling

Schedule noisy operations so as to minimize their duration at any given location.

5. Monitoring

To determine whether the above noise limits are being met and whether noise barriers are needed, the Contractor shall use a portable sound level meter meeting the requirements of American National Standards Institute Specification S1.4 for Type 2 sound level meters. If non-complying noise levels are found, the Contractor shall be responsible for monitoring and correction of excessive noise levels.

B. DUST CONTROL, AIR POLLUTION, AND ODOR CONTROL

1. Unpaved areas where vehicles are operated shall be periodically wetted down or given an equivalent form of treatment, to eliminate dust formation.

2. Store all volatile liquids, including fuels or solvents in closed containers.

3. No open burning of debris, lumber or other scrap will be permitted.

4. Properly maintain equipment to reduce gaseous pollutant emissions.

3.3 CONSTRUCTION STORAGE AREAS

A. Store and service equipment at the designated Contractor's storage area where oil wastes shall be collected in containers. Oil wastes shall not be allowed to flow onto the ground or into surface waters. Containers shall be required at the construction site for the disposal of materials such as paint, paint thinner, solvents, motor oil, fuels, resins and other environmentally deleterious substances. No dumping of surplus concrete or grout on the site will be permitted.

3.4 FIRE PREVENTION

A. Provide spark arresters on all internal combustion engines.

B. Store and handle flammable liquids in accordance with the Flammable and Combustible Liquids Code, NFPA 30.

C. Provide fire extinguishers at hazardous locations or operations, such as welding.

3.5 EROSION AND SEDIMENT TRANSPORT CONTROL

A. Discharge construction runoff into small drainages at frequent intervals to avoid buildup of large potentially erosive flows.

B. Prevent runoff from flowing over unprotected slopes.

C. Keep disturbed areas to the minimum necessary for construction.

D. Keep runoff away from disturbed areas during construction.

E. Direct flows over vegetated areas prior to discharge into public storm drainage systems.

F. Trap sediment before it leaves the site, using such techniques as check dams, sediment ponds, or siltation fences.

G. Remove and dispose of all project construction-generated siltation that occurs in offsite retention ponds.

H. Confine construction to the dry season, whenever possible. If construction needs to be scheduled for the wet season, ensure that erosion and sediment transport control measures are ready for implementation prior to the onset of the first major storm of the season.

I. Stabilize disturbed areas as quickly as possible.

3.6 DISPOSAL OPERATIONS

A. SOLID WASTE MANAGEMENT

Supply solid waste transfer containers. Daily remove all debris such as spent air filters, oil cartridges, cans, bottles, combustibles and litter. Take care to prevent trash and papers from blowing onto adjacent property. Encourage personnel to use refuse containers. Convey contents to a sanitary landfill.

Washing of concrete containers where waste water may reach adjacent property or natural water courses will not be permitted. Remove any excess concrete to the sanitary landfill.

B. CHEMICAL WASTE AND HAZARDOUS MATERIALS MANAGEMENT

Furnish containers for storage of spent chemicals used during construction operations. Dispose of chemicals and hazardous materials in accordance with applicable regulations.

C. GARBAGE

Store garbage in covered containers, pick up daily and dispose of in a sanitary landfill.

D. CLEARING AND GRUBBING

Dispose of vegetation, weeds, rubble, and other materials removed by the clearing, stripping and grubbing operations off site at a suitable disposal site in accordance with applicable regulations.

E. EXCAVATED MATERIALS

1. Native soil complying with the requirements of Section 02200, EARTHWORK, may be used for backfill, fill and embankments as allowed by that section.

2. Spoil Material: Remove all material which is excavated from the site and dispose of offsite in accordance with applicable regulations disposal site indicated in the Environmental Protection Plan. No additional compensation will be paid to the Contractor for such disposal. Include all such costs in the lump sum prices bid for the project. Remove rubbish and materials immediately following excavation.

   Rubbish shall consist of all materials not classified as suitable materials or rubble and shall include shrubbery, trees, timber, trash and garbage.

3. Excavated material may be stockpiled offsite for reuse in accordance with the requirements of Section 02200, EARTHWORK. Offsite stockpile locations shall be legally obtained by the Contractor and shall meet all of the applicable regulations and requirements of this Section. No additional compensation will be paid to the Contractor for such stockpiling and reuse of native soil.

END OF SECTION

SECTION 01000

ENVIRONMENTAL PROTECTION HIGH FIRE DANGER ALERTS AND CLOSURES

Marin County open space is very susceptible to wild land fires during the warm seasons of the year. This includes all "Open Space" lands such as MMWD lands, Marin County Open Space District (MCOSD) lands and any other private open space lands. Contractor must be aware of the possibility of fires at other times also and must use their own good judgment to work in a safe manner to prevent wild land fires. Contractors are encouraged to bring to any fire safety problems they observe or suggestions they may have to the attention of the Engineer. **Smoking is prohibited. This includes no smoking inside vehicles while on open space land.**

Red Flag Warning - Interagency Fire Closure Upon notification from the County Fire Department that a "Red Flag Warning - High Fire Danger Alert" exists for Marin County, Contractor shall suspend work at all affected open space lands. Contractors should monitor fire conditions with the Marin County Fire Department to know when closures are in effect. Contractor shall call the Marin County Fire Department contact the day before at 5 pm (415-499-7191) or otherwise as set by the County, each day to determine the fire conditions projected for the following day and plan their schedule accordingly.

If after 5 pm a high fire condition causes closure for the following day, then that Periods of high fire danger which result in the contractor being required to suspend work shall be considered Unavoidable Delays as described in Article 86 of the Standard Conditions. Additionally, during these periods the contractor may be prohibited from entering the open space lands.

RADIO COMMUNICATIONS

Whenever any work is being performed that may pose a potential fire danger, cell phones or 2-way radios must be on site to permit a rapid emergency response if necessary.

VEHICLES, EQUIPMENT, TOOLS

Trucks, Tractors Heat from exhaust systems can ignite a fire. Do not drive off road or in any area with tall grass whenever possible. Be sure all trucks and tractors are equipped with a fire extinguisher. Inspect trucks and tractors before use to be sure the spark arrestor exhaust system is in good condition and that there are no fires related defects. The Contractor shall not drive off road or park near or drive through tall grasses or other flammable vegetation types without approval from the District Inspector. Based upon authorization by District staff, the Contractor shall remove all grasses and other types of flammable vegetation from the off road work area approved for vehicle access.

Equipment, Tools Heat from power equipment exhaust systems, or sparks from equipment or tools can ignite a fire. Clear a space with a radius at least five feet from the exhaust in which to place equipment such as generators, chainsaws and power weed cutters. Be careful when using tools that produce sparks and be sure spark arrestors are

in good condition. Do not allow heated tools to contact ignitable fuels. If power equipment or tools that produce sparks are in use, a fire extinguisher must be kept onsite. Larger equipment should have a fire extinguisher mounted on it.

Fueling Equipment Before fueling power equipment or tools in the field, clear a space in which to perform the task. Fuel should be stored in a cleared space and, where possible, in the shade. If power equipment stays in one location during the task, store fuel and equipment and perform fueling operation in the same clearing. Be sure equipment is turned off while fueling. Take extra care when fueling heated equipment. Be sure gas spout/funnel is used to avoid spills and that gas caps are kept in place. Remove or dry any fuel spillage prior to starting equipment. During fueling operations, a fire extinguisher should be onsite ready for use.

GRASS AND BRUSH MOWING

Equipment and tools used to perform this fire hazard reduction task could instead ignite a fire. Suspend this task during “High Fire Danger Alert” periods. Use extreme caution in dry areas. Follow all procedures for equipment and tools. Use only non-metallic heads on weed cutters. Do not lay heated tools down in ignitable fuels. Carry a portable fire extinguisher at all times when working or fueling the brush cutter. When a tractor mower is used, a truck with a fire pumper must accompany the tractor. When the truck cannot follow due to terrain or tall grass conditions, then the truck driver must walk, carrying an additional fire extinguisher.

WELDING

Suspend this task during “High Fire Danger Alert” periods, on other hot dry days and when winds exceed five miles per hour. Perform this task in the morning prior to 10 am. Remove grass within a twelve-foot radius of the welding site. Wet the ground and surrounding vegetation prior to welding and every fifteen minutes thereafter. Maintain a portable welding screen around the welder. A truck-mounted pumper must be at the welding site, with the pump engaged during welding. An extra person must be present with no other duty except to watch for fire and operate the pumper.

FIRE SAFETY EQUIPMENT OPERATION

Where a truck with water pump is required, a person fully trained in truck and water pump operation must be present. All operators must be fully trained in use of the fire extinguishers.

Contractors shall have fire extinguishers onsite and follow fire safe procedures.

Appendix B
Air Quality

Pine Mountain Tunnel Replacement - Mass Emissions (Onsite + Offsite)

PROJECT DETAILS

Conversions

Tons	Pounds
1	2000
Year	**Days**
1	365

Construction Schedule

Phase	Start Date	End Date	Work Days
Site Preparation 2022	1/3/2022	1/31/2022	21
Site Preparation 2 2022	8/1/2022	8/31/2022	23
Grading 2022	9/1/2022	12/31/2022	87
Grading 2023	1/1/2023	1/31/2023	22
Building Construction 2023	8/1/2023	12/31/2023	109
Building Construction 2024	1/1/2024	1/31/2024	23
Building Construction 2 2024	8/1/2024	12/31/2024	109
Building Construction 2 2025	1/1/2025	1/31/2025	23
Building Construction 3 2025	8/1/2025	12/31/2025	109
Building Construction 4 2026	8/1/2026	11/30/2026	86
Paving 2026	12/1/2026	12/31/2026	23
Total			635

Work Days per Year

Year	Days
2022	131
2023	131
2024	132
2025	132
2026	109
Total	635

ANNUAL CONSTRUCTION EMISSIONS

Criteria Pollutant Emissions (tons/year)

		ROG	NOx	PM10 (exhaust)	PM2.5 (exhaust)
2022	On-Site	0.01	0.06	0.00	0.00
	Off-Site	0.02	0.26	0.00	0.00
	Total	**0.02**	**0.32**	**0.01**	**0.00**
2023	On-Site	0.01	0.06	0.00	0.00
	Off-Site	0.01	0.07	0.00	0.00
	Total	**0.01**	**0.13**	**0.00**	**0.00**
2024	On-Site	0.01	0.06	0.00	0.00
	Off-Site	0.00	0.01	0.00	0.00
	Total	**0.01**	**0.07**	**0.00**	**0.00**
2025	On-Site	0.01	0.05	0.00	0.00
	Off-Site	0.00	0.01	0.00	0.00
	Total	**0.01**	**0.07**	**0.00**	**0.00**
2026	On-Site	0.00	0.04	0.00	0.00
	Off-Site	0.00	0.01	0.00	0.00
	Total	**0.01**	**0.05**	**0.00**	**0.00**
	Total Construction	***0.07***	***0.64***	***0.02***	***0.02***

Greenhouse Gas Emissions (MTCO2e/phase)

		CO2e
2022	On-Site	12.0293
	Off-Site	6.50E+01
	Total	**76.98292201**
2023	On-Site	10.9362
	Off-Site	2.28E+01
	Total	**33.69356808**
2024	On-Site	10.8035
	Off-Site	9.12E+00
	Total	**19.92638906**
2025	On-Site	10.8035
	Off-Site	9.31E+00
	Total	**20.11017088**
2026	On-Site	8.921
	Off-Site	9.41E+00
	Total	**18.33432613**
	Total Construction	***169.0473762***

Criteria Pollutant Emissions (average pounds/day)

		ROG	NOx	PM10 (exhaust)	PM2.5 (exhaust)
2022	On-Site	0.09	0.86	0.04	0.03
	Off-Site	0.28	3.99	0.06	0.03
	Total	**0.36**	**4.85**	**0.10**	**0.07**
2023	On-Site	0.09	0.92	0.04	0.04
	Off-Site	0.12	1.09	0.03	0.02
	Total	**0.21**	**2.01**	**0.07**	**0.05**
2024	On-Site	0.09	0.88	0.04	0.03
	Off-Site	0.07	0.19	0.02	0.01
	Total	**0.15**	**1.07**	**0.06**	**0.05**
2025	On-Site	0.08	0.80	0.03	0.03
	Off-Site	0.07	0.19	0.02	0.01
	Total	**0.15**	**0.99**	**0.05**	**0.04**
2026	On-Site	0.08	0.80	0.03	0.03
	Off-Site	0.06	0.18	0.02	0.01
	Total	**0.14**	**0.98**	**0.05**	**0.04**

Pine Mountain Tunnel Replacement - Onsite Emissions Calculations

PROJECT DETAILS

Conversions

Tons	Pounds
1	2000
Year	Days
1	365

Construction Schedule

Phase	Start Date	End Date	Work Days
Site Preparation 2022	1/3/2022	1/31/2022	21
Site Preparation 2 2022	8/1/2022	8/31/2022	23
Grading 2022	9/1/2022	12/31/2022	87
Grading 2023	1/1/2023	1/31/2023	22
Building Construction 2023	8/1/2023	12/31/2023	109
Building Construction 2024	1/1/2024	1/31/2024	23
Building Construction 2 2024	8/1/2024	12/31/2024	109
Building Construction 2 2025	1/1/2025	1/31/2025	23
Building Construction 3 2025	8/1/2025	12/31/2025	109
Building Construction 4 2026	8/1/2026	11/30/2026	86
Paving 2026	12/1/2026	12/31/2026	23
Total			635

Work Days per Year

Year	Days
2022	131
2023	131
2024	132
2025	132
2026	109
Total	635

ANNUAL CONSTRUCTION EMISSIONS

Criteria Pollutant Emissions (tons/phase)

Phase	ROG	NOx	PM10 (exhaust)	PM2.5 (exhaust)
Site Preparation 2022	9.40E-04	9.06E-03	3.90E-04	3.60E-04
Site Preparation 2 2022	0.0010	0.0099	0.0004	0.0004
Grading 2022	0.0039	0.0375	0.0016	0.0015
Grading 2023	0.0009	0.0083	0.0004	0.0003
Building Construction 2023	0.0049	0.0521	0.0021	0.0020
Building Construction 2024	0.0010	0.0101	0.0004	0.0004
Building Construction 2 2024	0.0047	0.0479	0.0020	0.0018
Building Construction 2 2025	0.0009	0.0092	0.0004	0.0004
Building Construction 3 2025	0.0044	0.0436	0.0018	0.0017
Building Construction 4 2026	0.0035	0.0344	0.0014	0.0013
Paving 2026	0.0009	0.0092	0.0004	0.0004

See CalEEMod Output.

Greenhouse Gas Emissions (MTCO2e/phase)

Phase	CO2e
Site Preparation 2022	1.9284
Site Preparation 2 2022	2.112
Grading 2022	7.9889
Grading 2023	2.0203
Building Construction 2023	8.9159
Building Construction 2024	1.8824
Building Construction 2 2024	8.9211
Building Construction 2 2025	1.8824
Building Construction 3 2025	8.9211
Building Construction 4 2026	7.0386
Paving 2026	1.8824

See CalEEMod Output.

Criteria Pollutant Emissions (tons/year)

Year	ROG	NOx	PM10 (exhaust)	PM2.5 (exhaust)
2022	5.83E-03	5.65E-02	2.45E-03	2.26E-03
2023	0.0059	0.0604	0.0025	0.0023
2024	0.0057	0.0580	0.0024	0.0022
2025	0.0054	0.0528	0.0022	0.0020
2026	0.0045	0.0436	0.0018	0.0017

Greenhouse Gas Emissions (MTCO2e/year)

Year	CO2e
2022	12.0293
2023	10.9362
2024	10.8035
2025	10.8035
2026	8.9210

Criteria Pollutant Emissions (lbs/day)

Year	ROG	NOx	PM10 (exhaust)	PM2.5 (exhaust)
2022	8.90E-02	8.62E-01	3.74E-02	3.45E-02
2023	8.93E-02	9.22E-01	3.82E-02	3.53E-02
2024	8.59E-02	8.79E-01	3.59E-02	3.30E-02
2025	8.15E-02	8.00E-01	3.32E-02	3.06E-02
2026	8.17E-02	8.00E-01	3.32E-02	3.06E-02

AERSCREEN 21112 / A ERMOD 21112 8/4/2021
9:08:26

TITLE: Pine Mountai n Tunnel

**********	********** AREA PA	RAMETERS ******	**********
SOURCE EMISSION RAT	E: 1.0000	g/s	7.937 lb/hr
AREA EMISSION RATE:	5.59E-04	g/(s-m2)	0.444E-02 lb/(hr-m2)
AREA HEIGHT:	5	meters	16.40 feet
AREA SOURCE LONG SI	DE: 50.45	meters	165.52 feet
AREA SOURCE SHORT S	IDE: 35.46	meters	116.34 feet
INITIAL VERTICAL DI	MENSION: 1.40	meters	4.59 feet
RURAL OR URBAN:	RURAL		
FLAGPOLE RECEPTOR H	EIGHT: 1.80	meters	5.91 feet
INITIAL PROBE DISTA	NCE = 5000.	meters	16404. feet

**********	**** BUILDING DOWNW	ASH PARAMETERS	**********
BUIL	DING DOWNWASH NOT US	ED FOR NON-POINT	SOURCES

**********	******* FLOW SECTOR	ANALYSIS *****	**********
25	meter receptor spac	ing: 1. meters -	5000. meters

MAXIMUM IMPACT RECEPTOR

Zo SURFAC	E 1-HR CONC RADIA	L DIST TEMPOR	AL
SECTOR ROUGHN	ESS (ug/m3) (deg	) (m) PERIO	D
1* 1.30	0 6709. 0	50.0 WIN	

* = worst case diag onal

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*******************   ***  MAKEMET METEORO   LOGY PARAMETERS   *********************
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MIN/MAX TEMPERATURE   :   278.5 / 298.9 (                K)

MINIMUM WIND SPEED:   0.5 m/s

ANEMOMETER HEIGHT:    10.000 meters

SURFACE CHARACTERIS   TICS INPUT: AERMET S       EASONAL TABLES

DOMINANT SURFACE PR   OFILE: Coniferous Fo       rest
DOMINANT CLIMATE TY   PE:    Average Moist       ure
DOMINANT SEASON:      Winter

ALBEDO:                                    0.35
BOWEN RATIO:                                1.5
ROUGHNESS LENGTH:     1.300 (meters)

SURFACE FRICTION VE   LOCITY (U*) NOT ADUS       TED


METEOROLOGY           CONDITIONS USED TO P       REDICT OVERALL M   AXIMUM IMPACT
------------          --------------------       ----------------   -------------

YR MO DY JDY HR
-- -- -- --- --
10 01 16  16 01

H0    U*    W         *  DT/DZ ZICNV ZIMCH       M-O LEN    Z0      BOWEN ALBEDO  REF WS
- - - - - - - - -      - - - - - - - - - -       - - - - - - - -    - - - - - - - - - - -
-0.48  0.049 -9.00     0  0.020 -999.   25.       22.7 1.300        1.50   0.35    0.50

HT  REF TA             HT
- - - - - - - - - -    -
10.0   298.9    2                                  0


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*******************   ***** AERSCREEN AUTO   MATED DISTANCES   *********************
O                     VERALL MAXIMUM CONCE   NTRATIONS BY DIS   TANCE
-------------------   --------------------   ----------------   ----------------------
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DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1	3735	2525	86.38
25	6588	2550	85.24
50	6709	2575	84.13
75	5441	2600	83.04
100	4432	2625	81.98
125	3646	2650	80.93
150	3050	2675	79.92
175	2595	2700	78.92
200	2241	2725	77.95
225	1960	2750	76.99
250	1733	2775	76.06
275	1548	2800	75.14
300	1394	2824.99	74.25
325	1264	2850	73.37
350	1154	2875	72.51
375	1059	2900	71.67
400	977	2925	70.85
425	905.3	2950	70.04
450	842.3	2975	69.24
475	786.6	3000	68.47
500	736.8	3025	67.7
525	692.1	3050	66.96
550	651.7	3075	66.22
575	615.2	3100	65.5
600	582.1	3125	64.8
625	552.1	3150	64.1
650	524.6	3174.99	63.42
675	499.4	3199.99	62.76
699.99	476.2	3225	62.1
725	454.8	3250	61.46
750	435	3275	60.82
775	416.6	3300	60.2
800	399.6	3325	59.59
825	383.7	3350	58.99
850	368.9	3375	58.4
875.01	355.1	3400	57.82
900	342.1	3425	57.25
925	330	3450	56.7
950	318.5	3475	56.15
975	307.8	3500	55.6
1000	298.6	3525	55.07

1025	289	3550	54.55
1050	279.9	3575	54.03
1075	271.3	3600	53.53
1100	263.1	3625	53.03
1125	255.4	3650	52.54
1150	248	3675	52.06
1175	241	3699.99	51.58
1200	234.3	3725	51.12
1225	228	3750	50.66
1250	221.9	3775	50.2
1275	216.1	3800	49.76
1300	210.6	3825	49.32
1325	205.3	3849.99	48.89
1350	200.2	3875	48.46
1375	195.4	3900	48.04
1400	190.7	3925	47.63
1425	186.3	3950	47.22
1450	182	3975	46.82
1475	177.9	4000	46.43
1500	173.9	4025	46.04
1525	170.1	4050	45.65
1550	166.4	4075	45.27
1575	162.9	4100	44.9
1600	159.5	4125	44.53
1625	156.2	4150	44.17
1650	153.1	4175	43.81
1675	150	4200	43.46
1700	147	4225	43.12
1725	144.2	4250	42.77
1750	141.4	4275	42.43
1775	138.8	4300	42.1
1800	136.2	4325	41.77
1825	133.7	4350	41.45
1850	131.3	4375	41.13
1875	128.9	4400	40.81
1900	126.6	4425	40.5
1924.99	124.4	4450	40.19
1950	122.3	4475	39.89
1975	120.2	4500	39.59
1999.99	118.2	4525	39.3
2025	116.3	4550	39
2050	114.4	4575	38.72
2075	112.5	4600	38.43
2100	110.7	4625	38.15
2125	109	4650	37.87
2150	107.3	4675	37.6
2175	105.6	4700	37.33

2200	104	4725	37.06
2225	102.4	4750	36.8
2250	100.9	4775	36.54
2275	99.4	4800	36.28
2300	97.95	4825	36.03
2325	96.54	4850	35.78
2350	95.16	4875	35.53
2375	93.81	4900	35.28
2399.99	92.5	4924.99	35.04
2425	91.21	4950	34.8
2449.99	89.96	4975	34.57
2475	88.74	5000	34.33
2500	87.55		

****

*** AERSCREEN MAXIM

UM IMPACT SUMMAR

Y **********

3-hour, 8-hour, and 24-hour scaled
concentrations are equal to the 1-hour concentration as referenced in
SCREENING PROCEDURE S FOR ESTIMATING THE AIR QUALITY
IMPACT OF STATIONAR Y SOURCES, REVISED (Section 4.5.4)
Report number EPA-4 54/R-92-019
http://www.epa.gov/ scram001/guidance_pe rmit.htm
under Screening Gui dance

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALE 3-HOU CONC (ug/m3	D R CONC) (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	7191.	7191.		7191	7191.	N/A
DISTANCE FROM SOURC	E	37.00 mete	rs			
IMPACT AT THE AMBIENT BOUNDARY	3735.	3735.		3735	3735.	N/A
DISTANCE FROM SOURC	E	1.00 mete	rs			

Pine Mountain Tunnel Replacement - Construction Site HRA

Background Information

Conversions

Tons	Pounds	Grams			
1	2000	907185			
Year	Days	Day	Hour	Hour	Seconds
1	365	1	24	1	3600
Mile	Feet				
1	5280				

Emissions Information

Sensitive Receptors	Distance		AERSCREEN OUT [ug/m^3]/[g/s]	
	(ft)	(m)	max	annual
	390	119	3792.0	379.2

	DPM Exhaust (tons)[2]	DPM Exhaust (tons)[2]	Start Date[3]	End Date[3]	Duration
	Unmitigated	Mitigated			Days
Construction	0.0113		1/3/2022	12/31/2026	1824

[2]CalEEMod PM_{10} exhaust

[3]See construction schedule screenshot from CalEEMod

	DPM Exhaust (g/s)	DPM Exhaust (g/s)
	Unmitigated	Mitigated
Construction	0.0001	0.0000

Equations

Cancer Risk = Dose inhalation × Inhalation CPF × ASF × ED/AT × FAH **(Equation 8.2.4 A)**

Where:

Cancer Risk = residential inhalation cancer risk

Dose inhalation (mg/kg-day) = C_{AIR} × DBR × A × EF × 10^{-6} **(Equation 5.4.1.1)**

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

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

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

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

FAH = fraction of time at home (unitless)

Where:

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

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

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

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

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

Hazard Quotient = C_{air} / REL **(Section 8.3.1)**

Where:

Hazard Quotient = chronic non-cancer hazard

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

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

Risk Calculation

Dose Inhalation Inputs

Receptor Type	Exposure Scenario	Receptor Group Age	C_{AIR} (µg/m^3) Unmitigated	C_{AIR} (µg/m^3) Mitigated	DBR (L/kg-day)	A (unitless)	EF (days/year)	REL_{DPM}
Off-Site Child Resident	Construction	3rd Trimester	2.47E-02	0.00E+00	361	1	0.96	5
		Age 0<2	2.47E-02	0.00E+00	1090	1	0.96	5
		Age 2-9	2.47E-02	0.00E+00	861	1	0.96	5

Daily breathing rate is based on the OEHHA 95th percentile (Table 5.7).

Dose Inhalation Outputs

Receptor Type	Exposure Scenario	Receptor Group Age	Dose inhalation (mg/kg-day) Unmitigated	Dose inhalation (mg/kg-day) Mitigated
Off-Site Child Resident	Construction	3rd Trimester	8.55E-06	0.00E+00
		Age 0<2	2.59E-05	0.00E+00
		Age 2-9	2.04E-05	0.00E+00

Risk Inputs

Receptor Type	Exposure Scenario	Receptor Group Age	CPF (mg/kg-day^{-1})	ASF (unitless)	ED (years)	AT (years)	FAH (unitless) Unmitigated	FAH (unitless) Mitigated	MAF (unitless)
Off-Site Child Resident	Construction	3rd Trimester	1.1	10	0.25	70.00	0.85	0.85	1
		Age 0<2	1.1	10	2	70.00	0.85	0.85	1
		Age 2-9	1.1	3	2.75	70.00	0.72	0.72	1

Inhalation cancer potency factor from Table 7.1

Fraction of time at home is set to 1 for residential since the nearest school unmitigated cancer risk is >1 per million, per OEHHA Table 8.4.

Risk Outputs

Receptor Type	Exposure Scenario	Receptor Group Age	Cancer Risk (per million) Unmitigated	Cancer Risk (per million) Mitigated	Hazard Index Unmitigated	Hazard Index Mitigated
Off-Site Child Resident	Construction	3rd Trimester	0.29	0.00	0.0049	0.0000
		Age 0<2	6.91	0.00		
		Age 2-9	1.90	0.00		
Total Cancer Risk (per million) , Resident			**9.10**	**0.00**		

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

Table 7.1 Inhalation and Oral Cancer Potency Factors

Substance	Chemical Abstract Service Number (CAS)	Inhalation Potency Factor $(mg/kg\text{-}day)^{-1}$	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$
1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562-39-4	$1.3 \times 10^{+3}$	$1.3 \times 10^{+3}$
1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673-89-7	$1.3 \times 10^{+3}$	$1.3 \times 10^{+3}$
1,2,3,4,,6,7,8,9-Octachlorodibenzofuran	39001-02-0	$3.9 \times 10^{+1}$	$3.9 \times 10^{+1}$
Chlorinated paraffins	108171-26-2	8.9×10^{-2}	
Chloroform	67-66-3	1.9×10^{-2}	
4-Chloro-o-phenylenediamine	95-83-0	1.6×10^{-2}	
p-Chloro-o-toluidine	95-69-2	2.7×10^{-1}	
Chromium (hexavalent)	18540-29-9	$5.1 \times 10^{+2}$	5×10^{-1}
Chrysene [BaP]	218-01-9	3.9×10^{-2}	1.2×10^{-1}
Creosote	8001-58-9	*	
p-Cresidine	120-71-8	1.5×10^{-1}	
Cupferron	135-20-6	2.2×10^{-1}	
2,4-Diaminoanisole	615-05-4	2.3×10^{-2}	
2,4-Diaminotoluene	95-80-7	$4.0 \times 10^{+0}$	
Dibenz[*a,h*]acridine [BaP]	226-36-8	3.9×10^{-1}	$1.2 \times 10^{+0}$
Dibenz[*a,j*]acridine [BaP]	224-42-0	3.9×10^{-1}	$1.2 \times 10^{+0}$
Dibenz[*a,h*]anthracene [BaP]	53-70-3	$4.1 \times 10^{+0}$	$4.1 \times 10^{+0}$
Dibenzo[*a,e*]pyrene [BaP]	192-65-4	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
Dibenzo[*a,h*]pyrene [BaP]	189-64-0	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
Dibenzo[*a,l*]pyrene [BaP]	189-55-9	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
Dibenzo[*a,l*]pyrene [BaP]	191-30-0	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
7H-Dibenzo[*c,g*]carbazole [BaP]	194-59-2	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
1,2-Dibromo-3-chloropropane	96-12-8	$7.0 \times 10^{+0}$	
1,4-Dichlorobenzene	106-46-7	4.0×10^{-2}	
3,3'-Dichlorobenzidine	91-94-1	$1.2 \times 10^{+0}$	
1,1-Dichloroethane	75-34-3	5.7×10^{-3}	
Diesel exhaust [B]	NA	$1.1 \times 10^{+0}$	
Diethylhexylphthalate	117-81-7	8.4×10^{-3}	8.4×10^{-3}
p-Dimethylaminoazobenzene	60-11-7	$4.6 \times 10^{+0}$	
7,12-Dimethylbenz[*a*]anthracene [BaP]	57-97-6	$2.5 \times 10^{+2}$	$2.5 \times 10^{+2}$
1,6-Dinitropyrene [BaP]	42397-64-8	$3.9 \times 10^{+1}$	$1.2 \times 10^{+2}$
1,8-Dinitropyrene [BaP]	42397-65-9	$3.9 \times 10^{+0}$	$1.2 \times 10^{+1}$
2,4-Dinitrotoluene	121-14-2	3.1×10^{-1}	
1,4-Dioxane	123-91-1	2.7×10^{-2}	
Epichlorohydrin	106-89-8	8.0×10^{-2}	
Ethyl benzene	100-41-4	8.7×10^{-3}	1.1×10^{-2}
Ethylene dibromide	106-93-4	2.5×10^{-1}	
Ethylene dichloride	107-06-2	7.2×10^{-2}	
Ethylene oxide	75-21-8	3.1×10^{-1}	

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

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

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

Table 8.4 Recommendations for Fraction of Time at Home (FAH) for Evaluating Residential Cancer Risk

Table 8.3 Age Sensitivity Factors by Age Group for Cancer Risk Assessment

Age Group	Age Sensitivity Factor (unitless)
3rd Trimester	10
0<2 years	10
2<9 years	3
2<16 years	3
16<30 years	1
16-70 years	1

Table 6.3 Chronic Inhalation Reference Exposure Levels (RELs) and Chronic Hazard Index Target Organ System(s)

Substance	Chemical Abstract Service Number (CAS)	Chronic Inhalation REL $(\mu g/m^3)$	Chronic Inhalation Hazard Index Target Organ System(s)
Chlorinated Dibenzofurans [b]			
2,3,7,8-Tetrachlorodibenzofuran [b]	5120-73-19	4.0×10^{-4}	Alimentary System (Liver); Development; Endocrine System; Hematologic System; Reproductive System; Respiratory System
1,2,3,7,8-Pentachlorodibenzofuran [b]	57117-41-6	1.3×10^{-3}	
2,3,4,7,8-Pentachlorodibenzofuran [b]	57117-31-4	1.3×10^{-3}	
1,2,3,4,7,8-Hexachlorodibenzofuran [b]	70648-26-9	4.0×10^{-4}	
1,2,3,6,7,8-Hexachlorodibenzofuran [b]	57117-44-9	4.0×10^{-4}	
1,2,3,7,8,9-Hexachlorodibenzofuran [b]	72918-21-9	4.0×10^{-4}	
2,3,4,6,7,8-Hexachlorodibenzofuran [b]	60851-34-5	4.0×10^{-4}	
1,2,3,4,6,7,8-Heptachlorodibenzofuran [b]	67562-39-4	4.0×10^{-3}	
1,2,3,4,7,8,9-Heptachlorodibenzofuran [b]	55673-89-7	4.0×10^{-3}	
1,2,3,4,6,7,8,9-Octachlorodibenzofuran [b]	39001-02-0	1.3×10^{-1}	
Chlorobenzene	108-90-7	$1.0 \times 10^{+3}$	Alimentary System (Liver); Kidney; Reproductive System
Chloroform	67-66-3	$3.0 \times 10^{+2}$	Alimentary System (Liver); Development; Kidney
Chloropicrin	76-06-2	4.0×10^{-1}	Respiratory System
Chromium VI & Soluble Chromium VI Compounds (except chromic trioxide)	18540-29-9	2.0×10^{-1}	Respiratory System
Chromic Trioxide (as chromic acid mist)	1333-82-0	2.0×10^{-3}	Respiratory System
Cresol Mixtures	1319-77-3	$6.0 \times 10^{+2}$	Nervous System
1,4-Dichlorobenzene	106-46-7	$8.0 \times 10^{+2}$	Alimentary System (Liver); Kidney; Nervous System; Respiratory System
1,1-Dichloroethylene (Vinylidene Chloride)	75-35-4	$7.0 \times 10^{+1}$	Alimentary System (Liver)
Diesel Exhaust [a]	N/A	$5.0 \times 10^{+0}$	Respiratory System
Diethanolamine	111-42-2	$3.0 \times 10^{+0}$	Hematologic System; Respiratory System
N,N-Dimethylformamide	68-12-2	$8.0 \times 10^{+1}$	Alimentary System (Liver); Respiratory System
1,4-Dioxane	123-91-1	$3.0 \times 10^{+3}$	Alimentary System (Liver); Cardiovascular System; Kidney
Epichlorohydrin	106-89-8	$3.0 \times 10^{+0}$	Eyes; Respiratory System
1,2-Epoxybutane	106-88-7	$2.0 \times 10^{+1}$	Cardiovascular System; Respiratory System
Ethylbenzene	100-41-4	$2.0 \times 10^{+3}$	Alimentary System (Liver); Kidney; Development; Endocrine System
Ethyl Chloride	75-00-3	$3.0 \times 10^{+4}$	Alimentary System (Liver); Development
Ethylene Dibromide	106-93-4	8.0×10^{-1}	Reproductive System
Ethylene Dichloride	107-06-2	$4.0 \times 10^{+2}$	Alimentary System (Liver)
Ethylene Glycol	107-21-1	$4.0 \times 10^{+2}$	Development; Kidney; Respiratory System
Ethylene Glycol Monoethyl Ether	110-80-5	$7.0 \times 10^{+1}$	Hematologic System; Reproductive System
Ethylene Glycol Monoethyl Ether Acetate	111-15-9	$3.0 \times 10^{+2}$	Development

Age Range	Fraction of Time at Residence
3rd Trimester, and 0<2 years	0.85[1]
2<16 years[2]	0.72[1]
16-70 years[3]	0.73

[1] Use FAH = 1 if a school is within the 1×10^{-6} (or greater) cancer risk isopleth

Pine Mountain Tunnel Replacement - Construction Site PM2.5 Concentration

Background Information

Conversions

Tons	Pounds	Grams			
1	2000	907185			
Year	Days	Day	Hour	Hour	Seconds
1	365	1	24	1	3600
Mile	Feet				
1	5280				

Emissions Information

Sensitive Receptors	Distance		AERSCREEN OUT [ug/m^3]/[g/s]	
	(ft)	(m)	max	annual
	390	119	3792.0	379.2

2022	Duration	$PM_{2.5}$ Exhaust (tons)	$PM_{2.5}$ Exhaust (tons)
	Days	Unmitigated	Mitigated
	365	0.00448	

$PM_{2.5}$ Exhaust (g/s)	$PM_{2.5}$ Exhaust (g/s)
Unmitigated	Mitigated
0.0001	0.0000

$PM_{2.5}$ (µg/m^3)	**$PM_{2.5}$ (µg/m^3)**
0.05	0.00

2023	Duration	$PM_{2.5}$ Exhaust (tons)	$PM_{2.5}$ Exhaust (tons)
	Days	Unmitigated	Mitigated
	365	0.00357	

$PM_{2.5}$ Exhaust (g/s)	$PM_{2.5}$ Exhaust (g/s)
Unmitigated	Mitigated
0.0001	0.0000

$PM_{2.5}$ (µg/m^3)	**$PM_{2.5}$ (µg/m^3)**
0.04	0.00

2024	Duration	$PM_{2.5}$ Exhaust (tons)	$PM_{2.5}$ Exhaust (tons)
	Days	Unmitigated	Mitigated
	365	0.00313	

$PM_{2.5}$ Exhaust (g/s)	$PM_{2.5}$ Exhaust (g/s)
Unmitigated	Mitigated
0.0001	0.0000

$PM_{2.5}$ (µg/m^3)	**$PM_{2.5}$ (µg/m^3)**
0.00	0.00

2025	Duration	$PM_{2.5}$ Exhaust (tons)	$PM_{2.5}$ Exhaust (tons)
	Days	Unmitigated	Mitigated
	365	0.00296	

$PM_{2.5}$ Exhaust (g/s)	$PM_{2.5}$ Exhaust (g/s)
Unmitigated	Mitigated
0.0001	0.0000

$PM_{2.5}$ (µg/m^3)	**$PM_{2.5}$ (µg/m^3)**
0.00	0.00

	Duration	$PM_{2.5}$ Exhaust (tons)	$PM_{2.5}$ Exhaust (tons)
2026	Days	Unmitigated	Mitigated
	365	0.00244	

$PM_{2.5}$ Exhaust (g/s)	$PM_{2.5}$ Exhaust (g/s)
Unmitigated	Mitigated
0.0001	0.0000

$PM_{2.5}$ ($\mu g/m^3$)	**$PM_{2.5}$ ($\mu g/m^3$)**
0.00	0.00

Pine Mountain Tunnel Replacement - Worker Vehicle EMFAC Calculations

Background Information

Conversions

Tons	Pounds	Grams
1	2000	907185
Year	Days	
1	365	
Mile	Feet	
1	5280	
Tons	MT	
1	0.907185	

Construction Schedule

Phase	Start Date	End Date	Work Days
Site Preparation 2022	1/3/2022	1/31/2022	21
Site Preparation 2 2022	8/1/2022	8/31/2022	23
Grading 2022	9/1/2022	12/31/2022	87
Grading 2023	1/1/2023	1/31/2023	22
Building Construction 2023	8/1/2023	12/31/2023	109
Building Construction 2024	1/1/2024	1/31/2024	23
Building Construction 2 2024	8/1/2024	12/31/2024	109
Building Construction 2 2025	1/1/2025	1/31/2025	23
Building Construction 3 2025	8/1/2025	12/31/2025	109
Building Construction 4 2026	8/1/2026	11/30/2026	86
Paving 2026	12/1/2026	12/31/2026	23
Total			635

Work Days per Year

Year	Days
2022	131
2023	131
2024	132
2025	132
2026	109
Total	635

Trips per Construction Phase

Year	*Days per Year*	*Trips Per Day*	*Trips per Year*	*Trip Length*
2022	131	16	2096	10.8
2023	131	16	2096	10.8
2024	132	16	2112	10.8
2025	132	16	2112	10.8
2026	109	16	1744	10.8
See CalEEMod Output			10160	

Fleet Mix

Vehicle Type	*Fuel Type*	*% Fleet*
LDA	Gas	0.5
LDA	Disel	0
LDT1	Gas	0.125
LDT1	Diesel	0.125
LDT2	Gas	0.125
LDT2	Diesel	0.125

EMFAC Output

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: Sub-Area
Region: Marin (SF)
Calendar Year: 2022, 2023, 2024, 2025, 2026
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Trips	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
2022	LDA	Aggregate	Aggregate	Gasoline	495769.0526	0.061117741	0	0.305397996	0.001277826	0	0.002156779	0.002000001	0.002323238	0.001389715	0	0.002345558	0.008000002	0.006637822	0.013158095	0	0.417231942	0.108800013	0.283610302	1.634247808
2022	LDA	Aggregate	Aggregate	Diesel	4203.443751	0.256029879	0	0	0.020036225	0	0	0.002000001	0.002349518	0.020942174	0	0	0.008000002	0.00671291	0.031611687	0	0	0	0	0
2022	LDT1	Aggregate	Aggregate	Gasoline	57442.41125	0.167770241	0	0.482376556	0.001923	0	0.003290294	0.002000001	0.00281164	0.002091272	0	0.003578004	0.008000002	0.008033257	0.034886871	0	0.728050788	0.21261067	0.630023902	3.249027923
2022	LDT1	Aggregate	Aggregate	Diesel	25.84221048	1.654236941	0	0	0.237585812	0	0	0.002000001	0.003217614	0.248328389	0	0	0.008000002	0.009193183	0.313404433	0	0	0	0	0
2022	LDT2	Aggregate	Aggregate	Gasoline	275458.431	0.078726477	0	0.380776104	0.001299913	0	0.002100577	0.002000001	0.002693981	0.001413762	0	0.002284528	0.008000002	0.007697089	0.012263357	0	0.441787794	0.087419163	0.224328283	1.346269426
2022	LDT2	Aggregate	Aggregate	Diesel	2041.136844	0.050365916	0	0	0.004850634	0	0	0.002000001	0.002715345	0.005069959	0	0	0.008000002	0.007758127	0.012530209	0	0	0	0	0
2023	LDA	Aggregate	Aggregate	Gasoline	490507.8915	0.054118695	0	0.288623727	0.001228736	0	0.002075056	0.002000001	0.002322286	0.00133634	0	0.00225673	0.008000002	0.006635102	0.011528454	0	0.387287156	0.104957934	0.274365493	1.592899339
2023	LDA	Aggregate	Aggregate	Diesel	3894.190973	0.239563545	0	0	0.019498214	0	0	0.002000001	0.002359243	0.020379837	0	0	0.008000002	0.006740694	0.030777401	0	0	0	0	0
2023	LDT1	Aggregate	Aggregate	Gasoline	55350.27216	0.149682721	0	0.456785633	0.001806371	0	0.003100392	0.002000001	0.002814363	0.001964505	0	0.003371695	0.008000002	0.008041037	0.030819931	0	0.67742309	0.204468591	0.60017356	3.139720943
2023	LDT1	Aggregate	Aggregate	Diesel	22.73103417	1.650387489	0	0	0.236980178	0	0	0.002000001	0.003214629	0.24769537	0	0	0.008000002	0.009184654	0.312078339	0	0	0	0	0
2023	LDT2	Aggregate	Aggregate	Gasoline	278525.8192	0.069776213	0	0.355863299	0.001262728	0	0.002051133	0.002000001	0.002699548	0.001373328	0	0.00223078	0.008000002	0.007712993	0.011057179	0	0.41596421	0.085544173	0.22094527	1.330228791
2023	LDT2	Aggregate	Aggregate	Diesel	2023.66719	0.047376197	0	0	0.004812022	0	0	0.002000001	0.002742828	0.0050296	0	0	0.008000002	0.007836651	0.012436208	0	0	0	0	0
2024	LDA	Aggregate	Aggregate	Gasoline	485626.8151	0.048318289	0	0.273774561	0.001184657	0	0.002001182	0.002000001	0.002321466	0.001288422	0	0.002176468	0.008000002	0.006632761	0.010146334	0	0.360111524	0.100133391	0.263163182	1.538261511
2024	LDA	Aggregate	Aggregate	Diesel	3562.962785	0.220365239	0	0	0.01781155	0	0	0.002000001	0.002368144	0.01861691	0	0	0.008000002	0.006766125	0.028257349	0	0	0	0	0
2024	LDT1	Aggregate	Aggregate	Gasoline	53404.69597	0.133652376	0	0.432532967	0.001699903	0	0.002921548	0.002000001	0.002816374	0.001848767	0	0.003177354	0.008000002	0.008046784	0.027273124	0	0.630216614	0.195858549	0.57053225	3.022023169
2024	LDT1	Aggregate	Aggregate	Diesel	20.08896063	1.642890156	0	0	0.235898234	0	0	0.002000001	0.003211189	0.246564506	0	0	0.008000002	0.009174825	0.31059029	0	0	0	0	0
2024	LDT2	Aggregate	Aggregate	Gasoline	281275.4113	0.062554735	0	0.334940307	0.001229939	0	0.002010522	0.002000001	0.002705122	0.001337669	0	0.002186622	0.008000002	0.007728919	0.010043757	0	0.392266247	0.083012839	0.216483567	1.307529867
2024	LDT2	Aggregate	Aggregate	Diesel	1992.456944	0.044595263	0	0	0.004755158	0	0	0.002000001	0.002766498	0.004970165	0	0	0.008000002	0.00790428	0.012321078	0	0	0	0	0
2025	LDA	Aggregate	Aggregate	Gasoline	481149.1865	0.043623222	0	0.260105826	0.001145921	0	0.001938795	0.002000001	0.002320713	0.001246294	0	0.002108617	0.008000002	0.006630609	0.009028379	0	0.335048083	0.09622992	0.255618805	1.50028378
2025	LDA	Aggregate	Aggregate	Diesel	3229.447774	0.201769956	0	0	0.016746253	0	0	0.002000001	0.00237627	0.017503445	0	0	0.008000002	0.006789343	0.026862315	0	0	0	0	0
2025	LDT1	Aggregate	Aggregate	Gasoline	51613.77126	0.119689455	0	0.409523805	0.001608283	0	0.002772555	0.002000001	0.002817479	0.001749155	0	0.003015406	0.008000002	0.008049939	0.024199248	0	0.58636431	0.187047436	0.537944566	2.881928243
2025	LDT1	Aggregate	Aggregate	Diesel	17.86076582	1.63445728	0	0	0.234664436	0	0	0.002000001	0.003207311	0.24527492	0	0	0.008000002	0.009163746	0.308925714	0	0	0	0	0
2025	LDT2	Aggregate	Aggregate	Gasoline	283640.4358	0.056747891	0	0.317613429	0.001199631	0	0.001974749	0.002000001	0.002710463	0.001304709	0	0.00214772	0.008000002	0.007744179	0.009182146	0	0.370513411	0.081455465	0.215411434	1.300268339
2025	LDT2	Aggregate	Aggregate	Diesel	1948.21787	0.041411188	0	0	0.004625265	0	0	0.002000001	0.00278611	0.004834399	0	0	0.008000002	0.007960313	0.012128381	0	0	0	0	0
2026	LDA	Aggregate	Aggregate	Gasoline	478025.123	0.039849911	0	0.247975018	0.001103414	0	0.00188024	0.002000001	0.002319877	0.001200063	0	0.002044932	0.008000002	0.006628219	0.008111078	0	0.312301858	0.091606526	0.246905472	1.449467801
2026	LDA	Aggregate	Aggregate	Diesel	2908.115966	0.185049147	0	0	0.015729569	0	0	0.002000001	0.002383739	0.01644079	0	0	0.008000002	0.006810684	0.025528672	0	0	0	0	0
2026	LDT1	Aggregate	Aggregate	Gasoline	49947.96628	0.107511618	0	0.388203482	0.001524683	0	0.002640747	0.002000001	0.002818036	0.001658231	0	0.002872053	0.008000002	0.00805153	0.021521265	0	0.545529104	0.178481143	0.511011219	2.743498068
2026	LDT1	Aggregate	Aggregate	Diesel	15.76022989	1.621873819	0	0	0.232899755	0	0	0.002000001	0.00320279	0.243430448	0	0	0.008000002	0.00915083	0.306621475	0	0	0	0	0
2026	LDT2	Aggregate	Aggregate	Gasoline	285773.9483	0.051976278	0	0.303064712	0.001161834	0	0.00192819	0.002000001	0.002715571	0.001263601	0	0.002097083	0.008000002	0.007758775	0.008452171	0	0.350803048	0.07941936	0.215335864	1.295082686
2026	LDT2	Aggregate	Aggregate	Diesel	1896.68013	0.039297791	0	0	0.004605946	0	0	0.002000001	0.002802103	0.004814206	0	0	0.008000002	0.008006008	0.012075936	0	0	0	0	0

CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
287.7153802	0	74.35546804	0.003183794	0	0.086195768	0.005749687	0	0.035613329
241.1480016	0	0	0.001468302	0	0	0.037992966	0	0
340.6870296	0	93.2829823	0.007632638	0	0.134233385	0.011541674	0	0.043234036
418.4423862	0	0	0.014557037	0	0	0.065925768	0	0
357.1747692	0	92.11099182	0.003068124	0	0.093107898	0.006439289	0	0.040125661
332.4085896	0	0	0.000582004	0	0	0.052371109	0	0
282.9033196	0	72.80451385	0.002839823	0	0.081098521	0.005321222	0	0.034615621
240.3060663	0	0	0.001429551	0	0	0.037860319	0	0
336.3507963	0	91.41761981	0.00680041	0	0.126186944	0.010547568	0	0.042085929
418.5431052	0	0	0.014495442	0	0	0.065941637	0	0
351.0654632	0	90.28413288	0.00281006	0	0.088631285	0.005968251	0	0.038794483
330.0724871	0	0	0.000577638	0	0	0.052003055	0	0
278.0315564	0	71.27954853	0.002546579	0	0.076348218	0.00496455	0	0.033658999
239.1460883	0	0	0.0013125	0	0	0.037677564	0	0
331.7968592	0	89.59988963	0.006064737	0	0.11855064	0.009654011	0	0.040939278
418.3681482	0	0	0.014426325	0	0	0.065914072	0	0
345.0663173	0	88.51867075	0.002588997	0	0.084369243	0.005586111	0	0.03759213
327.4365865	0	0	0.000572291	0	0	0.051587768	0	0
273.1135538	0	69.78498882	0.002301368	0	0.071774484	0.004668736	0	0.032657124
237.8086718	0	0	0.001247703	0	0	0.037466853	0	0
327.0474144	0	87.82332408	0.005420603	0	0.111291634	0.008864314	0	0.039751491
418.1508877	0	0	0.014349009	0	0	0.065879843	0	0
339.170652	0	86.81214687	0.002397655	0	0.080318585	0.005274523	0	0.036528256
324.4155708	0	0	0.00056334	0	0	0.051111805	0	0
268.12743	0	68.30971649	0.002098093	0	0.067547772	0.004427837	0	0.031724768
236.4204827	0	0	0.001185758	0	0	0.037248143	0	0
322.1689051	0	86.06467511	0.004858481	0	0.104492553	0.008172489	0	0.038627886
417.6770603	0	0	0.014241981	0	0	0.065805191	0	0
333.3698697	0	85.15877256	0.002235853	0	0.076617244	0.00501748	0	0.035634352
321.1394543	0	0	0.000560904	0	0	0.050595652	0	0

Emissions Calcs

							TONS PER YEAR			TONS PER YEAR					TONS PER YEAR					TONS PER YEAR					
							NOx	NOx	NOx	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM10	PM10	PM10	PM10	PM10	ROG	ROG	ROG	ROG	ROG	ROG
				g/mi	g/trip	g/vehicle/day	g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/trip	g/trip	g/vehicle/day
	Year	One-Way Trips	trip length (mi)	tot mi	tot trip	tot veh	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
3	2022	1048	10.8	11318.4	1048	524	7.63E-04	0.00E+00	3.53E-04	1.59E-05	0.00E+00	2.49E-06	2.50E-05	2.90E-05	1.73E-05	0.00E+00	2.71E-06	9.98E-05	8.28E-05	1.64E-04	0.00E+00	4.82E-04	1.26E-04	3.28E-04	9.44E-04
4		0	10.8	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5		262	10.8	2829.6	262	131	5.23E-04	0.00E+00	1.39E-04	6.00E-06	0.00E+00	9.50E-07	6.24E-06	8.77E-06	6.52E-06	0.00E+00	1.03E-06	2.50E-05	2.51E-05	1.09E-04	0.00E+00	2.10E-04	6.14E-05	1.82E-04	4.69E-04
6		262	10.8	2829.6	262	131	5.16E-03	0.00E+00	0.00E+00	7.41E-04	0.00E+00	0.00E+00	6.24E-06	1.00E-05	7.75E-04	0.00E+00	0.00E+00	2.50E-05	2.87E-05	9.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7		262	10.8	2829.6	262	131	2.46E-04	0.00E+00	1.10E-04	4.05E-06	0.00E+00	6.07E-07	6.24E-06	8.40E-06	4.41E-06	0.00E+00	6.60E-07	2.50E-05	2.40E-05	3.83E-05	0.00E+00	1.28E-04	2.52E-05	6.48E-05	1.94E-04
8		262	10.8	2829.6	262	131	1.57E-04	0.00E+00	0.00E+00	1.51E-05	0.00E+00	0.00E+00	6.24E-06	8.47E-06	1.58E-05	0.00E+00	0.00E+00	2.50E-05	2.42E-05	3.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	2023	1048	10.8	11318.4	1048	524	6.75E-04	0.00E+00	3.33E-04	1.53E-05	0.00E+00	2.40E-06	2.50E-05	2.90E-05	1.67E-05	0.00E+00	2.61E-06	9.98E-05	8.28E-05	1.44E-04	0.00E+00	4.47E-04	1.21E-04	3.17E-04	9.20E-04
10		0	10.8	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11		262	10.8	2829.6	262	131	4.67E-04	0.00E+00	1.32E-04	5.63E-06	0.00E+00	8.95E-07	6.24E-06	8.78E-06	6.13E-06	0.00E+00	9.74E-07	2.50E-05	2.51E-05	9.61E-05	0.00E+00	1.96E-04	5.91E-05	1.73E-04	4.53E-04
12		262	10.8	2829.6	262	131	5.15E-03	0.00E+00	0.00E+00	7.39E-04	0.00E+00	0.00E+00	6.24E-06	1.00E-05	7.73E-04	0.00E+00	0.00E+00	2.50E-05	2.86E-05	9.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13		262	10.8	2829.6	262	131	2.18E-04	0.00E+00	1.03E-04	3.94E-06	0.00E+00	5.92E-07	6.24E-06	8.42E-06	4.28E-06	0.00E+00	6.44E-07	2.50E-05	2.41E-05	3.45E-05	0.00E+00	1.20E-04	2.47E-05	6.38E-05	1.92E-04
14		262	10.8	2829.6	262	131	1.48E-04	0.00E+00	0.00E+00	1.50E-05	0.00E+00	0.00E+00	6.24E-06	8.56E-06	1.57E-05	0.00E+00	0.00E+00	2.50E-05	2.44E-05	3.88E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
15	2024	1056	10.8	11404.8	1056	528	6.07E-04	0.00E+00	3.19E-04	1.49E-05	0.00E+00	2.33E-06	2.51E-05	2.92E-05	1.62E-05	0.00E+00	2.53E-06	1.01E-04	8.34E-05	1.28E-04	0.00E+00	4.19E-04	1.17E-04	3.06E-04	8.95E-04
16		0	10.8	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17		264	10.8	2851.2	264	132	4.20E-04	0.00E+00	1.26E-04	5.34E-06	0.00E+00	8.50E-07	6.29E-06	8.85E-06	5.81E-06	0.00E+00	9.25E-07	2.51E-05	2.53E-05	8.57E-05	0.00E+00	1.83E-04	5.70E-05	1.66E-04	4.40E-04
18		264	10.8	2851.2	264	132	5.16E-03	0.00E+00	0.00E+00	7.41E-04	0.00E+00	0.00E+00	6.29E-06	1.01E-05	7.75E-04	0.00E+00	0.00E+00	2.51E-05	2.88E-05	9.76E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
19		264	10.8	2851.2	264	132	1.97E-04	0.00E+00	9.75E-05	3.87E-06	0.00E+00	5.85E-07	6.29E-06	8.50E-06	4.20E-06	0.00E+00	6.36E-07	2.51E-05	2.43E-05	3.16E-05	0.00E+00	1.14E-04	2.42E-05	6.30E-05	1.90E-04
20		264	10.8	2851.2	264	132	1.40E-04	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	6.29E-06	8.69E-06	1.56E-05	0.00E+00	0.00E+00	2.51E-05	2.48E-05	3.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
21	2025	1056	10.8	11404.8	1056	528	5.48E-04	0.00E+00	3.03E-04	1.44E-05	0.00E+00	2.26E-06	2.51E-05	2.92E-05	1.57E-05	0.00E+00	2.45E-06	1.01E-04	8.34E-05	1.14E-04	0.00E+00	3.90E-04	1.12E-04	2.98E-04	8.73E-04
22		0	10.8	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23		264	10.8	2851.2	264	132	3.76E-04	0.00E+00	1.19E-04	5.05E-06	0.00E+00	8.07E-07	6.29E-06	8.86E-06	5.50E-06	0.00E+00	8.78E-07	2.51E-05	2.53E-05	7.61E-05	0.00E+00	1.71E-04	5.44E-05	1.57E-04	4.19E-04
24		264	10.8	2851.2	264	132	5.14E-03	0.00E+00	0.00E+00	7.38E-04	0.00E+00	0.00E+00	6.29E-06	1.01E-05	7.71E-04	0.00E+00	0.00E+00	2.51E-05	2.88E-05	9.71E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
25		264	10.8	2851.2	264	132	1.78E-04	0.00E+00	9.24E-05	3.77E-06	0.00E+00	5.75E-07	6.29E-06	8.52E-06	4.10E-06	0.00E+00	6.25E-07	2.51E-05	2.43E-05	2.89E-05	0.00E+00	1.08E-04	2.37E-05	6.27E-05	1.89E-04
26		264	10.8	2851.2	264	132	1.30E-04	0.00E+00	0.00E+00	1.45E-05	0.00E+00	0.00E+00	6.29E-06	8.76E-06	1.52E-05	0.00E+00	0.00E+00	2.51E-05	2.50E-05	3.81E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
27	2026	872	10.8	9417.6	872	436	4.14E-04	0.00E+00	2.38E-04	1.15E-05	0.00E+00	1.81E-06	2.08E-05	2.41E-05	1.25E-05	0.00E+00	1.97E-06	8.30E-05	6.88E-05	8.42E-05	0.00E+00	3.00E-04	8.81E-05	2.37E-04	6.97E-04
28		0	10.8	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
29		218	10.8	2354.4	218	109	2.79E-04	0.00E+00	9.33E-05	3.96E-06	0.00E+00	6.35E-07	5.19E-06	7.31E-06	4.30E-06	0.00E+00	6.90E-07	2.08E-05	2.09E-05	5.59E-05	0.00E+00	1.31E-04	4.29E-05	1.23E-04	3.30E-04
30		218	10.8	2354.4	218	109	4.21E-03	0.00E+00	0.00E+00	6.04E-04	0.00E+00	0.00E+00	5.19E-06	8.31E-06	6.32E-04	0.00E+00	0.00E+00	2.08E-05	2.37E-05	7.96E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
31		218	10.8	2354.4	218	109	1.35E-04	0.00E+00	7.28E-05	3.02E-06	0.00E+00	4.63E-07	5.19E-06	7.05E-06	3.28E-06	0.00E+00	5.04E-07	2.08E-05	2.01E-05	2.19E-05	0.00E+00	8.43E-05	1.91E-05	5.17E-05	1.56E-04
32		218	10.8	2354.4	218	109	1.02E-04	0.00E+00	0.00E+00	1.20E-05	0.00E+00	0.00E+00	5.19E-06	7.27E-06	1.25E-05	0.00E+00	0.00E+00	2.08E-05	2.08E-05	3.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		10160		109728	10160	5080																			

Total	TONS PER YEAR			TONS PER YEAR					TONS PER YEAR					TONS PER YEAR					
Year	NOx	NOx	NOx	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM10	PM10	PM10	PM10	PM10	ROG	ROG	ROG	ROG	ROG	ROG
2022	6.85E-03	0.00E+00	6.02E-04	7.82E-04	0.00E+00	4.05E-06	4.99E-05	6.47E-05	8.19E-04	0.00E+00	4.40E-06	2.00E-04	1.85E-04	1.33E-03	0.00E+00	8.20E-04	2.12E-04	5.74E-04	1.61E-03
2023	6.66E-03	0.00E+00	5.68E-04	7.79E-04	0.00E+00	3.88E-06	4.99E-05	6.48E-05	8.15E-04	0.00E+00	4.23E-06	2.00E-04	1.85E-04	1.29E-03	0.00E+00	7.63E-04	2.05E-04	5.54E-04	1.57E-03
2024	6.53E-03	0.00E+00	5.42E-04	7.80E-04	0.00E+00	3.76E-06	5.03E-05	6.53E-05	8.17E-04	0.00E+00	4.09E-06	2.01E-04	1.87E-04	1.26E-03	0.00E+00	7.17E-04	1.98E-04	5.35E-04	1.53E-03
2025	6.37E-03	0.00E+00	5.14E-04	7.75E-04	0.00E+00	3.64E-06	5.03E-05	6.54E-05	8.11E-04	0.00E+00	3.96E-06	2.01E-04	1.87E-04	1.23E-03	0.00E+00	6.68E-04	1.90E-04	5.17E-04	1.48E-03
2026	5.14E-03	0.00E+00	4.04E-04	6.35E-04	0.00E+00	2.91E-06	4.15E-05	5.40E-05	6.64E-04	0.00E+00	3.16E-06	1.66E-04	1.54E-04	9.89E-04	0.00E+00	5.16E-04	1.50E-04	4.12E-04	1.18E-03

TONS PER YEAR			TONS PER YEAR			TONS PER YEAR		
CO2 g/mi	CO2 g/vehicle/day	CO2 g/trip	CH4 g/mi	CH4 g/vehicle/day	CH4 g/trip	N2O g/mi	N2O g/vehicle/day	N2O g/trip
CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
3.59E+00	0.00E+00	8.59E-02	3.97E-05	0.00E+00	9.96E-05	7.17E-05	0.00E+00	4.11E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.06E+00	0.00E+00	2.69E-02	2.38E-05	0.00E+00	3.88E-05	3.60E-05	0.00E+00	1.25E-05
1.31E+00	0.00E+00	0.00E+00	4.54E-05	0.00E+00	0.00E+00	2.06E-04	0.00E+00	0.00E+00
1.11E+00	0.00E+00	2.66E-02	9.57E-06	0.00E+00	2.69E-05	2.01E-05	0.00E+00	1.16E-05
1.04E+00	0.00E+00	0.00E+00	1.82E-06	0.00E+00	0.00E+00	1.63E-04	0.00E+00	0.00E+00
3.53E+00	0.00E+00	8.41E-02	3.54E-05	0.00E+00	9.37E-05	6.64E-05	0.00E+00	4.00E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.05E+00	0.00E+00	2.64E-02	2.12E-05	0.00E+00	3.64E-05	3.29E-05	0.00E+00	1.22E-05
1.31E+00	0.00E+00	0.00E+00	4.52E-05	0.00E+00	0.00E+00	2.06E-04	0.00E+00	0.00E+00
1.10E+00	0.00E+00	2.61E-02	8.76E-06	0.00E+00	2.56E-05	1.86E-05	0.00E+00	1.12E-05
1.03E+00	0.00E+00	0.00E+00	1.80E-06	0.00E+00	0.00E+00	1.62E-04	0.00E+00	0.00E+00
3.50E+00	0.00E+00	8.30E-02	3.20E-05	0.00E+00	8.89E-05	6.24E-05	0.00E+00	3.92E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.04E+00	0.00E+00	2.61E-02	1.91E-05	0.00E+00	3.45E-05	3.03E-05	0.00E+00	1.19E-05
1.31E+00	0.00E+00	0.00E+00	4.53E-05	0.00E+00	0.00E+00	2.07E-04	0.00E+00	0.00E+00
1.08E+00	0.00E+00	2.58E-02	8.14E-06	0.00E+00	2.46E-05	1.76E-05	0.00E+00	1.09E-05
1.03E+00	0.00E+00	0.00E+00	1.80E-06	0.00E+00	0.00E+00	1.62E-04	0.00E+00	0.00E+00
3.43E+00	0.00E+00	8.12E-02	2.89E-05	0.00E+00	8.35E-05	5.87E-05	0.00E+00	3.80E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1.03E+00	0.00E+00	2.56E-02	1.70E-05	0.00E+00	3.24E-05	2.79E-05	0.00E+00	1.16E-05
1.31E+00	0.00E+00	0.00E+00	4.51E-05	0.00E+00	0.00E+00	2.07E-04	0.00E+00	0.00E+00
1.07E+00	0.00E+00	2.53E-02	7.54E-06	0.00E+00	2.34E-05	1.66E-05	0.00E+00	1.06E-05
1.02E+00	0.00E+00	0.00E+00	1.77E-06	0.00E+00	0.00E+00	1.61E-04	0.00E+00	0.00E+00
2.78E+00	0.00E+00	6.57E-02	2.18E-05	0.00E+00	6.49E-05	4.60E-05	0.00E+00	3.05E-05
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8.36E-01	0.00E+00	2.07E-02	1.26E-05	0.00E+00	2.51E-05	2.12E-05	0.00E+00	9.28E-06
1.08E+00	0.00E+00	0.00E+00	3.70E-05	0.00E+00	0.00E+00	1.71E-04	0.00E+00	0.00E+00
8.65E-01	0.00E+00	2.05E-02	5.80E-06	0.00E+00	1.84E-05	1.30E-05	0.00E+00	8.56E-06
8.33E-01	0.00E+00	0.00E+00	1.46E-06	0.00E+00	0.00E+00	1.31E-04	0.00E+00	0.00E+00

TONS PER YEAR			TONS PER YEAR			TONS PER YEAR		
CO2	CO2	CO2	CH4	CH4	CH4	N2O	N2O	N2O
8.11E+00	0.00E+00	1.39E-01	1.20E-04	0.00E+00	1.65E-04	4.97E-04	0.00E+00	6.52E-05
8.05E+00	0.00E+00	1.38E-01	1.16E-04	0.00E+00	1.59E-04	4.91E-04	0.00E+00	6.41E-05
8.05E+00	0.00E+00	1.38E-01	1.16E-04	0.00E+00	1.59E-04	4.91E-04	0.00E+00	6.41E-05
8.03E+00	0.00E+00	1.37E-01	1.13E-04	0.00E+00	1.57E-04	4.88E-04	0.00E+00	6.37E-05
8.04E+00	0.00E+00	1.37E-01	1.13E-04	0.00E+00	1.57E-04	4.88E-04	0.00E+00	6.37E-05

Worker Vehicle Emissions Summary

Total Emissions from Haul Truck Trips (tons/year)

Year	ROG	NOx	PM10	PM2.5
2022	0.0045	0.0075	0.0012	0.0009
2023	0.0044	0.0072	0.0012	0.0009
2024	0.0042	0.0071	0.0012	0.0009
2025	0.0041	0.0069	0.0012	0.0009
2026	0.0032	0.0055	0.0010	0.0007

Total Emissions from Haul Truck Trips (pounds/day)

Year	ROG	NOx	PM10	PM2.5
2022	0.0693	0.1137	0.0184	0.0138
2023	0.0668	0.1103	0.0184	0.0137
2024	0.0642	0.1071	0.0183	0.0136
2025	0.0619	0.1043	0.0182	0.0136
2026	0.0596	0.1017	0.0181	0.0135

Total GHG Emissions from Worker Vehicle Trips (tons/year)

Year	CO2	CH4	N2O
2022	8.2478	0.0003	0.0006
2023	8.1859	0.0003	0.0006
2024	8.1859	0.0003	0.0006
2025	8.1719	0.0003	0.0006
2026	8.1722	0.0003	0.0006

GWP	1	25	298

Total GHG Emissions from Worker Vehicle Trips (tons/year)

Year	CO2e
2022	8.4224
2023	8.3584
2024	8.3584
2025	8.3432
2026	8.3435

Total GHG Emissions from Worker Vehicle Trips (MT/year)

Year	CO2e
2022	7.6407
2023	7.5826
2024	7.5826
2025	7.5688
2026	7.5691

Pine Mountain Tunnel Replacement - Vendor Vehicle EMFAC Calculations

Background Information

Conversions

Tons	Pounds	Grams
1	2000	907185
Year	Days	
1	365	
Mile	Feet	
1	5280	
Tons	MT	
1	0.907185	

Construction Schedule

Phase	Start Date	End Date	Work Days
Site Preparation 2022	1/3/2022	1/31/2022	21
Site Preparation 2 2022	8/1/2022	8/31/2022	23
Grading 2022	9/1/2022	12/31/2022	87
Grading 2023	1/1/2023	1/31/2023	22
Building Construction 2023	8/1/2023	12/31/2023	109
Building Construction 2024	1/1/2024	1/31/2024	23
Building Construction 2 2024	8/1/2024	12/31/2024	109
Building Construction 2 2025	1/1/2025	1/31/2025	23
Building Construction 3 2025	8/1/2025	12/31/2025	109
Building Construction 4 2026	8/1/2026	11/30/2026	86
Paving 2026	12/1/2026	12/31/2026	23
Total			635

Work Days per Year

Year	Days
2022	131
2023	131
2024	132
2025	132
2026	109
Total	635

Vendor Trips

Year	*Days per Year*	*Trips Per Day*	*Trips Per Year*	*Trip Length*
2022	0	1.3	0	5
2023	109	1.3	141.7	5
2024	132	1.3	171.6	5
2025	132	1.3	171.6	5
2026	109	1.3	141.7	5

See CalEEMod Output

Fleet Mix

Vehicle Type	*Fuel Type*	*% Fleet*
HHDT	Diesel	0.5
MHDT	Diesel	0.5

EMFAC Output

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: Sub-Area
Region: Marin (SF)
Calendar Year: 2022, 2023, 2024, 2025, 2026
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Trips	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
2022	HHDT	Aggregate	Aggregate	Diesel	9946.236538	3.023560594	61.16360794	2.536338057	0.028355294	0.044452782	0	0.008770385	0.029802238	0.029637394	0.046462739	0	0.03508154	0.085149253	0.037868784	4.23868087	0	0	0	0
2022	MHDT	Aggregate	Aggregate	Diesel	16026.5831	1.958594875	17.52264858	1.498501191	0.022500216	0.051714232	0	0.003000001	0.015896755	0.023517576	0.05405252	0	0.012000003	0.045419301	0.053879185	0.31355366	0	0	0	0
2023	HHDT	Aggregate	Aggregate	Diesel	10073.05412	2.509823225	57.00517492	2.859585951	0.026988245	0.041027512	0	0.008769703	0.029257386	0.028208534	0.042882594	0	0.035078814	0.083592531	0.02340991	4.26034771	0	0	0	0
2023	MHDT	Aggregate	Aggregate	Diesel	16142.13788	1.617576969	15.88172985	1.620941219	0.018755163	0.043462832	0	0.003000001	0.015896366	0.019603188	0.045428029	0	0.012000003	0.045418189	0.041319926	0.28809916	0	0	0	0
2024	HHDT	Aggregate	Aggregate	Diesel	10357.71303	2.393317603	56.48474277	2.921178764	0.026642059	0.038309158	0	0.008769831	0.029084612	0.027846694	0.040041328	0	0.035079324	0.083098893	0.022534083	4.26737415	0	0	0	0
2024	MHDT	Aggregate	Aggregate	Diesel	16337.4949	1.48385221	15.2649107	1.645704364	0.016292266	0.03628498	0	0.003000001	0.015895724	0.01702893	0.037925626	0	0.012000003	0.045416354	0.036188523	0.26921093	0	0	0	0
2025	HHDT	Aggregate	Aggregate	Diesel	10589.93098	2.280481098	55.96584667	2.964593791	0.026196788	0.035749263	0	0.008770614	0.028955486	0.02738129	0.037365686	0	0.035082455	0.082729959	0.021665165	4.26946346	0	0	0	0
2025	MHDT	Aggregate	Aggregate	Diesel	16587.50192	1.352646063	14.68661518	1.654601448	0.014080554	0.030081322	0	0.003000001	0.015895304	0.014717214	0.031441465	0	0.012000003	0.045415155	0.031490745	0.25301982	0	0	0	0
2026	HHDT	Aggregate	Aggregate	Diesel	10787.15077	2.180682331	55.49257474	2.997776873	0.025979366	0.03362303	0	0.008771649	0.028961005	0.027154037	0.035143314	0	0.035086594	0.082745729	0.020915302	4.27081451	0	0	0	0
2026	MHDT	Aggregate	Aggregate	Diesel	16797.21339	1.232492534	14.1743665	1.656653465	0.012232122	0.024907147	0	0.003000001	0.015894913	0.012785204	0.026033338	0	0.012000003	0.045414036	0.027427602	0.23962821	0	0	0	0

CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
1748.144258	10671.46683	0	0.001758907	0.196875748	0	0.27542084	1.681293945	0
1162.510833	2432.38295	0	0.002502549	0.014563756	0	0.18315406	0.383222924	0
1724.640643	10328.68619	0	0.00108733	0.197882117	0	0.27171784	1.627288716	0
1156.659122	2383.321694	0	0.001919204	0.01338146	0	0.18223212	0.375493304	0
1699.030838	10178.22096	0	0.00104665	0.198208477	0	0.267683	1.603582858	0
1152.182574	2365.46317	0	0.001680863	0.01250415	0	0.18152683	0.372679686	0
1670.937291	10013.02458	0	0.001006291	0.19830552	0	0.26325685	1.5775561	0
1146.018484	2343.012776	0	0.001462664	0.011752115	0	0.18055568	0.369142617	0
1643.074585	9849.297332	0	0.000971462	0.198368273	0	0.25886707	1.551760806	0
1139.608283	2320.862981	0	0.001273941	0.01113011	0	0.17954575	0.365652908	0

Emissions Calcs

							TONS PER YEAR			TONS PER YEAR					TONS PER YEAR					TONS PER YEAR					
							NOx	NOx	NOx	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM10	PM10	PM10	PM10	PM10	ROG	ROG	ROG	ROG	ROG	ROG
				g/mi	g/trip	g/vehicle/day	g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/vehicle/day
		One-Way Trips	trip length (mi)	tot mi	tot trip	tot veh	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
3	2022	0	5	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4		0	5	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2023	70.85	5	354.25	70.85	35.425	9.80E-04	2.23E-03	2.23E-04	1.05E-05	1.60E-06	0.00E+00	3.42E-06	1.14E-05	1.10E-05	1.67E-06	0.00E+00	1.37E-05	3.26E-05	9.14E-06	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6		70.85	5	354.25	70.85	35.425	6.32E-04	6.20E-04	1.27E-04	7.32E-06	1.70E-06	0.00E+00	1.17E-06	6.21E-06	7.65E-06	1.77E-06	0.00E+00	4.69E-06	1.77E-05	1.61E-05	1.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2024	85.8	5	429	85.8	42.9	1.13E-03	2.67E-03	2.76E-04	1.26E-05	1.81E-06	0.00E+00	4.15E-06	1.38E-05	1.32E-05	1.89E-06	0.00E+00	1.66E-05	3.93E-05	1.07E-05	2.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8		85.8	5	429	85.8	42.9	7.02E-04	7.22E-04	1.56E-04	7.70E-06	1.72E-06	0.00E+00	1.42E-06	7.52E-06	8.05E-06	1.79E-06	0.00E+00	5.67E-06	2.15E-05	1.71E-05	1.27E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	2025	85.8	5	429	85.8	42.9	1.08E-03	2.65E-03	2.80E-04	1.24E-05	1.69E-06	0.00E+00	4.15E-06	1.37E-05	1.29E-05	1.77E-06	0.00E+00	1.66E-05	3.91E-05	1.02E-05	2.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10		85.8	5	429	85.8	42.9	6.40E-04	6.95E-04	1.56E-04	6.66E-06	1.42E-06	0.00E+00	1.42E-06	7.52E-06	6.96E-06	1.49E-06	0.00E+00	5.67E-06	2.15E-05	1.49E-05	1.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
11	2026	70.85	5	354.25	70.85	35.425	8.52E-04	2.17E-03	2.34E-04	1.01E-05	1.31E-06	0.00E+00	3.43E-06	1.13E-05	1.06E-05	1.37E-06	0.00E+00	1.37E-05	3.23E-05	8.17E-06	1.67E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
12		70.85	5	354.25	70.85	35.425	4.81E-04	5.54E-04	1.29E-04	4.78E-06	9.73E-07	0.00E+00	1.17E-06	6.21E-06	4.99E-06	1.02E-06	0.00E+00	4.69E-06	1.77E-05	1.07E-05	9.36E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Total	TONS PER YEAR			TONS PER YEAR					TONS PER YEAR					TONS PER YEAR					
Year	NOx	NOx	NOx	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM10	PM10	PM10	PM10	PM10	ROG	ROG	ROG	ROG	ROG	ROG
2022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2023	1.61E-03	2.85E-03	3.50E-04	1.79E-05	3.30E-06	0.00E+00	4.60E-06	1.76E-05	1.87E-05	3.45E-06	0.00E+00	1.84E-05	5.04E-05	2.53E-05	1.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2024	1.83E-03	3.39E-03	4.32E-04	2.03E-05	3.53E-06	0.00E+00	5.57E-06	2.13E-05	2.12E-05	3.69E-06	0.00E+00	2.23E-05	6.08E-05	2.78E-05	2.15E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2025	1.72E-03	3.34E-03	4.37E-04	1.90E-05	3.11E-06	0.00E+00	5.57E-06	2.12E-05	1.99E-05	3.25E-06	0.00E+00	2.23E-05	6.06E-05	2.51E-05	2.14E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2026	1.33E-03	2.72E-03	3.64E-04	1.49E-05	2.29E-06	0.00E+00	4.60E-06	1.75E-05	1.56E-05	2.39E-06	0.00E+00	1.84E-05	5.00E-05	1.89E-05	1.76E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TONS PER YEAR			TONS PER YEAR			TONS PER YEAR		
CO2	CO2	CO2	CH4	CH4	CH4	N2O	N2O	N2O
g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip
CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.73E-01	4.03E-01	0.00E+00	4.25E-07	7.73E-06	0.00E+00	1.06E-04	6.35E-05	0.00E+00
4.52E-01	9.31E-02	0.00E+00	7.49E-07	5.23E-07	0.00E+00	7.12E-05	1.47E-05	0.00E+00
8.03E-01	4.81E-01	0.00E+00	4.95E-07	9.37E-06	0.00E+00	1.27E-04	7.58E-05	0.00E+00
5.45E-01	1.12E-01	0.00E+00	7.95E-07	5.91E-07	0.00E+00	8.58E-05	1.76E-05	0.00E+00
7.90E-01	4.74E-01	0.00E+00	4.76E-07	9.38E-06	0.00E+00	1.24E-04	7.46E-05	0.00E+00
5.42E-01	1.11E-01	0.00E+00	6.92E-07	5.56E-07	0.00E+00	8.54E-05	1.75E-05	0.00E+00
6.42E-01	3.85E-01	0.00E+00	3.79E-07	7.75E-06	0.00E+00	1.01E-04	6.06E-05	0.00E+00
4.45E-01	9.06E-02	0.00E+00	4.97E-07	4.35E-07	0.00E+00	7.01E-05	1.43E-05	0.00E+00

TONS PER YEAR			TONS PER YEAR			TONS PER YEAR		
CO2	CO2	CO2	CH4	CH4	CH4	N2O	N2O	N2O
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6.73E-01	4.03E-01	0.00E+00	4.25E-07	7.73E-06	0.00E+00	1.06E-04	6.35E-05	0.00E+00
1.13E+00	4.96E-01	0.00E+00	1.17E-06	8.25E-06	0.00E+00	1.77E-04	7.82E-05	0.00E+00
1.26E+00	5.74E-01	0.00E+00	1.24E-06	9.90E-06	0.00E+00	1.98E-04	9.05E-05	0.00E+00
1.35E+00	5.93E-01	0.00E+00	1.29E-06	9.96E-06	0.00E+00	2.12E-04	9.35E-05	0.00E+00

Vendor Vehicle Emissions Summary

Total Emissions from Haul Truck Trips (tons/year)

Year	ROG	NOx	PM10	PM2.5
2022	0.0000	0.0000	0.0000	0.0000
2023	0.0002	0.0048	0.0001	0.0000
2024	0.0002	0.0057	0.0001	0.0001
2025	0.0002	0.0055	0.0001	0.0000
2026	0.0002	0.0044	0.0001	0.0000

Total Emissions from Haul Truck Trips (pounds/day)

Year	ROG	NOx	PM10	PM2.5
2022	0.0000	0.0000	0.0000	0.0000
2023	0.0031	0.0734	0.0014	0.0007
2024	0.0037	0.0857	0.0016	0.0008
2025	0.0036	0.0833	0.0016	0.0007
2026	0.0036	0.0810	0.0016	0.0007

Total GHG Emissions from Vendor Vehicle Trips (tons/year)

Year	CO2	CH4	N2O
2022	0.0000	0.0000	0.0000
2023	1.0768	0.0000	0.0002
2024	1.6215	0.0000	0.0003
2025	1.8295	0.0000	0.0003
2026	1.9415	0.0000	0.0003

GWP	1	25	298

Total GHG Emissions from Vendor Vehicle Trips (tons/year)

Year	CO2e
2022	0.0000
2023	1.1275
2024	1.6979
2025	1.9157
2026	2.0329

Total GHG Emissions from Vendor Vehicle Trips (MT/year)

Year	CO2e
2022	0.0000
2023	1.0229
2024	1.5403
2025	1.7379
2026	1.8442

Pine Mountain Tunnel Replacement - Haul Truck EMFAC Calculations

Background Information

Conversions

Tons	Pounds	Grams
1	2000	907185
Year	Days	
1	365	
Mile	Feet	
1	5280	
Tons	MT	
1	0.907185	

Construction Schedule

Phase	Start Date	End Date	Work Days
Site Preparation 2022	1/3/2022	1/31/2022	21
Site Preparation 2 2022	8/1/2022	8/31/2022	23
Grading 2022	9/1/2022	12/31/2022	87
Grading 2023	1/1/2023	1/31/2023	22
Building Construction 2023	8/1/2023	12/31/2023	109
Building Construction 2024	1/1/2024	1/31/2024	23
Building Construction 2 2024	8/1/2024	12/31/2024	109
Building Construction 2 2025	1/1/2025	1/31/2025	23
Building Construction 3 2025	8/1/2025	12/31/2025	109
Building Construction 4 2026	8/1/2026	11/30/2026	86
Paving 2026	12/1/2026	12/31/2026	23
Total			635

Work Days per Year

Year	Days
2022	131
2023	131
2024	132
2025	132
2026	109
Total	635

Vendor Trips

Year	*Days per Year*	*Trips Per Day*	*Trips Per Year*	*Trip Length*
2022	87	63.0733945	5487.385321	2.918
2023	22	63.0733945	1387.614679	2.918
2024	0	0	0	2.918
2025	0	0	0	2.918
2026	0	0	0	2.918
Total			6875	

See CalEEMod Output

EMFAC Output

Source: EMFAC2021 (v1.0.1) Emission Rates
Region Type: Sub-Area
Region: Marin (SF)
Calendar Year: 2022, 2023, 2024, 2025, 2026
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HOTSOAK and RUNLOSS, g/vehicle/day for IDLEX and DIURN

Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Trips	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
2022	HHDT	Aggregate	Aggregate	Diesel	9946.236538	3.023560594	61.1636079	2.536338057	0.028355294	0.044452782	0	0.008770385	0.029802238	0.029637394	0.046462739	0	0.03508154	0.085149253	0.037868784	4.23868087	0	0	0	0
2023	HHDT	Aggregate	Aggregate	Diesel	10073.05412	2.509823225	57.0051749	2.859585951	0.026988245	0.041027512	0	0.008769703	0.029257386	0.028208534	0.042882594	0	0.035078814	0.083592531	0.02340991	4.26034771	0	0	0	0
2024	HHDT	Aggregate	Aggregate	Diesel	10357.71303	2.393317603	56.4847428	2.921178764	0.026642059	0.038309158	0	0.008769831	0.029084612	0.027846694	0.040041328	0	0.035079324	0.083098893	0.022534083	4.26737415	0	0	0	0
2025	HHDT	Aggregate	Aggregate	Diesel	10589.93098	2.280481098	55.9658467	2.964593791	0.026196788	0.035749263	0	0.008770614	0.028955486	0.02738129	0.037365686	0	0.035082455	0.082729959	0.021665165	4.26946346	0	0	0	0
2026	HHDT	Aggregate	Aggregate	Diesel	10787.15077	2.180682331	55.4925747	2.997776873	0.025979366	0.03362303	0	0.008771649	0.028961005	0.027154037	0.035143314	0	0.035086594	0.082745729	0.020915302	4.27081451	0	0	0	0

CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
1748.144258	10671.46683	0	0.001758907	0.19687575	0	0.27542084	1.68129395	0
1724.640643	10328.68619	0	0.00108733	0.19788212	0	0.271717836	1.62728872	0
1699.030838	10178.22096	0	0.00104665	0.19820848	0	0.267683	1.60358286	0
1670.937291	10013.02458	0	0.001006291	0.19830552	0	0.263256851	1.5775561	0
1643.074585	9849.297332	0	0.000971462	0.19836827	0	0.25886707	1.55176081	0

Emissions Calcs

							TONS PER YEAR			TONS PER YEAR					TONS PER YEAR					TONS PER YEAR					
							NOx	NOx	NOx	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM10	PM10	PM10	PM10	PM10	ROG	ROG	ROG	ROG	ROG	ROG
				g/mi	g/trip	g/vehicle/day	g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/mi	g/vehicle/day	g/trip	g/mi	g/mi	g/vehicle/day
	Year	One-Way Trips	trip length (mi)	tot mi	tot trip	tot veh	NOx_RUNEX	NOx_IDLEX	NOx_STREX	PM2.5_RUNEX	PM2.5_IDLEX	PM2.5_STREX	PM2.5_PMTW	PM2.5_PMBW	PM10_RUNEX	PM10_IDLEX	PM10_STREX	PM10_PMTW	PM10_PMBW	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_HOTSOAK	ROG_RUNLOSS	ROG_DIURN
3	2022	5487.385321	2.918	16012.19037	5487.385321	2743.692661	5.34E-02	1.85E-01	1.53E-02	5.00E-04	1.34E-04	0.00E+00	1.55E-04	5.26E-04	5.23E-04	1.41E-04	0.00E+00	6.19E-04	1.50E-03	6.68E-04	1.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	2023	1387.614679	2.918	4049.059633	1387.614679	693.8073394	1.12E-02	4.36E-02	4.37E-03	1.20E-04	3.14E-05	0.00E+00	3.91E-05	1.31E-04	1.26E-04	3.28E-05	0.00E+00	1.57E-04	3.73E-04	1.04E-04	3.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	2024	0	2.918	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2025	0	2.918	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	2026	0	2.918	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Total	TONS PER YEAR			TONS PER YEAR					TONS PER YEAR					TONS PER YEAR					
Year	NOx	NOx	NOx	PM2.5	PM2.5	PM2.5	PM2.5	PM2.5	PM10	PM10	PM10	PM10	PM10	ROG	ROG	ROG	ROG	ROG	ROG
2022	5.34E-02	1.85E-01	1.53E-02	5.00E-04	1.34E-04	0.00E+00	1.55E-04	5.26E-04	5.23E-04	1.41E-04	0.00E+00	6.19E-04	1.50E-03	6.68E-04	1.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2023	1.12E-02	4.36E-02	4.37E-03	1.20E-04	3.14E-05	0.00E+00	3.91E-05	1.31E-04	1.26E-04	3.28E-05	0.00E+00	1.57E-04	3.73E-04	1.04E-04	3.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2024	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2025	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2026	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TONS PER YEAR			TONS PER YEAR			TONS PER YEAR		
CO2	CO2	CO2	CH4	CH4	CH4	N2O	N2O	N2O
g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip	g/mi	g/vehicle/day	g/trip
CO2_RUNEX	CO2_IDLEX	CO2_STREX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	N2O_RUNEX	N2O_IDLEX	N2O_STREX
3.09E+01	3.23E+01	0.00E+00	3.10E-05	5.95E-04	0.00E+00	4.86E-03	5.08E-03	0.00E+00
7.70E+00	7.90E+00	0.00E+00	4.85E-06	1.51E-04	0.00E+00	1.21E-03	1.24E-03	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TONS PER YEAR			TONS PER YEAR			TONS PER YEAR		
CO2	CO2	CO2	CH4	CH4	CH4	N2O	N2O	N2O
3.09E+01	3.23E+01	0.00E+00	3.10E-05	5.95E-04	0.00E+00	4.86E-03	5.08E-03	0.00E+00
7.70E+00	7.90E+00	0.00E+00	4.85E-06	1.51E-04	0.00E+00	1.21E-03	1.24E-03	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Haul Truck Emissions Summary

Total Emissions from Haul Truck Trips (tons per year)

Year	ROG	NOx	PM10	PM2.5
2022	0.0135	0.2537	0.0028	0.0013
2023	0.0034	0.0592	0.0007	0.0003
2024	0.0000	0.0000	0.0000	0.0000
2025	0.0000	0.0000	0.0000	0.0000
2026	0.0000	0.0000	0.0000	0.0000

Total Emissions from Haul Truck Trips (pounds per day)

lbs/day	ROG	NOx	PM10	PM2.5
2022	0.2059	3.8732	0.0425	0.0201
2023	0.0513	0.9034	0.0105	0.0049
2024	0.0000	0.0000	0.0000	0.0000
2025	0.0000	0.0000	0.0000	0.0000
2026	0.0000	0.0000	0.0000	0.0000

Total GHG Emissions from Haul Truck Trips (tons per year)

Year	CO2	CH4	N2O
2022	63.1303	0.0006	0.0099
2023	15.5969	0.0002	0.0025
2024	0.0000	0.0000	0.0000
2025	0.0000	0.0000	0.0000
2026	0.0000	0.0000	0.0000

GWP	1	25	298

Total GHG Emissions from Haul Truck Trips (tons per year)

Year	CO2e
2022	63.1767
2023	15.5998
2024	0.0000
2025	0.0000
2026	0.0000

Total GHG Emissions from Haul Truck Trips (MT/year)

Year	CO2e
2022	57.3130
2023	14.1519
2024	0.0000
2025	0.0000
2026	0.0000

Pine Mountain Tunnel Replacement
Construction HRA Modeling Source
Construction Site
Resident
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