APPENDIX B
NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETING

PAGE INTENTIONALLY BLANK

San Francisco Planning

49 South Van Ness Avenue, Suite 1400
San Francisco, CA 94103
628.652.7600
www.sfplanning.org

PUBLIC NOTICE

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETINGS

Date:	June 28, 2023
Case No.:	**2023-005370ENV**
Project Title:	**PG&E Power Assets Acquisition Project**
Location:	Various Locations in San Francisco and San Mateo counties
Zoning:	Various
Block/Lot:	Various
Neighborhoods:	Outer Mission, Bayview, Crocker Amazon, Ingleside, Lakeshore, Merced Heights, Oceanview, Sunnydale, Little Hollywood, Visitacion Valley, Excelsior, Cayuga Terrace (San Francisco); Bayshore, Crocker, Peninsula Gateway, Mission Street, Southern Hills, Vista Grande, Westlake (Daly City); Baylands, Bayfront, Beatty, Northwest Bayshore (Brisbane); and Unincorporated San Mateo County
Project Sponsor:	San Francisco Public Utilities Commission Sue Chau – (415) 554-3238
Lead Agency:	San Francisco Planning Department
Staff Contact:	Julie Moore – (628) 652-7566 CPC.PGEPowerAssetsEIR@sfgov.org

The San Francisco Planning Department is issuing this notice of preparation (NOP) of an environmental impact report (EIR) for the project listed above. State law known as the California Environmental Quality Act (CEQA) requires public agencies to evaluate environmental impacts prior to approving any project, and to reduce those impacts to the degree feasible. (See the attached Fact Sheet for more information about EIRs). The purpose of an EIR is to:

(1) provide information about potential significant physical environmental effects of a proposed project

(2) identify possible ways to reduce the significant effects, and

(3) describe and analyze possible alternatives to the project that could reduce significant environmental effects.

This notice informs the public, responsible and trustee agencies, and interested parties that the San Francisco Planning Department is preparing an EIR in compliance with CEQA and the CEQA Guidelines. This notice describes the project, the EIR process, and how to provide input on the environmental review.

Comments on the scope and content of the environmental impact analysis may be submitted by mail, email, or at any of the in-person or online public scoping meetings. Public scoping meetings will be held to receive

oral comments concerning the EIR scope. The presentation will be the same at each meeting, and is also available online. The two in-person meetings will be held on **Tuesday**, **July 11**, **2023**, **at 6 p.m. at the San Francisco Planning Department (49 South Van Ness Avenue, 1st Floor Room 0196**, **San Francisco**, **CA 94103) and Saturday**, **July 15**, **2023**, **at 10 a.m. at the Mission Blue Center in Brisbane (475 Mission Blue Drive**, **Brisbane**, **CA 94005)**. An informational open house will occur from 6 to 6:30 p.m. and 10 to 10:30 a.m. prior to the formal scoping meetings on July 11th and 15th, respectively. An online scoping meeting will be held on **Thursday**, **July 13**, **2023**, **at 6:30 p.m.**, accessible at https://bit.ly/pgepowerassets. Written comments also may be submitted by mail or email (more information on page 24). All comments – oral or written – will receive equal consideration as part of the department's scoping. This NOP, the scoping meeting presentation video, and online meeting instructions are available for public review online at https://sfplanning.org/sfceqadocs.

1. Project Summary

The City and County of San Francisco (the "City") is proposing to purchase Pacific Gas and Electric Company (PG&E)-owned electrical transmission and distribution assets (the "Assets") located in San Francisco and San Mateo County that are needed to provide electricity service to customers within the city (the "project"). "Assets" include equipment, facilities, property, and records that would be acquired by SFPUC including the following: PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer-level distribution lines, and related facilities); PG&E's 115 kilovolts[1] (kV) and 230 kV transmission assets (substations, transmission lines, busses, transformers, and related facilities needed for operational control); a portion of the Martin Substation facilities (located in Brisbane) or interconnections needed to enable the SFPUC to control all power flows from the Martin Substation into San Francisco; and other systems and equipment, materials, records, operating and maintenance facilities, property and other land-related agreements as necessary for safe and reliable operation and maintenance of the acquired physical assets. After the City completes its acquisition of the Assets, the San Francisco Public Utilities Commission (SFPUC) would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned by PG&E. This transaction does not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.

In addition to acquiring the necessary transmission and distribution system and electrical facilities, the SFPUC would need to physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco/San Mateo county border), to allow both systems to be safely, reliably and independently operated by SFPUC and PG&E. After system separation, the SFPUC would provide electricity service to City customers; PG&E would continue to provide electricity service to its customers outside San Francisco. Construction associated with the project would take 1.5 to 3 years after the purchase and transfer of the Assets. It is anticipated that SFPUC and PG&E would coordinate on the implementation of the project.

[1] Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

2. Project Location

The project location includes all areas of the City and County of San Francisco where the Assets are located (see inset map on **Figure 1**). The areas where new construction or modifications to existing Assets would occur (project activities that could result in physical environmental effects) are primarily located in the southern portions of San Francisco and the northern parts of Brisbane and Daly City, along the San Francisco-San Mateo County border (Figure 1). These areas contain a mix of residential, commercial, industrial, and public uses as well as PG&E's Martin Substation in Brisbane and Daly City Yard (west of and adjacent to the Martin Substation) in Daly City.

3. Project Background

The Hetch Hetchy Power System, owned and operated by the SFPUC, is comprised of three hydroelectric powerhouses: Moccasin, Kirkwood and Holm.[2] This is the main source of electricity supplies for Hetch Hetchy Power – San Francisco's municipally-owned, public power utility. Approximately 160 miles of SFPUC-owned transmission lines deliver the electricity generated by the three powerhouses to Warnerville Substation and Newark Substation. The SFPUC also generates about 10 megawatts (MW) of clean, renewable energy from 27 solar arrays and a biogas cogeneration facility located in San Francisco. Together, these supplies are delivered to meet the needs of Hetch Hetchy Power's wholesale and retail power customers. The SFPUC also owns and operates about 70 miles of distribution lines at the Hetch Hetchy Power System and in the San Francisco Bay Area.

SFPUC's Hetch Hetchy Power provides electric services within San Francisco, the San Francisco International Airport in San Mateo County, and to certain electricity customers outside of San Francisco. Hetch Hetchy Power provides its clean energy to most of San Francisco's municipal facilities. Its customers include Zuckerberg San Francisco General Hospital and Trauma Center; San Francisco Municipal Railway (Muni); the San Francisco Police Department; the San Francisco Fire Department; San Francisco Unified School District; Port of San Francisco; redevelopment areas such as the Hunters Point Shipyard, Treasure Island/Yerba Buena Island, and Mission Rock; and retail tenants, residences and businesses in San Francisco such as the Salesforce Transit Center.

The SFPUC also provides a clean power portfolio of supply-only services[3] through CleanPowerSF, the City's community choice aggregation program. CleanPowerSF provides electricity supplies to retail customers in San Francisco that choose CleanPowerSF as an alternative to PG&E.[4]

Together, Hetch Hetchy Power and CleanPowerSF currently provide more than 70 percent of the electricity consumed in San Francisco. However, SFPUC-sourced supplies have to be delivered across San Francisco through PG&E-owned and -operated electricity transmission and distribution facilities to Hetch Hetchy Power and CleanPower SF customers.

---

2 SFPUC Power Enterprise Hetch Hetchy Power System - https://sfpuc.org/about-us/our-systems/hetch-hetchy-power-system.

3 Community choice aggregation programs only provide supply services, not distribution services (delivery of power to customers).

4 As with all of California's community choice aggregation programs, CleanPowerSF customers continue to be distribution service customers of PG&E.

SOURCE: ESA, 2022

Note: The project includes purchase of PG&E's transmission and distribution assets needed for the city to provide reliable electricity service to customers in San Francisco. Only major project components involving physical changes to the environment are shown. The project also includes work within existing substations, PG&E properties, storage and maintenance yards, and other system reinforcement work.

PG&E Asset Acquisition Project

Figure 1
Project Overview

PG&E provides electricity services throughout its service territory in Northern and Central California, including to residential, commercial, and industrial customers in San Francisco and San Mateo counties. PG&E's electric transmission system serving San Francisco includes power lines, underground ducts and vaults, substations, and electrical equipment that deliver power at 115 kV and 230 kV. PG&E's distribution system within San Francisco (which distributes power at 35 kV and below to individual customers) generally consists of power lines, utility poles, underground ducts and vaults, substations, electrical equipment, and customer meters.

According to the SFPUC, the acquisition of the transmission and distribution assets needed to provide electricity services to all electricity users in San Francisco is critical to: 1) allow the City to provide Hetch Hetchy hydropower, and other clean power, to all San Francisco customers; 2) improve the cost and timeliness of electrical grid connections for critical City functions, such as public safety, affordable housing production, transportation, and schools; and, 3) ensure that the City's electric system is owned and managed with transparency and accountability, consistent with a cost-based, not-for-profit business model that will prioritize affordable, cost-effective, reliable, safe, and timely service in San Francisco. The SFPUC states this is an important and necessary step in reducing San Francisco's reliance on PG&E for electric service in the city and a crucial step towards local control of San Francisco's energy future.

4. Overview of Project Components

The project consists of the purchase of PG&E's transmission and distribution assets (as described above) needed for the City to provide reliable electricity service to customers in San Francisco. This transaction does not include the purchase of PG&E's natural gas facilities.

The change in ownership itself would not entail physical changes to the environment. However, some of the acquired assets must be physically separated from PG&E's remaining electricity grid outside of San Francisco. To do so, the SFPUC would modify portions of the existing distribution infrastructure, construct new underground distribution feeder lines, and modify the existing Martin Substation (or construct a new substation, which will be analyzed in the EIR as a new substation variant).

After the acquisition and separation of PG&E's facilities, the SFPUC would be responsible for the continued operation and maintenance of the acquired facilities and new SFPUC-owned infrastructure.

The environmental review will focus on project components involving *physical changes to the environment*, and evaluate potential environmental effects that would be anticipated as a result of those physical changes. Those project components are presented below and summarized in **Table 1**. Detailed discussions of each component follow Table 1.

4.1 System Separation Components

- **Martin Substation Separation:** Reconfiguring the existing PG&E-owned Martin Substation, located at the corner of Bayshore Boulevard and Geneva Avenue in Brisbane. These changes could include adding/relocating cable terminations, circuit breakers, cable trenches, and transformer locations within the existing substation fence. The Martin Substation is the source for PG&E's transmission lines supplying electricity to San Francisco and is used to reduce voltage from transmission to distribution service voltages.

- **Distribution Express Feeder Lines:** Constructing new underground distribution express feeder lines[5] from the separated Martin Substation to connect to the existing distribution system grid in the southwestern part of San Francisco.[6] The proposed express feeder lines would be installed in a *duct bank* – an underground trench reinforced with concrete designed to protect a series of conduits (PVC pipes) housing electrical and communications cables. The proposed duct bank trench for the distribution express feeder lines would be approximately 3.75 miles long extending through parts of southern San Francisco and the northern parts of Daly City and Brisbane.
- **Local Distribution System Separation:** Reconfiguring and separating distribution lines on overhead poles and at underground vaults in and around the county border. Based on the availability of existing feeder lines, the local distribution system separation would include installation of new overhead or underground power distribution lines and equipment to facilitate the distribution separation and reconnect feeder segments.
- **System Reinforcements Associated with Separation of the Distribution System:** Implementing reinforcements to ensure that, after separation, the independent SFPUC and PG&E distribution systems along the county border comply with all applicable requirements and standards for safety, functionality and reliability.

4.2 Other Components

- **Modifications to Retain PG&E Access to Non-Electrical Facilities:** Where PG&E natural gas facilities or other non-electrical facilities are located on the same parcel as an electric substation, minor modifications (e.g., fencing, ingress/egress alterations) may be needed to allow PG&E to continue to access, operate, and maintain its non-electrical facilities in San Francisco.
- **Operations Control Center:** Interior modifications of an existing building[7] in San Francisco for an operations control center for the electric system.
- **Operations and Maintenance Service Yards; Materials and Equipment Storage**. Modifications, such as fencing, to existing City-owned space or space at acquired substations in San Francisco.

4.3 Project Variant

The EIR will also analyze a variant of the project. Under the project variant, instead of the Martin Substation separation, SFPUC would construct and operate a new substation on a portion of the property known as Daly City Yard which the City would acquire from PG&E. The project variant (new substation) would be interconnected to Martin Substation via new transmission lines. All other project variant components would be the same as listed above for the project.

[5] Generally, electrical feeders are wires that transmit electricity to other circuits. A distribution feeder is an electrical circuit from a substation that provides power and distributes electricity to homes and businesses. A distribution express feeder is a circuit used to serve load farther away from the substation by bypassing other feeders.

[6] Areas in the west/southwest part of San Francisco are currently supplied by distribution lines originating from PG&E's existing Daly City Substation in San Mateo County.

[7] SFPUC anticipates sufficient space would be available in a single existing building, however a specific building has not been identified.

Table 1 Project Components

Project Component	Component Purpose and Description	Location
Proposed Project		
System Separation		
Martin Substation Separation	**Purpose.** Martin Substation is the source for PG&E's transmission lines supplying electricity to San Francisco and is used to step down transmission voltages to distribution service voltages. **Description.** Reconfigure and partition the existing PG&E Martin Substation into two interconnected[8] utility systems —one serving San Francisco and one serving PG&E's remaining customers in San Mateo County.	Existing PG&E Martin Substation, at the intersection of Geneva Avenue and Bayshore Boulevard in Brisbane
Distribution Express Feeder Lines	**Purpose.** Distribute electricity from Martin Substation to areas in San Francisco that are currently supplied by distribution lines originating from PG&E's existing Daly City Substation in San Mateo County. **Description.** Install approximately 3.75 miles of duct banks for new underground distribution express feeder lines from the Martin Substation, consisting of approximately 0.23 mile of duct banks in Brisbane, approximately 0.52 mile in Daly City, and approximately 3 miles in San Francisco.	Geneva Avenue in Brisbane and Daly City Geneva Avenue, Alemany Boulevard, Huron Avenue, Sickles Avenue, Sagamore Street and Brotherhood Way in San Francisco
Local Distribution System Separation	**Purpose.** Connect customers so they are served by the appropriate utility providers (SFPUC or PG&E). **Description.** Reconfigure and separate overhead and below ground distribution lines around the county border.	Locations generally within 1,000 feet of the San Francisco-San Mateo County border
System Reinforcements	**Purpose.** Ensure for both systems electrical system reliability and ability to restore power in the event of outages. **Description.** Install and replace overhead and underground equipment to maintain service reliability on existing lines.	Various locations on both sides of the San Francisco-San Mateo County border

[8] Interconnection is defined as an electrical connection between multiple entities.

Table 1 Project Components

Project Component	Component Purpose and Description	Location
Proposed Project		
Other Components		
Modifications to Retain PG&E Access to Non-Electrical Facilities	**Purpose.** Provide continued access for PG&E's operation of non-electrical facilities where such facilities would be located adjacent to electric facilities to be acquired by SFPUC. **Description.** Modifications to fencing, ingress/egress, at certain sites with non-electrical facilities.	Martin Substation (on Geneva Ave (between Schwerin St and Bayshore Blvd in Brisbane) Potrero Substation (on Illinois Street between Humboldt and 23rd Street) and other substations in San Francisco
Operations Control Center	**Purpose.** Office facility for grid operators. Centralize data on transmission and distribution systems status and security. **Description.** Interior modifications to an existing building.	Within an existing building in San Francisco
Operations and Maintenance Service Yards; Materials and Equipment Storage	**Purpose.** Store equipment, trucks, and other supplies for operations and maintenance of the power grid in San Francisco. **Description.** Modifications, such as fencing, to existing City-owned space or space at acquired substations.	Existing maintenance and storage properties or space at acquired substations in San Francisco
Project Variant		
New Substation	**Purpose.** Interconnect the City's transmission system with PG&E's transmission system and maintain distribution service to San Francisco customers formerly served by PG&E from Martin Substation. **Description.** Construct a new substation at the site adjacent to the existing Martin Substation (Daly City Yard), instead of implementing the Martin Substation separation.	Daly City Yard, 731 Schwerin Street, Daly City
All Other Components	**Purpose and Description.** The other components of the project variant (new substation) would be the same as listed above for the proposed project.	

SOURCE: San Francisco Public Utilities Commission

5. Detailed Description of Project Components

5.1 Martin Substation Separation

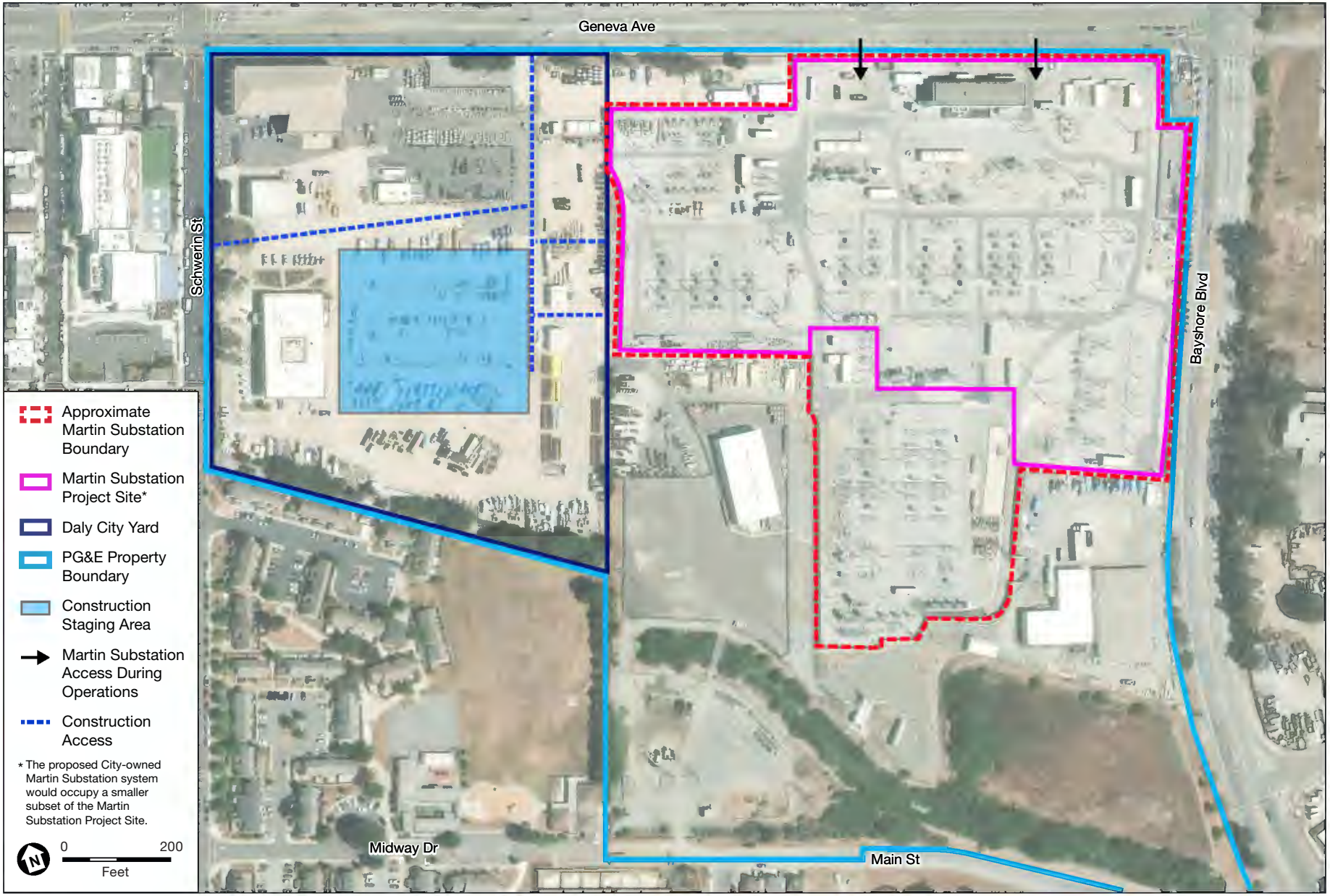
Martin Substation is an outdoor, air-insulated substation[9] connecting PG&E's transmission and distribution system serving San Francisco and San Mateo counties. Transmission lines from the south, in San Mateo County, as well as the transmission system in San Francisco are connected to PG&E's Martin Substation at several voltage levels: 230 kV, 115 kV, and 60 kV. Numerous step-down transformers (which reduce the input voltage to a lower voltage) are connected to the Martin Substation system. These transformers include 230/115 kV transformers, a 115/60 kV transformer and multiple 115/12 kV transformers —these transformers convert system voltage from 230 kV to 115 kV, from 115 kV to 60 kV, and from 115 kV to 12 kV, respectively. The 115/12 kV transformers supply the distribution system that is also located at the Martin Substation, where 12/4 kV transformers further step down the voltage for some lines. The Martin Substation distribution system supplies 12kV and 4 kV distribution lines that serve the surrounding area, including parts of southern San Francisco as well as communities in San Mateo County, including Daly City and Brisbane.

Typical transmission systems consist of a high-voltage, regional electrical "grid" in which multiple entities are electrically interconnected with one another for reliable operation of the overall system. The project would reconfigure the existing Martin Substation transmission and distribution facilities to create separate City-owned and PG&E-owned systems. These changes could include adding/relocating cable terminations, circuit breakers, cable trenches, and transformer locations within the existing substation fence. New electrical circuits and equipment would be installed entirely within Martin Substation. Although operated separately, the San Francisco- and PG&E-owned transmission systems would remain interconnected to support reliable operation of the transmission grid serving the city. As is common with utility-to-utility transmission interconnection, the parties would be expected to coordinate for the reliable operation of the transmission system, including at Martin Substation. **Figure 2** shows approximate boundaries of the Martin Substation project site where new, City-owned facilities would be located. The Martin Substation project site shown in Figure 2 is larger than the final SFPUC-owned substation because it includes areas for construction work and staging. **Figure 3** shows examples of types of new electrical equipment proposed for the Martin Substation project site.

Excavation to access existing duct banks for reconnection, as well as construction of new underground duct banks and vaults to connect the equipment, within the Martin Substation project site would be necessary to separate the two systems. **Figure 4** illustrates typical underground duct banks and vaults. Additionally, a separate distribution system (including several 115/12 kV transformers and 12 kV switchgear equipment) would be needed at Martin Substation.

A galvanized fence would be installed along the southern border of the Martin Substation project site to separate the two utility systems. The project would not alter the existing perimeter fencing surrounding the Martin Substation. Proposed equipment or reconfiguration work is not anticipated to be located within areas subject to California Department of Toxic Substances Control (DTSC) environmental deed restrictions due to hazardous materials in soil and groundwater; however, these areas could be used for staging.

[9] Air- insulated substations have all equipment installed outdoors and utilize air as an insulator.



SOURCE: ESA, 2023

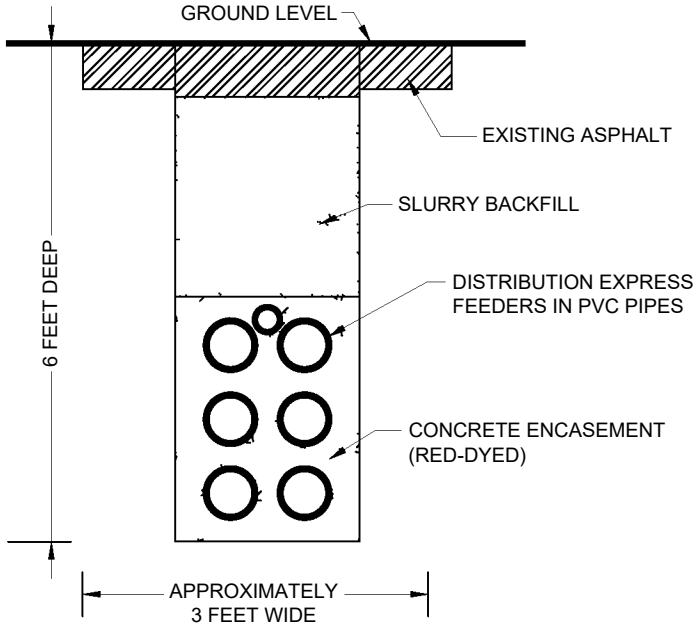
PG&E Asset Acquisition Project

Figure 2
Martin Substation Project Site and Construction Staging Area

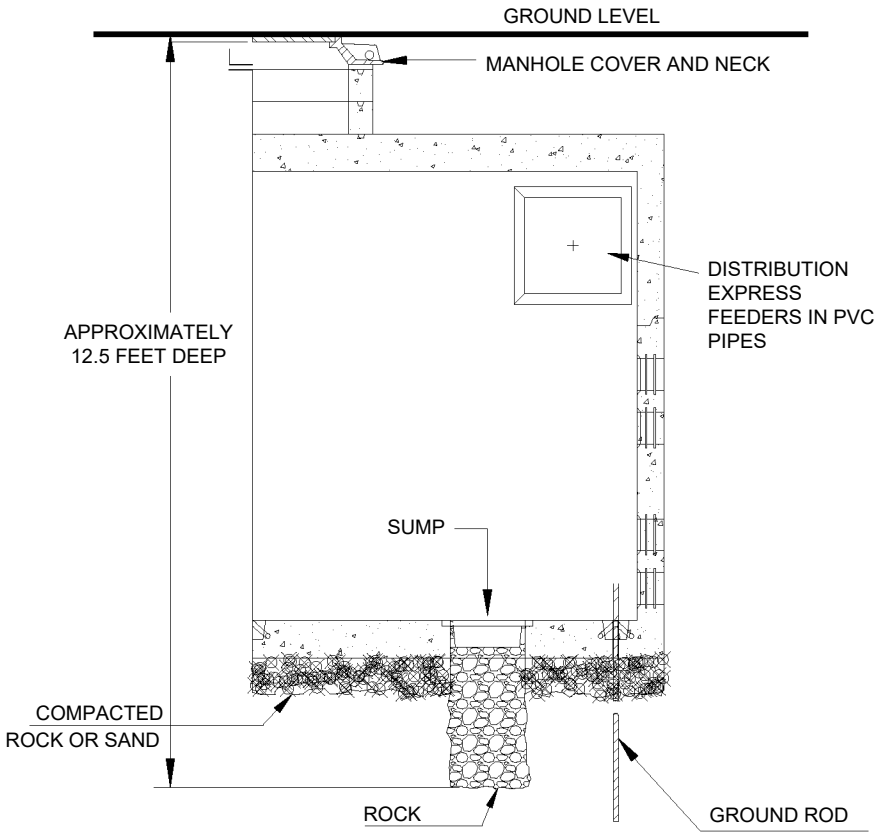
SOURCE: Google Earth Street View, 2023

PG&E Asset Acquisition Project

Figure 3
Examples of Above-Ground Infrastructure at an Electrical Substation



Typical Duct Bank



Typical Vault (Manhole)

SOURCE: Worley, 2023

PG&E Asset Acquisition Project

Figure 4
Typical Duct Bank and Vault Diagrams

5.2 Distribution Express Feeder Lines

Some of San Francisco's southwestern neighborhoods are supplied by distribution lines from PG&E's Daly City Substation. Replacement distribution lines would be needed for these customers because these feeder lines would be disconnected near the county boundary as part of the proposed project.

As a result, the proposed project includes construction of approximately 3.75 miles of new duct banks for the new distribution express feeder lines from Martin Substation in Brisbane to the existing distribution system near the intersection of Brotherhood Way and Arch Street in San Francisco. The new distribution express feeder lines would be installed in an underground duct bank within streets, sidewalks, and other publicly owned land located adjacent to residential, commercial, industrial, and public areas (e.g., parks). Approximately 0.75 mile of the duct bank alignment is located within Brisbane and Daly City, consisting of approximately 0.23 mile in Brisbane and approximately 0.52 mile in Daly City, and approximately 3 miles are in San Francisco. The new distribution express feeder lines would connect with the existing distribution grid in the southwest area of the city to supply this area from the Martin Substation or the new substation described in the project variant. The proposed alignment is shown on Figure 1.

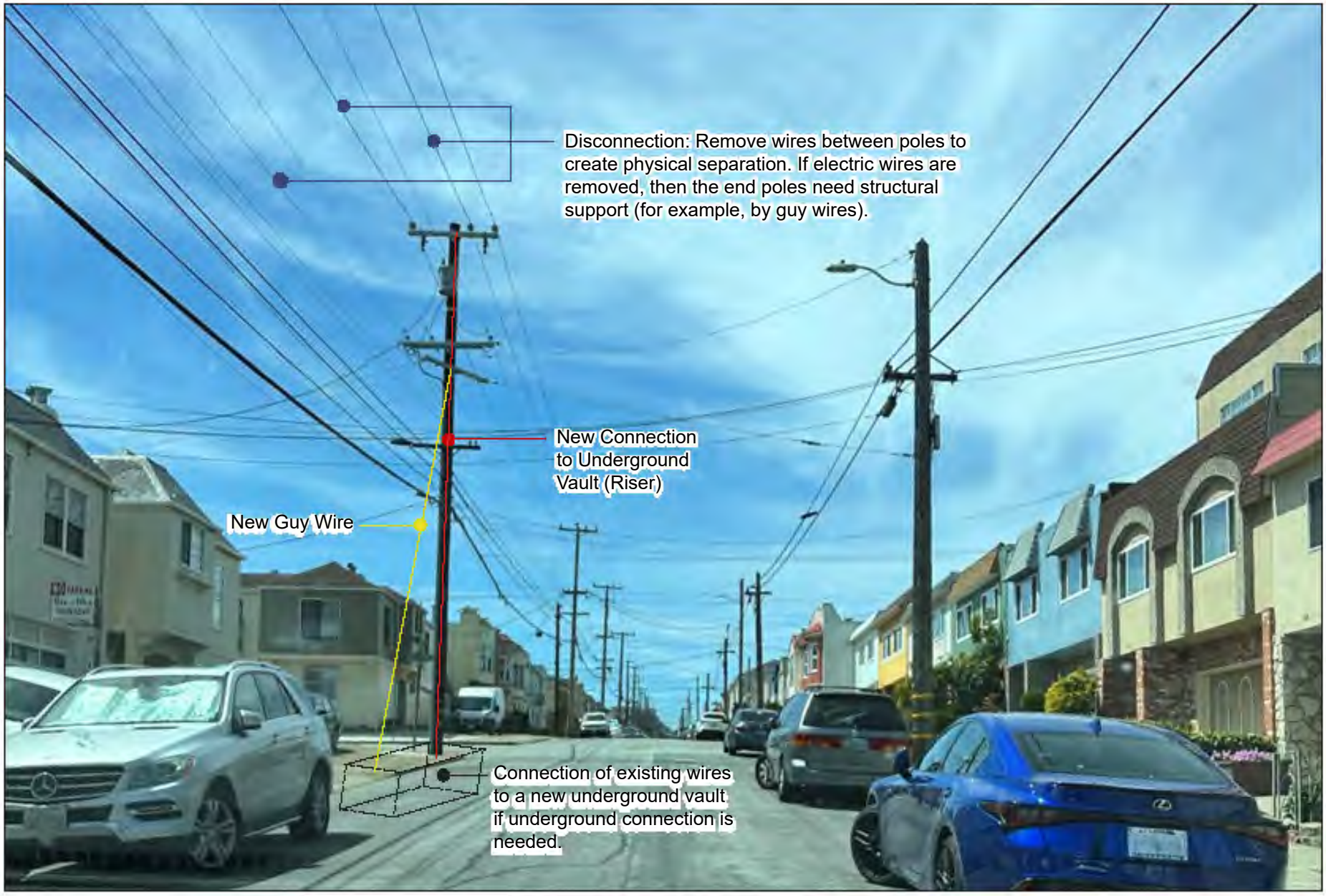
5.3 Local Distribution System Separation

The border between San Francisco and San Mateo counties is not split along a single street; blocks weave in and out of the border and are serviced by the nearest distribution line, regardless of the jurisdiction (i.e., some electrical loads in San Francisco are supplied by distribution lines in Daly City and vice versa). For the proposed project, the local distribution system would be separated by reconfiguring existing electric lines at certain locations generally within 1,000 feet of the San Francisco-San Mateo County border, shown as the Local Distribution System Separation on Figure 1. In some locations, short segments of new distribution lines in the appropriate jurisdictions would be constructed to facilitate such connections. The local distribution system separation would result in two distinct electric systems. San Francisco customers would be serviced by SFPUC distribution lines, and PG&E's San Mateo County customers would be serviced by PG&E-owned distribution lines south of the county border. The new distribution line segments would be either connected by overhead wires on new or existing poles or enclosed in new duct banks within city streets and sidewalks, as existing conditions allow (**Figures 4 and 5** illustrate typical duct banks and overhead wires). This work is referred to as the "local distribution separation work."

Local distribution system separation would also include work to maintain service to locations served by distribution lines at a different voltage than the available nearby grid. Such work, including installation and/or replacement of poles, overhead equipment, and underground equipment, would occur in portions of neighborhoods in Daly City.[10]

Table 2 summarizes the local distribution system separation work.

[10] The neighborhoods that will be affected by the reconfiguration work are: Portions of the Bayshore Heights neighborhood in Daly City bordering Martin Substation, in the area generally bounded by Rio Verde Street, Geneva Avenue, Schwerin Street, and Martin Street; portions of the Crocker neighborhood in Daly City, generally bounded on the North by Mission Street, by Guttenberg Street to the East, and Crocker Avenue and Frankfort Street to the South; and portions of the Hillside neighborhood in Daly City, in the area generally bounded by East Vista and Hillside Boulevard.



SOURCE: Woodard & Curran

PG&E Asset Acquisition Project

Figure 5
Typical Overhead Wire Disconnections

Table 2 Local Distribution System Separation Work

Activity Type	Activity Subtype	Activity Description
Existing Line Segments Disconnections	Overhead disconnections	• Remove existing overhead conductors (wires) between existing poles and terminate the existing line segments at nearest available pole • Add supporting structures as needed (e.g., guy wires) • Remove existing poles and equipment if no longer needed. Poles may remain if they are jointly used by other utilities (e.g., telecommunications)
	Underground disconnections	• Remove existing underground conductors (cables) within existing conduit and terminate the existing line segments at the nearest underground vault • If there are no nearby underground vaults, a new vault would be constructed • Abandon in-place any unused underground conduits, vaults and/or equipment
Line Segments to Appropriate Utility Reconnection	Overhead Reconnections	• Install new poles or replace existing poles (and attachments, as needed) and extend new overhead conductors (wires) from the nearest available tie-in point on the existing distribution system and reestablish a connection to the separated line segments
	Underground Reconnections	• Trench and install new underground conduits and enclosures (as needed) and extend new underground conductors (cables) from the nearest available tie-in point on the existing distribution system and reestablish a connection to the separated line segments
	Overhead/Underground Transitions	• Install a wire on an existing or new pole and underground conduits and enclosures to provide a transition between overhead and underground systems by connecting the overhead and underground conductors
Electrical Equipment Additions or Replacements	On or Within Existing Structures/Enclosures	• Electrical equipment would be installed on/in existing structures/enclosures provided such facilities are available and appropriately sized
	New or Upgraded Structures/Enclosures	• If sufficient structures/enclosures are not available, new, or upgraded structures (e.g., poles, cross-arms, vaults, etc.) would be installed/constructed
Modifications of Existing Line Voltages	--	• Installation and replacement of poles, overhead equipment and underground equipment to maintain or modify service voltage on existing lines, which includes poles, line insulators, transformers, wires/cables and related accessories

SOURCE: San Francisco Public Utilities Commission

5.4 System Reinforcements Associated with Distribution System Separation

SFPUC would implement system reinforcements to maintain system reliability and the ability to restore power in the event of outages for utilities on either side of the San Francisco-San Mateo County border. The types of physical activities for system reinforcement work would be similar to activities described in Table 2. Activities would include:

- Reconnecting circuits

Adding, replacing, or upgrading electrical protection equipment such as fuses and automatic sectionalizing devices[11] to maintain system safety and reliability

5.5 Modifications to Retain PG&E Access to Non-Electrical Facilities

SFPUC would not acquire PG&E's non-electric facilities (e.g., natural gas) serving San Francisco. At some sites, such as the Potrero Substation, PG&E-owned natural gas and electrical equipment are located on the same site. SFPUC would acquire the electrical equipment at these locations, and would make site modifications to allow PG&E continued access to its non-electric facilities.

5.6 Operations Control Center

SFPUC would modify the interior of an existing building[12] within San Francisco city limits to house a centralized operations control center. The operations control center would require approximately 20,000 square feet of space and allow grid operators to monitor the flow of electricity and manage outages in the electrical system, forecast demand, and monitor and ensure the overall security of the system. The control center would be equipped with electronic devices (e.g., computers, large wall displays, communication systems/infrastructure) and typical office furnishings. Establishing a control center would require interior modifications of one or more floors of the selected building.

5.7 Operations and Maintenance Equipment Storage

SFPUC would use its City-owned, existing maintenance and storage properties (such as 1990 Newcomb Avenue) or space at acquired substations to house equipment, trucks, and crew parking. Modifications such as fencing would be needed to securely store equipment at the storage yards.

6. Project Construction

Construction activities would generally consist of installing new equipment, poles, fencing, underground cable, duct banks, and vaults and disconnecting or connecting cables and conduits. Such installation would require excavation. The project would use various construction equipment and vehicles, such as saw-cutting machines, excavators, backhoes/loaders, drill rigs, skid loaders, air compressors, portable generators, drilling machines, rollers, pavers, cranes, compactors, and concrete trucks. Depending on the work location, construction equipment and materials would be staged within existing substations, the sites of other project components, or within areas of the roadway including sidewalks and parking lanes. Work crew passenger

[11] Automatic sectionalizing devices are protective devices that automatically isolate a faulted section of electrical line from the rest of the distribution system.

[12] SFPUC anticipates sufficient space would be available in a single existing building; however, a specific building has not been identified.

vehicles may be parked on side streets or in other areas to minimize use of on-street parking spaces along the project alignment.

Underground construction for distribution lines, including border separation work, would generally be completed using a cut-and-cover method (open trenching) within roadways, except at the I-280 crossing where a trenchless method, such as jack-and-bore,[13] could be used. Existing underground utilities within the proposed construction areas would be protected or relocated prior to excavation.

The total duration of construction would depend on the number of crews working concurrently, and crew deployment timing would be confirmed as project design progresses. While localized construction on an individual block (e.g., separation work, construction of express feeders) would be short-term, construction of all separation components combined would range from 1.5 to 3 years. Local distribution system separation and activities at the Operations Control Center, PG&E retained facilities, system reinforcement locations and operations and maintenance equipment storage yards in San Francisco could proceed concurrently throughout construction.

Project construction hours would typically be consistent with local noise ordinances. Project construction in San Francisco would proceed up to seven days per week, except holidays, between 7 a.m. and 8 p.m. consistent with the City's noise ordinance. Construction in Brisbane would generally proceed between the hours of 7 a.m. and 7 p.m. on weekdays and 9 a.m. to 7 p.m. on weekends and holidays. Construction in Daly City would generally proceed between 8 a.m. and 5 p.m. on weekdays. Construction in unincorporated areas of San Mateo County would generally proceed between 7 a.m. and 6 p.m. on weekdays and 9 a.m. and 5 p.m. on Saturdays. Some nighttime construction may be needed to avoid affecting peak electricity demand or traffic considerations, which could require nighttime safety and security lighting. Temporary customer power service disruptions could occur during local distribution system separation work.

7. Operations and Maintenance

The SFPUC would be responsible for the continued operations and maintenance of the acquired Assets and new infrastructure in accordance with federal and state regulations and standards for the safe and reliable operation of the substation and the overhead and underground electric facilities. The total energy delivered to serve San Francisco electricity customers is not expected to change as a result of the proposed project.

Operations and maintenance of the system would involve routine inspections, meter readings, periodic testing, and as-needed repairs and replacement of existing equipment during regular maintenance cycles in accordance with prudent utility practice and manufacturers' recommendations. All distribution system facilities (overhead, underground and substations) would be inspected and maintained in accordance with California Public Utilities Commission guidelines and general orders (e.g., General Orders 165 and 174 for inspecting overhead and underground facilities, and substations, respectively). These are the same guidelines applicable to PG&E's existing operations and to SFPUC's current power operations.

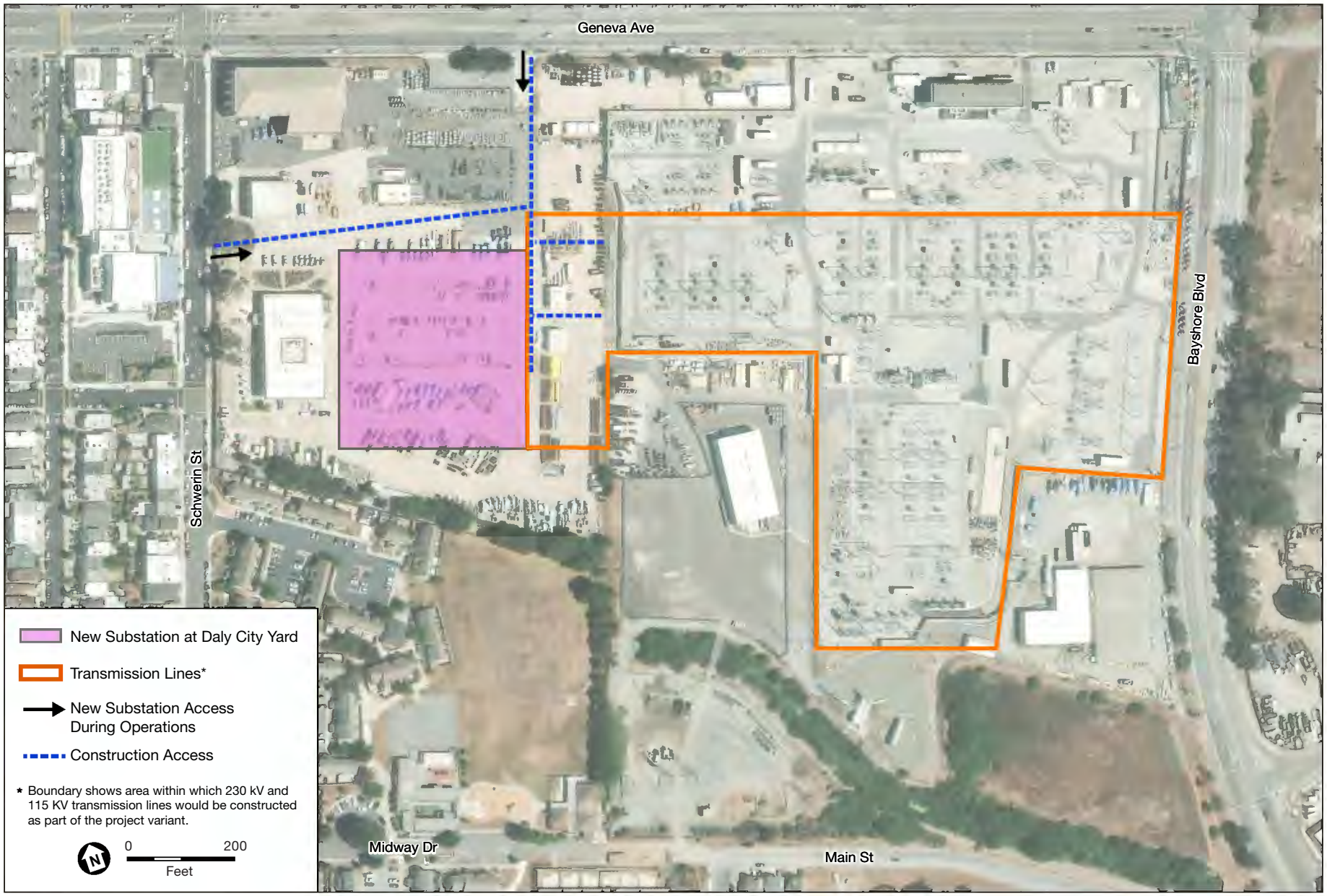
[13] Jack-and-bore is a method of horizontal boring for installation of pipe between two points without disturbing the surface between the sending and receiving pits; commonly referred to as micro tunneling.

The electrical system facilities currently operate 24 hours per day, seven days per week; no changes to operating hours are anticipated. The SFPUC anticipates approximately 200 to 400 employees may be hired for administration, operation and maintenance of the electrical system, and would be based at SFPUC offices, service yards, and the operations control center.

8. Project Variant (New Substation)

As a variant of the project, instead of reconfiguring the Martin Substation, as described in section 5.1 Martin Substation Separation above, the SFPUC could construct a new, gas-insulated substation at PG&E's adjacent Daly City Yard (see **Figure 6**). The components of the project variant would be the same as the proposed project, except that the variant would include construction of a new substation instead of the separation work at the existing Martin Substation, and the distribution express feeder lines would originate from the new substation. Unlike the existing Martin Substation, which is an outdoor, air-insulated, transmission and distribution substation, under the project variant the SFPUC would build a gas-insulated substation[14] that would contain high-voltage components (e.g., circuit-breakers and disconnect switches) within a two- to three-story structure (with maximum height of 30 feet) housing the gas-insulated equipment. The inert gas contained within the sealed equipment has two to three times the insulating ability of air, allowing a smaller footprint for the project variant substation. Transformers would be located outdoors, separated by firewalls. **Figure 7** shows a conceptual site rendering of the new substation. Lighting would be installed around the new structure and transformers, and an 8-foot-tall fence would be constructed around the site for safety and security. Underground transmission lines would need to be rerouted or constructed to connect the new substation to the Martin Substation and to the existing transmission lines that serve San Francisco. Additionally, a new distribution system would be needed within Martin Substation to maintain service to existing San Francisco customers. The new substation would require construction (including pile driving) within an area subject to environmental restrictions due to hazardous substances in soil and groundwater. A land use covenant currently restricts activities that would disturb the site cap on this parcel, and prohibits certain types of land uses (e.g., residential, hospital, school, daycare center). Construction and operation of a new substation on the site would require compliance with the restrictions, including obtaining DTSC approval of a soil management plan and a health and safety plan prior to any excavation. No demolition of existing structures would be required. However, PG&E's outdoor storage and parking areas may need to be relocated to accommodate the new substation.

[14] In a gas insulated substation, the equipment uses sulfur hexafluoride (SF6) gas to insulate the high voltage equipment. SF6 gas is an inert, non-toxic, and non-combustible gas that is denser than air and used as an insulating medium for electric equipment.



SOURCE: ESA, 2023

PG&E Asset Acquisition Project

Figure 6
Project Variant (New Substation) at Daly City Yard

SOURCE: SFPUC; ESA, 2023

PG&E Asset Acquisition Project

Figure 7
Conceptual Rendering of the Project Variant (New Substation)

9. Anticipated Permits and Approvals

The permits and approvals anticipated to be required from federal, state, and local agencies are listed below. The project could be subject to various local regulations and could require encroachment permits from Caltrans, San Mateo County, and/or various local jurisdictions. However, because California Government Code section 53091 et seq. provides that the SFPUC receive intergovernmental immunity from the zoning and building laws of other cities and counties, local regulations may not be applicable to the SFPUC. The SFPUC would also obtain any other regulatory approvals for the project, as required by law. SFPUC would acquire property rights as needed for the construction, installation, operation, and maintenance of proposed infrastructure on public land or private lands.

9.1 Federal Actions and Approvals

- Approval from the Federal Energy Regulatory Commission for FERC-jurisdictional facilities under Federal Power Act section 203.

9.2 State Actions and Approvals

- California Public Utilities Commission
  - Approval for transfer of utility assets
- Regional Water Quality Control Board, San Francisco Bay Region
  - Construction general permit and stormwater pollution prevention plan, if more than 1 acre of land is disturbed in areas outside of the combined sewer system (i.e., the separate sewer area)
- California Department of Toxic Substances Control
  - Approval of soil management plan and health and safety plan for excavation at the PG&E Daly City Yard and Martin Substation
  - Approval of excavation guideline for routine maintenance or installation of utility facilities
- California Coastal Commission Coastal Development Permit
  - Coastal Development Permit for construction within the coastal zone (retained jurisdiction)
- California Department of Transportation (Caltrans)
  - Encroachment permits, access permits
- Bay Area Air Quality Management District
  - Approval of a dust mitigation plan to address naturally-occurring asbestos
- San Francisco Bay Conservation and Development Commission
  - Development permit for construction within 100 feet of the San Francisco Bay shoreline

9.3 Local Actions and Approvals

- San Francisco Planning Commission
  - Certification of the PG&E Asset Acquisition Project EIR
  - Coastal Zone Permit for construction within San Francisco Coastal Zone

- San Francisco Public Utilities Commission
  - Adoption of CEQA findings and mitigation monitoring and reporting program
  - Issuance of a report pursuant to San Francisco Charter Section 16.101 (for acquisition of utility property)
  - Approval of the proposed project and revenue bonds
  - Approval of real estate rights transfer
- Board of Supervisors
  - Adoption of the CEQA findings and mitigation monitoring and reporting program adopted by the SFPUC
  - Adoption of an ordinance to authorize the issuance of revenue bonds
  - Approval of real estate rights transfer
- San Mateo County
  - Coastal Development Permit for construction within San Mateo County Coastal Zone
  - Public Works Department Encroachment permit
- Daly City
  - Coastal Development Permit for construction within Daly City Coastal Zone
  - Encroachment permit
- City of Brisbane
  - Encroachment permit
- Other City Departments
  - SFPUC will consult and coordinate with San Francisco departments, including without limitation San Francisco Public Works, Department of Building Inspection, Department of Public Health, and the Municipal Transportation Agency, to ensure that soil disturbance and site mitigation, street and sidewalk improvements, on-street parking modifications, dust control, noise control, and building construction complies with substantive requirements of applicable local laws.

10. Summary of Potential Environmental Issues

The proposed project could result in potentially significant environmental effects. Therefore, the San Francisco Planning Department will prepare an initial study and EIR in accordance with CEQA, the CEQA Guidelines, and Chapter 31 of the San Francisco Administrative Code. The EIR will evaluate the construction and operational impacts of the project and variant. The EIR will examine the potential for significant physical environmental effects, identify mitigation measures that could avoid or reduce potential significant effects, and analyze whether the mitigation measures would reduce the environmental effects to a less-than-significant level. The environmental review will not address ongoing operation of existing facilities that would not change as a result of the project. The initial study, which helps to determine the range of EIR analysis, will be published as an appendix to the draft EIR and will be considered part of the EIR. The document will consider both project-specific and cumulative impacts for all topics in the San Francisco Planning Department's initial study checklist. Key environmental topics to be addressed in the EIR (including the initial study) are described briefly below.

10.1 Aesthetics

Aboveground project components would consist of new or modified electrical equipment or structures in locations where similar electrical equipment already exists. Project construction would involve equipment operating in urbanized areas, along roadways, sidewalks, and within or adjacent to existing electrical facilities. Project construction could require nighttime safety and security lighting, which would temporarily affect project area aesthetics. The EIR's aesthetics analysis will consider potential project effects from temporary construction activities and permanent facilities on scenic vistas, scenic resources, conflicts with applicable zoning and other regulations regarding scenic quality, as well as impacts related to new light or glare.

10.2 Cultural Resources

Project construction would involve ground disturbance and building modifications. Archeological and historical resources have been documented in the vicinity of the project area. The EIR will assess the potential for the project to result in significant impacts to archeological resources and historical resources. The analysis will consider historic and prehistoric archeological deposits and historic buildings or structures ("historical resources"). The EIR will describe the historical resources and potential historical resources on the project site, assess the potential for subsurface archeological resources to be present, and identify potential impacts of the project on these resources.

10.3 Tribal Cultural Resources

The EIR will assess the potential for the project to result in significant impacts to tribal cultural resources. The planning department will notify Native American tribal representatives and will undertake consultation if requested.

10.4 Noise

Project construction would include the use of heavy equipment, which would temporarily increase noise and vibration levels in the project area. In addition, with new substation facilities, operational noise near the Martin Substation could also change. The EIR will include analysis of noise compatibility standards for residential and other land uses and discuss the long-term impacts of noise that could result from the proposed project. Short-term construction-related noise and vibration impacts also will be described, and the analysis will evaluate the potential for noise from the project to adversely affect nearby sensitive land uses.

10.5 Air Quality

The project would require the use of heavy construction equipment. The EIR will describe the existing conditions in the project area and at surrounding sensitive land uses, and evaluate project consistency with applicable air quality plans and standards and the potential to emit odors that could affect substantial numbers of people. The air quality analysis will include quantification of both construction- and operations-related air pollutant emissions and will evaluate potential health risk effects from emissions of toxic air contaminants, including effects on residents near the project site.

10.6 Biological Resources

Project construction would involve vegetation removal, increased noise, potential nighttime noise and lighting, and ground disturbance in urban areas. While the project area's ecology has been substantially

modified over the years, the western portion of the local distribution system separation construction activities could occur in areas that provide less disturbed habitat for biological resources, including special-status plants and animals. The EIR will analyze potential direct, indirect, and cumulative effects of project construction and operation on special-status plants and animals and their habitats; sensitive natural communities; movement of any native resident or migratory fish or wildlife species; and potential conflicts with the substantive requirements of the relevant, applicable local policies, codes, and ordinances, such as San Francisco's urban forestry ordinance.

10.7 Hazards and Hazardous Materials

The project would include activities on a project site that is on a hazardous materials sites list compiled pursuant to Government Code Section 65962.5 (commonly called the Cortese List). In addition, because the distribution express feeder lines would be located in the public right-of-way adjacent to hazardous materials sites, excavations could encounter hazardous substances in soil or groundwater. The EIR's hazards and hazardous materials analysis will assess the project's potential to create a significant hazard to the public or the environment, including through reasonably foreseeable upset and accident conditions or due to being located on a site which is included on the Cortese List. The EIR will also assess whether the project would emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school, or impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

10.8 Other Environmental Issues and Topics

All topics listed on the City's initial study checklist will be considered in the project EIR. In addition to the key topics identified above, potential effects associated with the environmental topics listed below will also be analyzed.

- Land Use and Planning
- Population and Housing
- Transportation and Circulation
- Greenhouse Gas Emissions
- Wind and Shadow
- Recreation
- Utilities and Service Systems
- Public Services
- Geology, Soils, Seismicity, and Paleontological Resources
- Hydrology and Water Quality
- Mineral Resources
- Energy
- Agriculture and Forestry Resources
- Wildfire
- Mandatory Findings of Significance

Pursuant to CEQA, the EIR will further analyze a range of alternatives that would reduce or avoid potential significant environmental impacts identified in the EIR, including a No Project Alternative, as described in CEQA Guidelines section 15126.6. The EIR will also address other topics required by CEQA, including growth-inducing impacts; significant unavoidable impacts; significant irreversible impacts; known controversy associated with environmental effects; issues to be resolved by the decision-makers; and the potential for the project to contribute to significant cumulative effects.

11. Finding

This project may have a significant effect on the environment and an environmental impact report is required. This determination is based upon the criteria of the CEQA Guidelines sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance). The purpose of an EIR is to provide information about potential significant physical environmental effects of a proposed project, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to a proposed project. Preparation of a NOP or EIR does not indicate a decision by the City to approve or to disapprove the project. However, prior to making any such decision, the decision makers must review and consider the information contained in an EIR.

12. Public Scoping Process

You may participate in the public process for the proposed project's environmental review by submitting written or oral comments to the planning department. All comments, whether written or oral, have equal consideration in the environmental review process. Your comments should focus on significant environmental issues about the project information that would help the environmental analysis or factors to consider in the environmental analysis. The following sections describe how to provide oral or written comments to the planning department.

The planning department will hold three public scoping meetings to receive oral comments concerning the scope of the EIR. The two in-person meetings will be held on **Tuesday**, **July 11, 2023**, **at 6 p.m. at the San Francisco Planning Department (49 South Van Ness Avenue, 1st Floor, Room 0196, San Francisco, CA 94103) and Saturday**, **July 15**, **2023**, **at 10 a.m. at the Mission Blue Center in Brisbane (475 Mission Blue Drive**, **Brisbane**, **CA 94005)**. Each meeting will consist of the same staff presentation describing the project background, proposed features, and the environmental review process, followed by an opportunity for the public to provide oral comments. Because the scoping meeting format does not provide an opportunity for planning staff to respond to questions, an informational open house will occur prior to the in-person scoping meetings on July 11th from 6 to 6:30 p.m. and July 15th, from 10 to 10:30 a.m.

One online scoping meeting will be held on **Thursday July 13 at 6:30 p.m.**, accessible at https://bit.ly/pgepowerassets. The public can also participate in the online scoping meeting by telephone (877-853-5247, webinar ID: 896 8704 9846). Staff's scoping meeting presentation, meeting procedures, and instructions—including on how to provide oral comments—are available at sfplanning.org/sfceqadocs. To request a language interpreter, assistive listening devices, real time captioning, sign language interpreters, readers, large print agendas or other accommodations, please contact Candace SooHoo, at (628) 652-7616 or candace.soohoo@sfgov.org at least 72 hours in advance of the meeting to help ensure availability.

As noted above, the staff presentation video is also available on the department's website and may be viewed at any time. Written comments will be accepted **until 5 p.m**. **on Friday**, **July 28**, **2023**. Written comments should be mailed to Julie Moore, EIR Coordinator, San Francisco Planning Department, 49 South Van Ness Avenue, Suite 1400, San Francisco, CA 94103, or emailed to CPC.PGEPowerAssetsEIR@sfgov.org. Your comments should focus on significant environmental issues concerning the project, information that would help the environmental analysis or factors to consider in the environmental analysis. Members of the public are encouraged to participate in the scoping process.

State Agencies: If you represent an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency. If you have questions or input concerning environmental review of the proposed project, please contact **Julie Moore** at (628) 652-7566 or CPC.PGEPowerAssetsEIR@sfgov.org.

Members of the public are not required to provide personal identifying information when they communicate with the commission or the department. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the department's website or in other public documents.

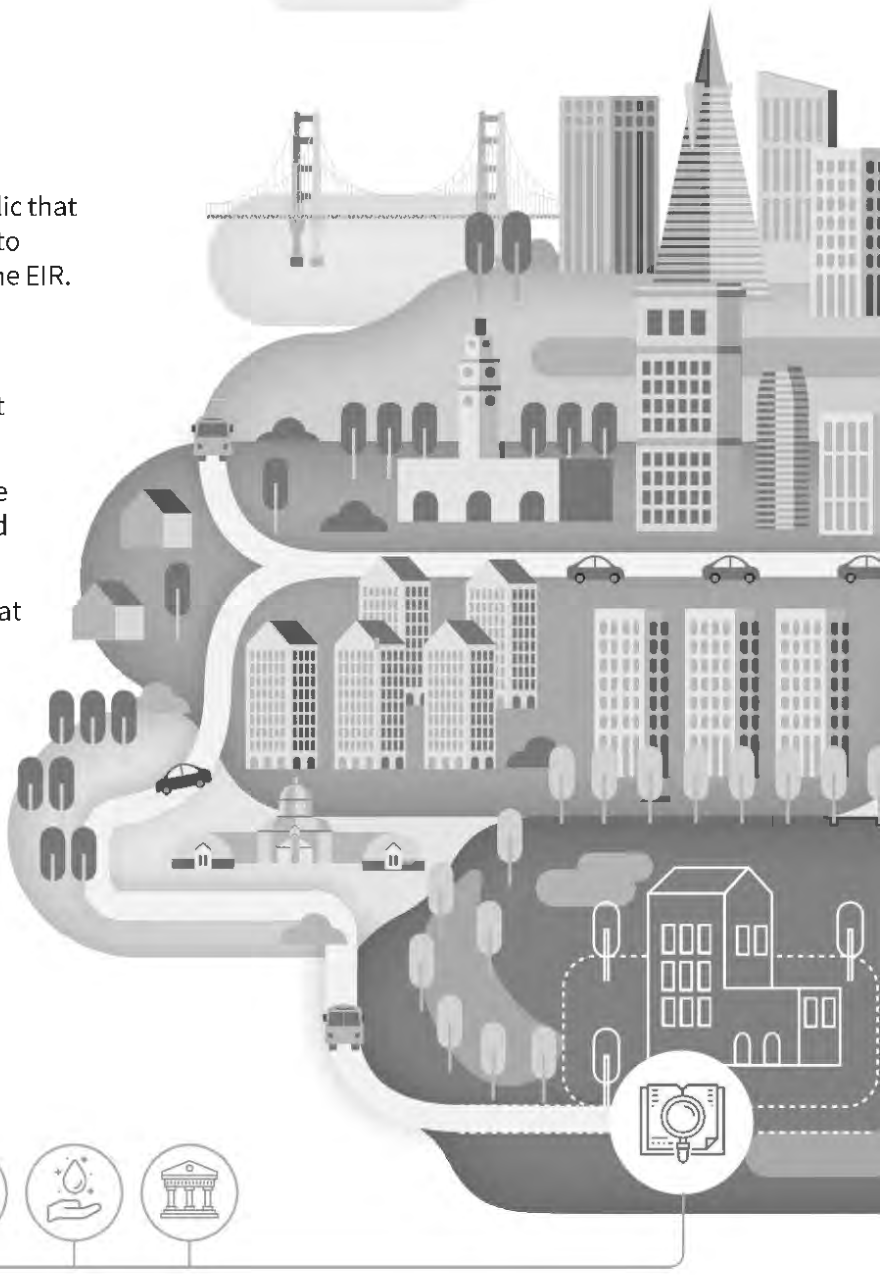
June 28, 2023
Date

Lisa Gibson
Environmental Review Officer

EIR

WHAT IS AN EIR?

An environmental impact report (EIR) is a study required for a project that may have a significant effect on the environment.



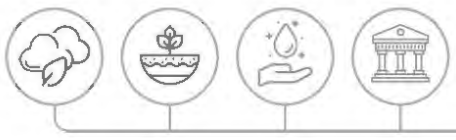
THE BASIC PARTS OF AN EIR ARE:

1. **Notice of Preparation:** a notice to inform the public that the City is preparing an EIR. The public is invited to comment on the scope of and topics analyzed in the EIR.

2. **Draft EIR** includes:
   - Description of the project, including the project goals (called objectives).
   - Environmental impact analysis, focusing on the project's significant environmental impacts and mitigation measures to reduce its impacts.
   - A range of other options (called alternatives) that meet project goals and reduce its significant impacts.
   - May include an initial study, which is a preliminary analysis prepared to determine the relative environmental impacts of the project.

   Public comments on the accuracy of the draft EIR are accepted in writing and at a public hearing.

3. **Responses to Comments:**
   A document formally responding to comments received on the draft EIR.



THE PURPOSE OF AN EIR IS:

To inform decision makers and the public about the potential significant environment impacts of a proposed project. Mitigation measures identify the ways that the environmental damage can be avoided or reduced.

The EIR analysis includes alternatives to the project that would avoid or substantially lessen the proposed project's impacts. The alternatives must meet most of the basic project objectives.

San Francisco Planning

中文詢問請電 Para información en Español llamar al Para sa impormasyon sa Filipino tumawag sa 628.652.7550

EIR STEPS

SCOPING

Determines the scope of the EIR in consultation with agencies, the public, and the applicant proposing the project. The EIR notice of preparation describes the project and EIR process. This notice may include the initial study.

DRAFT EIR

Incorporates prior public comment, and includes project description, environmental impact analysis, and alternatives. This may include an initial study, if not previously published.

PUBLIC COMMENT PERIOD

a. Draft EIR public hearing

b. Written public comments accepted

RESPONSES TO COMMENTS

Responds to comments on the draft EIR and makes revisions to draft EIR, as needed.

EIR CERTIFICATION

The Planning Commission certifies the final EIR (the draft EIR and the Responses to Comments document) if it is adequate, accurate, and complete. It is not a project approval.

PROJECT APPROVAL

After the final EIR is complete, the City determines whether to approve the project or an alternative to the project.

HOW CAN I PARTICIPATE?

SCOPING PERIOD - 30 DAYS

Written comments accepted throughout the 30 day period. Some projects have public meetings called scoping meetings, which anyone can attend to learn about the project and make comments on the environmental analysis topics, methods, or potential alternatives.

DRAFT EIR PUBLIC COMMENT PERIOD

Once the draft EIR is published, written comments are accepted during the comment period, which is generally 45 days. Spoken comments are also accepted at the Planning Commission draft EIR hearing.

For some projects, the Historic Preservation Commission comments on the draft EIR.

DRAFT EIR HEARING AT PLANNING COMMISSION

The Planning Commission comments on the draft EIR during one of their regularly scheduled hearings. During this hearing, the public also can provide spoken comments on the draft EIR either by calling in or attending the hearing in person.

Public participation is encouraged throughout the process. Each icon above represents a different way to share your thoughts. You can always contact Planning Department staff on any questions too.

Written comments are accepted as part of the formal EIR record

Spoken comments are accepted as part of the formal EIR record

Comment period

What is an environmental effect? EIRs consider how a project may affect a wide range of topics as part of the "physical environment." Topics range from air quality and noise to transportation and historic resources.

What is a mitigation measure? Mitigation measures identify the ways that the environmental damage can be avoided or reduced.

MORE QUESTIONS ON THIS PARTICULAR PROJECT?

Contact the assigned environmental planner

WHERE CAN I FIND MORE INFORMATION?

To learn more, please visit:
sfplanning.org/environmental-review

To view all published EIR documents:
sfplanning.org/sfceqadocs

To learn more about CEQA:
sfplanning.org/whatisCEQA

San Francisco Planning

49 South Van Ness Avenue, Suite 1400
San Francisco, CA 94103
628.652.7600
www.sfplanning.org

PUBLIC NOTICE

AVAILABILITY OF NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETINGS

PROJECT INFORMATION

Date:	June 28, 2023
Project Title:	**PG&E Power Assets Acquisition Project**
Project Address:	Various Locations in San Francisco and San Mateo counties
Case No.:	**2023-005370ENV**
Block/Lot No.:	Various
Zoning District(s):	Various
Neighborhood(s):	Outer Mission, Bayview, Crocker Amazon, Ingleside, Lakeshore, Merced Heights, Oceanview, Sunnydale, Little Hollywood, Visitacion Valley, Excelsior, Cayuga Terrace (San Francisco); Bayshore, Crocker, Peninsula Gateway, Mission Street, Southern Hills, Vista Grande, Westlake (Daly City); Baylands, Bayfront, Beatty, Northwest Bayshore (Brisbane); Unincorporated San Mateo County
Project Sponsor:	Sue Chau, San Francisco Public Utilities Commission 415.554.3238
EIR Coordinator:	Julie Moore 628.652.7566 CPC.PGEPowerAssetsEIR@sfgov.org

PUBLIC SCOPING MEETINGS INFORMATION

Meeting 1 Date:	Tuesday, July 11, 2023
Time:	6:00 p.m.
Location:	San Francisco Planning Department, Room 196 49 South Van Ness Avenue San Francisco, CA 94103
Meeting 2 Date:	Thursday, July 13, 2023
Time:	6:30 p.m.
Location:	Online at https://bit.ly/pgepowerassets
Meeting 3 Date:	Saturday, July 15, 2023
Time:	10:00 a.m.
Location:	Brisbane Mission Blue Center 475 Mission Blue Drive Brisbane, CA 94005

SEND WRITTEN COMMENTS TO

Planner:	Julie Moore
Via Mail:	49 South Van Ness Ave, Suite 1400 San Francisco, CA 94103
Via Email:	CPC.PGEPowerAssetsEIR@sfgov.org

The San Francisco Planning Department has issued a notice of preparation (NOP) of an environmental impact report (EIR) in connection with this project. Next, the department will begin the preparation of an EIR as required by the California Environmental Quality Act. The department welcomes your comments regarding the scope of the EIR. Refer to the Project Description and Purpose of Notice sections below for a summary. For more information, the NOP, translations of this notice, and the scoping meeting presentation video are available at sfplanning.org/sfceqadocs, and upon request to the planner listed above.

Project Description

The City and County of San Francisco (the "City") is proposing to purchase Pacific Gas and Electric Company (PG&E)-owned electrical transmission and distribution assets (the "Assets") in San Francisco and San Mateo County that are needed to provide electricity service to customers within the city (the "project"). After the City completes its acquisition of the Assets, the San Francisco Public Utilities Commission (SFPUC) would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned by PG&E. This transaction does not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.

The change in ownership itself would not result in physical changes to the environment; however, the SFPUC would need to physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco/San Mateo county border), to allow both systems to be safely, reliably, and independently operated by SFPUC and PG&E. The SFPUC would provide electricity service to city customers; PG&E would continue to provide electricity service to its customers outside of San Francisco.

The portion of the project requiring new construction or modifications to existing facilities would primarily be in the southern portion of San Francisco and along the county border in the northern portions of Brisbane and Daly City. The SFPUC would modify the existing Martin Substation (or construct a new substation, which will be analyzed in the EIR as a new substation variant), construct new underground distribution feeder lines, and modify the existing distribution infrastructure. The distribution express feeder line alignment would be approximately 3.75 miles long and installed within streets, sidewalks, and other publicly owned land. It would extend from near Arch Street in the west, south to Brotherhood Way and Sagamore Street, east along Sickles Avenue, northeast along Huron Avenue and Alemany Boulevard, and southeast along Geneva Avenue to the Martin Substation in Brisbane. Disconnecting and connecting distribution lines between overhead poles and underground vaults could occur either above- or below-ground, and would be performed in small, discontinuous areas generally located near the county border. Construction associated with the project would take 1.5 to 3 years after the purchase and transfer of the Assets.

Purpose of Notice

The Planning Department has determined that an EIR must be prepared for the proposed project. The purpose of the EIR is to provide information about potential significant physical environmental effects of the proposed project, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to the proposed project. Preparation of an NOP or EIR does not indicate a decision by the City to approve or to disapprove the project. However, prior to making any such decision, the decision makers must review and consider the information contained in the EIR.

You are not required to take any action. If you wish to provide comments on the scope of the environmental review (which focuses on the *physical environmental effects* of the project), you may do so by mail, email, or at any of the in-person or online public scoping meetings described above. To request a language interpreter or to accommodate persons with disabilities at the scoping meeting, please contact the EIR coordinator listed above at least 72 hours in advance of the meeting. All comments have equal consideration in the environmental review process. If you work for an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is relevant to your agency's statutory responsibilities in connection with the proposed project. We will also need the name of the contact person for your agency. If you have questions concerning environmental review of the proposed project, please contact the planner listed above.

Members of the public are not required to provide personal identifying information when they communicate with the Commission or the Department. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the department's website or in other public documents.

EIR

WHAT IS AN EIR?

An environmental impact report (EIR) is a study required for a project that may have a significant effect on the environment.

THE BASIC PARTS OF AN EIR ARE:

1. **Notice of Preparation:** a notice to inform the public that the City is preparing an EIR. The public is invited to comment on the scope of and topics analyzed in the EIR.

2. **Draft EIR** includes:
   - Description of the project, including the project goals (called objectives).
   - Environmental impact analysis, focusing on the project's significant environmental impacts and mitigation measures to reduce its impacts.
   - A range of other options (called alternatives) that meet project goals and reduce its significant impacts.
   - May include an initial study, which is a preliminary analysis prepared to determine the relative environmental impacts of the project.

   Public comments on the accuracy of the draft EIR are accepted in writing and at a public hearing.

3. **Responses to Comments:**
   A document formally responding to comments received on the draft EIR.

THE PURPOSE OF AN EIR IS:

To inform decision makers and the public about the potential significant environment impacts of a proposed project. Mitigation measures identify the ways that the environmental damage can be avoided or reduced.

The EIR analysis includes alternatives to the project that would avoid or substantially lessen the proposed project's impacts. The alternatives must meet most of the basic project objectives.

San Francisco Planning

中文詢問請電 Para información en Español llamar al Para sa impormasyon sa Filipino tumawag sa 628.652.7550

EIR STEPS

1 SCOPING

Determines the scope of the EIR in consultation with agencies, the public, and the applicant proposing the project. The EIR notice of preparation describes the project and EIR process. This notice may include the initial study.

2 DRAFT EIR

Incorporates prior public comment, and includes project description, environmental impact analysis, and alternatives. This may include an initial study, if not previously published.

3 PUBLIC COMMENT PERIOD

a. Draft EIR public hearing

b. Written public comments accepted

4 RESPONSES TO COMMENTS

Responds to comments on the draft EIR and makes revisions to draft EIR, as needed.

5 EIR CERTIFICATION

The Planning Commission certifies the final EIR (the draft EIR and the Responses to Comments document) if it is adequate, accurate, and complete. It is not a project approval.

PROJECT APPROVAL

After the final EIR is complete, the City determines whether to approve the project or an alternative to the project.

HOW CAN I PARTICIPATE?

SCOPING PERIOD - 30 DAYS

Written comments accepted throughout the 30 day period. Some projects have public meetings called scoping meetings, which anyone can attend to learn about the project and make comments on the environmental analysis topics, methods, or potential alternatives.

DRAFT EIR PUBLIC COMMENT PERIOD

Once the draft EIR is published, written comments are accepted during the comment period, which is generally 45 days. Spoken comments are also accepted at the Planning Commission draft EIR hearing.

For some projects, the Historic Preservation Commission comments on the draft EIR.

DRAFT EIR HEARING AT PLANNING COMMISSION

The Planning Commission comments on the draft EIR during one of their regularly scheduled hearings. During this hearing, the public also can provide spoken comments on the draft EIR either by calling in or attending the hearing in person.

Public participation is encouraged throughout the process. Each icon above represents a different way to share your thoughts. You can always contact Planning Department staff on any questions too.

- Written comments are accepted as part of the formal EIR record
- Spoken comments are accepted as part of the formal EIR record
- Comment period

What is an environmental effect? EIRs consider how a project may affect a wide range of topics as part of the "physical environment." Topics range from air quality and noise to transportation and historic resources.

What is a mitigation measure? Mitigation measures identify the ways that the environmental damage can be avoided or reduced.

MORE QUESTIONS ON THIS PARTICULAR PROJECT?

Contact the assigned environmental planner

WHERE CAN I FIND MORE INFORMATION?

To learn more, please visit:
sfplanning.org/environmental-review

To view all published EIR documents:
sfplanning.org/sfceqadocs

To learn more about CEQA:
sfplanning.org/whatisCEQA

APPENDIX C
FEDERAL ENERGY REGULATORY COMMISSION PROCEEDINGS

PAGE INTENTIONALLY BLANK

FERC Proceedings

FERC Docket[1]	Description
EL15-3 ER15-702 ER15-703 ER15-704 ER15-705 **ER15-735**	Dispute over grandfathering (defining PG&E's obligations to provide and San Francisco's eligibility for wholesale distribution service) and PG&E's proposed replacement agreements for transition to PG&E's Wholesale Distribution Tariff. (WDT) EL15-3: City Complaint ER dockets: City protests *Note:* Protest of PG&E's compliance filing to implement FERC's remand orders still pending. PG&E's petition for review of FERC's remand orders pending.
ER17-910 ER17-1509 ER17-2181 ER17-2406-000 ER18-198-000 ER18-768-000 ER18-790-000 ER18-1102-000* **ER18-1482-000**	City protest of PG&E quarterly filings with FERC regarding PG&E's interconnection and service agreements pursuant to the WDT *City protest of unexecuted service agreement for 6 Berry (dispute over Direct Assignment Facilities).
ER17-2204	City protest of unexecuted agreement for affordable housing project (PG&E refusal to serve (grandfather) affordable housing project)
EL19-38	City Complaint regarding PG&E refusal to provide secondary service under WDT2.
ER20-2878 ER22-619 **ER22-620**	City protest of PG&E's WDT3 filings: initial WDT3 filing, notice to terminate unmetered service, PG&E's unexecuted appendix for interim service to certain unmetered loads.

[1] https://elibrary.ferc.gov/eLibrary/search

FERC Docket[1]	Description
ER20-378	City protest of unexecuted service agreement for Oliver de Silva (dispute over PG&E refusing to provide requested Reserved Capacity)
ER20-1038	City protest of unexecuted agreement for tennis complex in Golden Gate Park (dispute over Direct Assignment Facilities) *Note:* CCSF filed short protest asking this be held in abeyance while 6 Berry pending, because it raised same issues. CCSF dropped protest after FERC's orders on 6 Berry.
D.C. Cir. Nos. 20-1084 & 20-1297	San Francisco petitions for review of FERC's grandfathering orders in EL15-3, et al. Petitions granted in *San Francisco v. FERC*, 24 F4th 652 (D.C. Cir. 2022)
D.C. Cir. Nos. 20-1313 & 20-1458	San Francisco petitions for review of FERC's orders in EL19-38. Petitions granted in *San Francisco v. FERC*, 24 F4th 652 (D.C. Cir. 2022)
D.C. Cir. Nos. 23-1041 & 23-1127	PG&E petitions for review of FERC's remand orders in EL15-3, et al. (pending)

APPENDIX D
SFPUC STANDARD CONSTRUCTION MEASURES

PAGE INTENTIONALLY BLANK

SFPUC Standard Construction Measures

1. SEISMIC AND GEOTECHNICAL STUDIES: All projects will prepare a characterization of the soil types and potential for liquefaction, subsidence, landslide, fault displacement, and other geological hazards at the project site and will be engineered and designed as necessary to minimize risks to safety and reliability due to such hazards. As necessary, geotechnical investigations will be performed.

2. AIR QUALITY: All projects within San Francisco City (the City) limits will comply with the Construction Dust Control Ordinance. All projects outside the City will comply with applicable local and State dust control regulations. All projects within City limits will comply with the Clean Construction Ordinance. Projects outside City limits will comply with San Francisco or other applicable thresholds for health risks. All projects, both within and outside of City limits, will comply with either San Francisco or other applicable thresholds for construction criteria air pollutants.

To meet air quality thresholds, all projects (as necessary) will implement air quality controls to be tailored to the project, such as using high tier engines, Verified Diesel Emissions Control Strategies (VDECS) such as diesel particulate filters, customized construction schedules and procedures, and low emissions fuel.

3. WATER QUALITY: All projects will implement erosion and sedimentation controls to be tailored to the project site such as, fiber rolls and/or gravel bags around stormdrain inlets, installation of silt fences, and other such measures sufficient to prevent discharges of sediment and other pollutants to storm drains and all surface waterways, such as San Francisco Bay, the Pacific Ocean, water supply reservoirs, wetlands, swales, and streams. As required based on project location and size, a Stormwater Control Plan (in most areas of San Francisco) or a Stormwater Pollution Prevention Plan (SWPPP) (outside of San Francisco and in certain areas of San Francisco) will be prepared. If uncontaminated groundwater is encountered during excavation activities, it will be discharged in compliance with applicable water quality standards and discharge permit requirements.

4. TRAFFIC: All projects will implement traffic control measures sufficient to maintain traffic and pedestrian circulation on streets affected by construction of the project. Traffic control measures may include, but not be limited to, flaggers and/or construction warning signage of work ahead; scheduling truck trips during non-peak hours to the extent feasible; maintaining access to driveways, private roads, and off-street commercial loading facilities by using steel trench plates or other such method; and coordination with local emergency responders to maintain emergency access. For projects in San Francisco, the measures will also, at a minimum, be consistent with the requirements of San Francisco Municipal Transportation Agency (SFMTA)'s Blue Book. Any temporary rerouting of transit vehicles or relocation of transit facilities would be coordinated with the applicable transit agency, such as SFMTA Muni Operations in San Francisco. All Projects will obtain encroachment permits from the applicable jurisdiction for work in public roadways.

5. NOISE: All projects will comply with local noise ordinances regulating construction noise. The SFPUC shall undertake measures to minimize noise disruption to nearby neighbors and sensitive receptors during construction. These efforts could include using best available noise control technologies on equipment (i.e., mufflers, ducts, and acoustically attenuating shields),

locating stationary noise sources (i.e., pumps and generators) away from sensitive receptors, erecting temporary noise barriers, and other such measures.

6. HAZARDOUS MATERIALS: Where there is reason to believe that site soil or groundwater that will be disturbed may contain hazardous materials, the SFPUC shall undertake an assessment of the site in accordance with any applicable local requirements (e.g., Maher Ordinance) or using reasonable commercial standards (e.g., Phase I and Phase II assessments, as needed). If hazardous materials will be disturbed, the SFPUC shall prepare a plan and implement the plan for treating, containing or removing the hazardous materials in accordance with any applicable local, State and federal regulations so as to avoid any adverse exposure to the material during and after construction. In addition, any unidentified hazardous materials encountered during construction likewise will be characterized and appropriately treated, contained or removed to avoid any adverse exposure. Measures will also be implemented to prevent the release of hazardous materials used during construction, such as storing them pursuant to manufacturer recommendation, maintaining spill kits onsite, and containing any spills that occur to the extent safe and feasible followed by collection and disposal in accordance with applicable laws. SFPUC will report spills of reportable quantity to applicable agencies (e.g., the Governor's Office of Emergency Services).

7. BIOLOGICAL RESOURCES: All project sites and the immediately surrounding area will be screened to determine whether biological resources may be affected by construction. A qualified biologist will also carry out a survey of the project site, as appropriate, to note the general resources and identify whether habitat for special-status species and/or migratory birds, are present. In the event further investigation is necessary, the SFPUC will comply with all local, State, and federal requirements for surveys, analysis, and protection of biological resources (e.g., Migratory Bird Treaty Act, federal and State Endangered Species Acts, etc.). If necessary, measures will be implemented to protect biological resources, such as installing wildlife exclusion fencing, establishing work buffer zones, installing bird deterrents, monitoring by a qualified biologist, and other such measures. If tree removal is required, the SFPUC would comply with any applicable tree protection ordinance.

8. VISUAL AND AESTHETIC CONSIDERATIONS, PROJECT SITE: All project sites will be maintained in a clean and orderly state. Construction staging areas will be sited away from public view where possible. Nighttime lighting will be directed away from residential areas and have shields to prevent light spillover effects. Upon project completion, project sites on SFPUC-owned lands will be returned to their general pre-project condition, including re-grading of the site and re-vegetation or re-paving of disturbed areas to the extent this is consistent with SFPUC's Integrated Vegetation Management Policy. However, where encroachment has occurred on SFPUC-owned lands, the encroaching features may not be restored if inconsistent with the SFPUC policies applicable to management of its property. Project sites on non-SFPUC land will be restored to their general pre-project condition so that the owner may return them to their prior use, unless otherwise arranged with the property owner.

9. CULTURAL RESOURCES: All projects that will alter a building or structure, produce vibrations, or include soil disturbance will be screened to assess whether cultural resources are or may be present and could be affected, as detailed below.

Archeological Resources. No archeological review is required for a project that will not entail ground disturbance. Projects involving ground disturbance will undergo screening for

archeological sensitivity as described below and implement, as applicable, SFPUC's Standard Archeological Measures I (Discovery), II (Monitoring) and III (Testing/Data Recovery) per the Cultural Resources Attachments. Standard Construction Measure I will be implemented on all projects involving ground disturbance and Standard Archeological Measures II and III will be implemented based on the screening process described below for projects assessed as having the potential to encounter archeological sites and/or if an archeological discovery occurs during construction.

Projects involving ground disturbance will initially be screened to identify whether there is demonstrable evidence of prior ground disturbance in the project site to the maximum vertical and horizontal extent of the current project's planned disturbance. For projects where prior complete ground disturbance has occurred throughout areas of planned work, SFPUC will provide evidence of the previous disturbance in the Categorical Exemption application and no further archeological screening will be required.

For projects that are on previously undisturbed sites or where the depth/extent of prior ground disturbance cannot be documented, or where the planned project-related ground disturbance will extend beyond the depth/extent of prior ground disturbance, additional screening will be carried out as detailed below and shown on the attached flow chart titled "SFPUC Standard Construction Measure #9 Archeological Assessment Process". The additional screening will be conducted by the SFPUC's qualified archeologist (defined as meeting the Secretary of the Interior's Professional Qualifications Standards [36 CFR 61]) and, if a consultant, selected in consultation with the San Francisco Planning Department's Environmental Review Officer (ERO) and meeting criteria or specialization required for the resource type as identified by the ERO.

1) The SFPUC qualified archeologist will conduct an archival review for the project site, including review of Environmental Planning's (EP's) archeological GIS data and/or a records search of the California Historical Resources Information System (CHRIS) and other archival sources as appropriate. The qualified archeologist will also conduct an archeological field survey of the project site if, in the archeologist's judgment, this is warranted by site conditions. Based on the results, the archeologist will complete and submit to EP a Preliminary Archeological Checklist (PAC) (version dated 4/2015, to be amended in consultation with the ERO as needed). The PAC will include recommendations for the need for archeological testing, additional research and/or treatment measures consistent with Archeological Measures I, II, and III, to be implemented by the project to protect and/or treat significant archeological resources identified as being present within the site and potentially affected by the project.

2) The EP Archeologist (for projects within the City) or the ERO's archeological designee (for projects outside the City) will then conduct a Preliminary Archeological Review (PAR) of the PAC and other sources as warranted; concur with the PAC recommendations; and/or amend the PAC in consultation with the SFPUC archeologist or archeological consultant to require additional research, reports, or treatment measures as warranted based on his/her professional opinion.

3) The SFPUC shall implement the PAC/PAR recommendations prior to and/or during project construction consistent with Standard Archeological Measures I, II, and III, and

shall consult with the EP Archeologist in selecting an archeological consultant, as needed, to implement these measures.

4) Ground disturbing activities in archeologically sensitive areas, as identified through the above screening, will not begin until required preconstruction archeological measures of the PAC/PAR (e.g., preparation of an Archeological Monitoring Plan, Archeological Treatment Plan, and/or an Archeological Research Design and Data Recovery Plan) have been implemented.

Historic (Built Environment) Resources. For projects within the City that include activities with the potential for direct or indirect effects to historic buildings or structures, initial CEQA screening will include a review, for the project footprint and up to one parcel surrounding the footprint of CCSF's online planning map, all relevant survey data, preservation address files, and other pertinent sources for previously-identified, historically significant buildings and building and structures more than 45 years old that have not been previously evaluated. For projects outside of the City, initial CEQA screening will include a records search of EP's CCSF historical resources data, CHRIS, and other pertinent sources for historically significant or potentially significant buildings and structures older than 45 years.

For projects that would modify an existing building or structure that has been determined by EP as being a significant historical resource (i.e., appears eligible to qualify for the CRHR), or that would introduce new aboveground facilities in the vicinity of a significant historical resource, or that would affect previously unevaluated buildings or structures more than 45 years old, the SFPUC will retain a qualified architectural historian (defined as meeting the Secretary of the Interior's Professional Qualification standards and, if a consultant, also selected in consultation with the ERO) to conduct a historical resource evaluation (HRE). SFPUC will submit the project description and the HRE to the CCSF Planning Department Preservation Planner or to the ERO's-designated qualified architectural historian to assess potential effects. Where the potential for the project to have adverse effects on historic buildings or structures is identified, the CCSF Planning Department Preservation Planner or the ERO's designee will consult with SFPUC to determine if the project can be conducted as planned or if the project design can be revised to avoid the significant impact, and will comply with applicable procedures set forth in Historic Architectural Resource Measure I. If these options are not feasible, the project will need to undergo further review with EP and mitigation may be required. If so, the project would not qualify for a Categorical Exemption from CEQA review.

Where construction will take place in proximity to a building or structure identified as a significant historical resource but would not otherwise directly affect it, the SFPUC will implement protective measures, such as but not limited to, the erection of temporary construction barriers to ensure that inadvertent impacts to such buildings or structures are avoided.

APPENDIX E
NOISE AND VIBRATION TECHNICAL MEMORANDUM AND NOISE METHODS MEMORANDUM

PAGE INTENTIONALLY BLANK

ESA

575 Market Street
Suite 3700
San Francisco, CA 94105
415.896.5900 phone
415.896.0332 fax

esassoc.com

Technical Memorandum

date March 10, 2025

to Julie Moore and Tania Sheyner, San Francisco Environmental Planning

from Chris Sanchez, ESA

subject Noise and Vibration Technical Memorandum – PG&E Power Asset Acquisition Project

1. Project Description

1.1 Project

The City and County of San Francisco ("City") proposes the Pacific Gas and Electric Company (PG&E) Power Asset Acquisition Project ("the project") which includes (1) the City's purchase ("acquisition") of PG&E-owned electrical transmission and distribution assets ("Assets") located in San Francisco and San Mateo counties that are needed to provide electric service[1] to customers within San Francisco, and (2) other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco ("separation").

The Assets include equipment, facilities, property, and records that the City would acquire, including the following:

- PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer-serving distribution lines, and related facilities)
- PG&E's 115 *kilovolt*[2] (kV) and 230 kV transmission assets within San Francisco and portions in San Mateo County (substations, transmission lines, transformers, and related facilities needed for operations)
- Certain PG&E distribution lines in Brisbane emanating from the Martin Substation that serve customers in San Francisco[3]

[1] Broadly, electric service includes generation, transmission, distribution, and customer services. Generation service refers to sources (supplies) of electricity, generated using electric generation facilities, such as power houses, solar arrays, cogeneration facilities, and wind turbines. Transmission and distribution services deliver electricity from those sources to customers. Customer service includes customer programs, billing services, affordability assistance, and similar services.

[2] Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

[3] Existing distribution lines serving only customers in San Francisco would be acquired by the City. Distribution lines serving only PG&E customers outside of San Francisco would remain with PG&E. Finally, some of the distribution lines serve both customers in San Francisco and customers outside of San Francisco. These feeders would be separated at the border and the City would construct new infrastructure to ensure that each utility would have its own system and that all customers would continue to be served.

- A portion of the Martin Substation facilities (located in Brisbane) or *interconnections*[4] needed to enable the San Francisco Public Utilities Commission (SFPUC) to operate the transmission and distribution system from Martin Substation into San Francisco
- Other systems and equipment, materials, records, operating and maintenance facilities, property, and other land-related agreements as necessary for safe and reliable operation, maintenance, repair, control, and protection of the acquired transmission and distribution system

After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition, the City would acquire property rights as needed to operate and maintain the Assets and new City equipment, as needed, on public and private lands. The project would not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.[5]

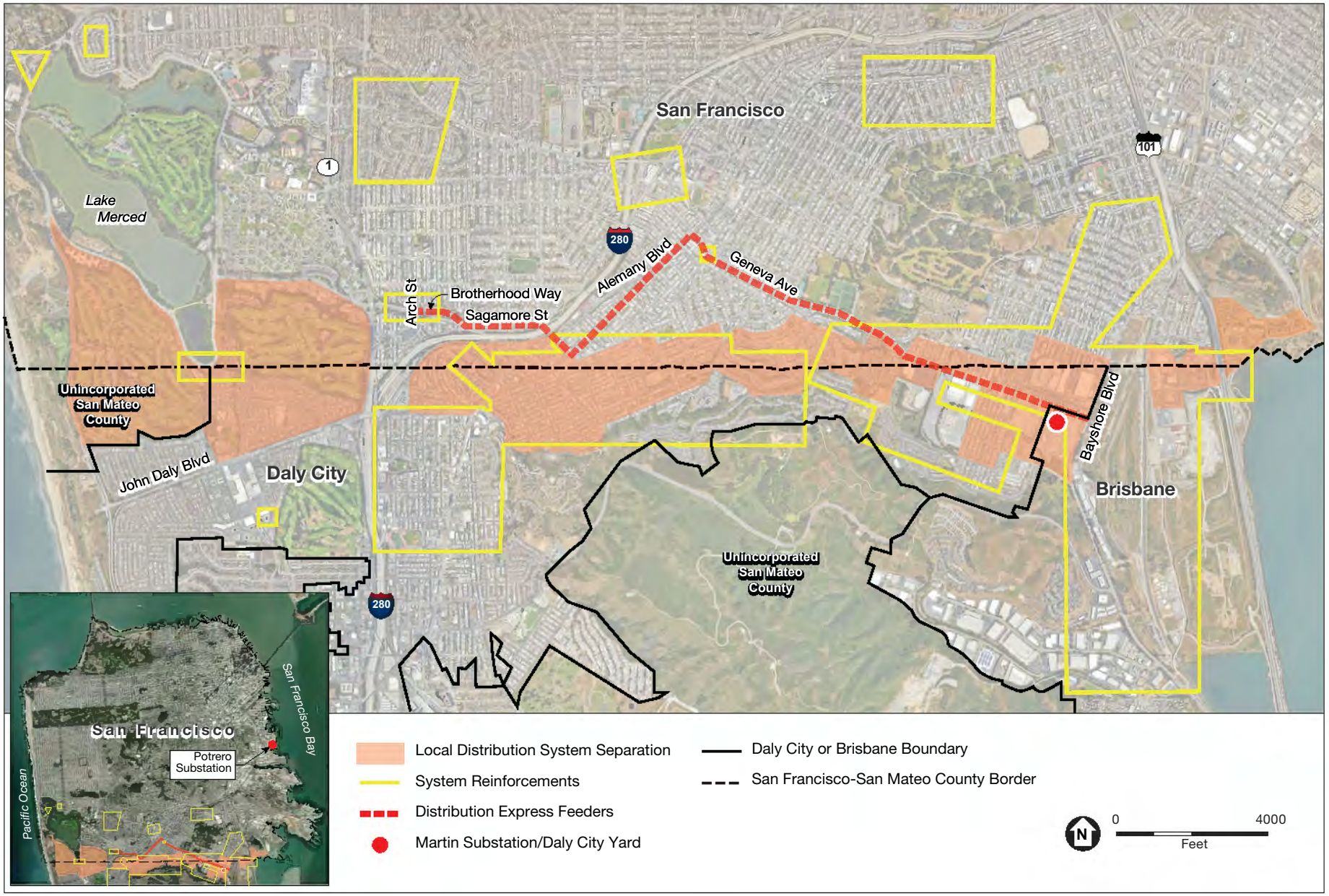
As part of the project, some of the acquired Assets would be physically separated from PG&E's electricity grid outside of San Francisco so there would be two separate systems generally divided along the San Francisco-San Mateo County border. To separate these Assets, the City would modify portions of PG&E's existing transmission and distribution infrastructure, reconnect the terminals of some of the existing transmission lines at or near the Martin Substation, construct new overhead and underground distribution lines, modify the existing Martin Substation (or, as variant of the project, construct a new substation), and other related work.[6] After the acquisition and separation of PG&E's facilities, the SFPUC would provide electric service to customers in San Francisco currently served by PG&E; PG&E would continue to provide electric service to its customers outside San Francisco. The construction portion of the project (separation) is anticipated to take approximately 3 years after the acquisition. It is anticipated that the City and PG&E would coordinate on the implementation of the project.

The noise and vibration analysis focuses on project components involving changes to the physical environment and evaluates associated potential environmental effects. Those project components are presented in **Figure 1** below and summarized in **Table 1**. **Figure 2** shows the Martin Substation separation project site.

4 Interconnection is defined as an electrical connection between multiple entities.

5 In addition, the interconnection between the transmission system in San Francisco and the Trans Bay Cable (TBC), and TBC operation, would not be physically changed as a result of the acquisition.

6 As an example of related work, the City would acquire the PG&E Egbert Switching Station as part of the project. The Egbert Switching Station is a new transmission switching station planned to be constructed in San Francisco. The project was underway and is currently on hold. However, if the Egbert Switching Station is constructed, a revenue meter would be needed inside the switching station.



SOURCE: Google Earth Aerial Imagery

PG&E Asset Acquisition Project

Note: The project includes purchase of PG&E's transmission and distribution assets needed for the city to provide reliable electric service to customers in San Francisco, including some assets in San Mateo County. Physical changes would occur at existing PG&E substations, along the distribution express feeders alignment, and at some locations within the areas shaded or outlined in yellow. The project also includes work within PG&E properties and City and County of San Francisco properties.

Figure 1
Project Areas Overview

SOURCE: Google Earth Aerial Imagery

PG&E Asset Acquisition Project

Figure 2
Martin Substation Project Site and Construction Staging Area

TABLE 1
PROJECT COMPONENTS

Project Component	Component Purpose	Component Description	Location
Martin Substation Separation[a]	Enable the City to transmit electricity to customers in San Francisco from PG&E's transmission lines in San Mateo County. Once separated, the substation would also be used to step down transmission voltages to distribution service voltages to serve customers in San Francisco.	Reconfigure and partition the existing PG&E Martin Substation into two interconnected utility systems—one serving San Francisco and one serving PG&E's remaining customers in San Mateo County.	Existing PG&E Martin Substation, at the intersection of Geneva Avenue and Bayshore Boulevard in Brisbane.
Distribution Express Feeders[b]	Distribute electricity from the Martin Substation to areas in San Francisco that are currently supplied by distribution lines originating from PG&E's existing Daly City Substation, a substation located in San Mateo County. The existing distribution lines from Daly City would be disconnected at the border after completion.	Install approximately 3.8 miles of *duct banks*[c] for new underground distribution express feeders from the Martin Substation, consisting of approximately 0.3 mile of duct banks in Brisbane, approximately 0.5 mile in Daly City, and approximately 3 miles in San Francisco.	Geneva Avenue in Brisbane and Daly City. Geneva Avenue, Alemany Boulevard, Huron Avenue, Sickles Avenue, Sagamore Street, and Brotherhood Way in San Francisco.
Local Distribution System Separation	Connect customers in San Francisco to the City's electrical system and San Mateo County customers to PG&E.	Reconfigure and separate overhead and underground distribution lines around the county border, including approximately 3.9 miles of underground work.	Approximately 70 work areas within the project areas generally along the San Francisco-San Mateo County border.
System Reinforcements	Ensure electrical system reliability and ability to restore power in the event of outages for both the City and PG&E systems after the separation.	Install and replace overhead and underground equipment to maintain service reliability on existing lines, including approximately 4.2 miles of underground work.	Approximately 25 work areas within the project areas on both sides of the San Francisco-San Mateo County border.
Modifications to Retain PG&E Access to Non-Electrical Facilities	Provide continued access for PG&E's operation of non-electrical facilities where such facilities would be located adjacent to electric facilities to be acquired by the City.	Modify fencing and ingress/egress, at certain sites with non-electrical facilities.	Martin Substation (on Geneva Avenue between Schwerin Street and Bayshore Boulevard in Brisbane). Potrero Substation (on Illinois Street between Humboldt and 23rd Street).
Operations Control Center	Provide an office facility needed for dispatchers and operators. Centralize data on transmission and distribution systems status and security.	Modify interior of an existing building, upgrade utilities, and install fencing and a new standby diesel generator.	An existing commercial or office building in the southeastern part of San Francisco.
Operations and Maintenance Service Yards; Materials and Equipment Storage	Securely store equipment, trucks, spare materials and other supplies for operations and maintenance of the power grid in San Francisco, including vehicle parking spaces and containment for hazardous materials, such as transformer oils. In addition, provide offices for workers in an existing building.	Modify existing yards (e.g., fencing).	Existing maintenance and storage properties, vacant parcels, or space at acquired substations in southeastern San Francisco.

TABLE 1
PROJECT COMPONENTS

Project Component	Component Purpose	Component Description	Location
Telecommunications Equipment	Provide a network to enable prompt and reliable exchange of information for the safe and secure operation, control, and protection of power system equipment.	Install equipment at substations (e.g., remote terminal units) inside control room (no excavation). Install fiber optic cables between substations and other telecommunication aggregation points underground within existing or new duct banks. Install other telecommunications equipment (e.g., wireless mesh *SMART*[7] devices) mounted in underground vaults or on existing poles (no excavation).	Existing or proposed substations, control centers, underground duct banks, and mounted on poles throughout San Francisco and south of the border within the project boundaries.

NOTES:

a. As a variant of the project, instead of the Martin Substation separation, the City would construct a new, gas-insulated substation (the new City Substation) at PG&E's Daly City Yard. The components of the project variant would be the same as those of the proposed project except that (1) the variant would include construction of the new City Substation instead of the separation work at the existing Martin Substation, (2) the distribution express feeders would originate from the new City Substation, and (3) the City would also install new incoming transmission lines from the Martin Substation to the new City Substation and outgoing distribution and transmission lines from the new City Substation to the existing distribution and transmission system.
b. Generally, electrical distribution express feeders are lines that deliver electricity to electrical loads (i.e., customers). Distribution express feeders are lines used to serve loads farther away from the substation by bypassing other customers.
c. A duct bank is defined as two or more ducts or conduits (polyvinyl chloride [PVC], high-density polyethylene [HDPE], or equivalent), to house electrical cables, typically installed underground in a trench and protected with concrete or other material.

1.2 Project Construction

1.2.1 Construction Schedule

Project construction would occur over approximately three years, with an estimated construction period of 2026 to 2028, although construction could occur later depending on the entitlement process.[8] (refer to **Table 2**, **Project Construction Schedule**). The construction duration for each component would range from one month to thirty-three months. Construction in San Francisco would generally proceed Monday through Friday, except holidays, between 7 a.m. and 8 p.m. consistent with the City's noise ordinance. Construction in Brisbane and Daly City would generally proceed between the hours of 7 a.m. and 7 p.m. on weekdays and 9 a.m. to 7 p.m. on weekends and holidays. Construction in unincorporated areas of San Mateo County would generally proceed between 7 a.m. and 6 p.m. on weekdays and 9 a.m. and 5 p.m. on Saturdays. Some nighttime and weekend construction would occur on an as-needed basis.

[7] SMART is defined as Self-Monitoring, Analysis and Reporting Technology; it allows users to connect a device to the internet.

[8] If work on multiple components proceeds concurrently, construction would take about three years to complete. If some project components are delayed, work could take up to five years. The date of construction start (2026) is an estimate.

TABLE 2
PROJECT CONSTRUCTION SCHEDULE

Construction Activity	Approximate Duration	Year 1	Year 2	Year 3
Martin Substation Separation *Two crews of five workers each*	33 months			
Distribution Express Feeders *Two crews of six workers each*	12 months			
Local Distribution System Separation *Two crews of six workers each*	24 months			
System Reinforcements *Two crews of five workers each*	28 months			
Operations Control Center *Four crews of five workers each*	14 months			
Modifications to Retain PG&E Access to Non-Electrical Facilities *Two crews of three workers each*	1 month			
Operations and Maintenance Service Yards; Materials and Equipment Storage *Two crews of three workers each*	2 months			

NOTE: Telecommunications Equipment not listed separately because installation would occur concurrently with other components in the table.

1.2.2 Night Construction

Temporary lighting would be used in construction areas during working hours when days are short, and at Martin Substation when nighttime work beyond typical hours is needed to maintain the project schedule. Tasks such as outage switching,[9] cable splicing, electrical connections, low voltage wiring, and relay setting[10] adjusting could be completed at Martin Substation at night. These tasks would typically use hand tools, various electrical testing and metering devices, and task lighting. Construction tasks using heavy machinery, and other major construction work would occur during normal daytime hours.

The Martin Substation and Daly City Yard have existing night lighting. However, additional lighting could be used along the boundaries of the construction areas at Martin Substation and Daly City Yard, including near Geneva Avenue and Schwerin Street. Lighting would be oriented downwards toward work areas and away from surrounding areas.

[9] Outage switching is the transfer of electrical loads between power sources.

[10] Relays must be configured to operate, control, and protect the system.

During work required within the launching and receiving pits for the jack-and-bore tunneling for the distribution express feeders in San Francisco near San Jose Avenue, overnight dewatering would be required to maintain dry equipment and a generator may operate a pump overnight.

1.2.3 Construction Access, Staging, Equipment and Workforce

Due to the limited space at Martin Substation, the Daly City Yard would serve as the primary staging/ laydown area for separation work at Martin Substation (refer to Figure 2). No excavation would be required during staging activities, and the area would support storage of construction equipment, material, stockpiles, and employee parking.

Most of the underground power line construction associated with the distribution express feeders and local distribution system separation would be restricted to within roadways. Construction equipment and materials would be staged within areas of the roadway including sidewalks and parking lanes. Staging for work in the San Francisco substations would occur entirely within the walled/fenced substations.

The primary vehicle access for construction haul trucks and deliveries to the Martin Substation would be Geneva Avenue to Bayshore Boulevard to US 101. The vehicle access for the distribution express feeders alignment and distribution separation work may include the same roads above as well as other local roads where the duct bank alignments or separation/reinforcement work would be located. Alternatively, access to the local roads could be provided from I-280 and Alemany Boulevard and Junipero Serra Boulevard, or other on/off ramps. Construction truck routes would be selected to minimize travel on local roads to the extent feasible.

The project would use various construction equipment and vehicles, such as concrete saws, excavators, backhoes/loaders, pile drivers, air compressors, portable generators, rollers, pavers, cranes, compactors, and concrete trucks. **Table 3**, **Equipment List for All Phases of Construction**, presents the construction equipment proposed to be used.

Up to 76 workers would be involved in construction in various work areas when multiple construction activities overlap.

TABLE 3
EQUIPMENT LIST FOR ALL PHASES OF CONSTRUCTION

Project Component or Subphase	Equipment Type	Quantity
Martin Substation Separation - Site Excavation	Tractors/Loaders/Backhoes	1
	Excavators	2
	Plate Compactors	1
	Air Compressors	4
	Concrete/Industrial Saws	1
	Generator Sets	1
	Jack Hammer	1
	Paver	1
	Water Buffalo with pump on trailer	2
	Street Sweeper	2
	Roller	1

TABLE 3
EQUIPMENT LIST FOR ALL PHASES OF CONSTRUCTION

Project Component or Subphase	Equipment Type	Quantity
	Cable Pulling equipment	2
Martin Substation Separation - Concrete Foundations	Cranes	1
	Tractors/Loaders/Backhoes	1
	Generator Sets	2
	Air Compressors	2
Martin Substation Separation - Backfill and Grading	Tractors/Loaders/Backhoes	1
	Plate Compactors	1
	Water Buffalo with pump on trailer	2
	Street Sweeper	2
	Generator Sets	2
	Air Compressors	2
Martin Substation Separation - Placement of Facilities	Cranes	1
	Lift/bucket trucks	1
	Jack Hammer	1
	Air Compressors	2
	Generator Sets	2
Martin Substation Separation - Equipment and Gate Installation	Tractors/Loaders/Backhoes	1
	Cranes	1
	Generator Sets	1
	Jack Hammer	1
	Air Compressors	2
Distribution Express Feeders, Local Distribution System Separation, System Reinforcements	Tractors/Loaders/Backhoes	2 each
	Plate Compactors	2 each
	Concrete/Industrial Saws	2 each
	Excavators	2 each
	Generator Sets	2 each
	Air Compressors	2 each
	Jack Hammer	2 each
	Paver	2 each
	Water Buffalo with Pump on Trailer	2 each
	Street Sweeper	2 each
	Roller	2 each
	Lift / Bucket Truck[a]	2 each
	Line Truck (Crane-and Augur-Mounted)[a]	2 each
	Cable Pulling equipment	2 each
	Pile Driver[b]	1 (Distribution express feeders only)
Exterior Work for Operations Control Center	Excavators	1
	Plate Compactors	1
	Concrete/Industrial Saws	1
	Water Buffalo with pump on trailer	2
	Street Sweeper	2
	Jack Hammer	1

TABLE 3
EQUIPMENT LIST FOR ALL PHASES OF CONSTRUCTION

Project Component or Subphase	Equipment Type	Quantity
New City Substation (Project Variant) - Site Excavation and Preparation	Tractors/Loaders/Backhoes	1
	Excavators	1
	Water Truck	1
	Plate Compactors	1
	Air Compressors	2
	Generator Sets	2
	Pile Driver	1
New City Substation (Project Variant) - Concrete Foundations	Cranes	1
	Tractors/Loaders/Backhoes	1
	Generator Sets	2
	Air Compressors	2
	Water Truck	1
	Plate Compactors	1
New City Substation (Project Variant) - Backfill and Grading	Tractors/Loaders/Backhoes	1
	Water Truck	1
	Plate Compactors	1
	Generator Sets	2
	Air Compressors	2
New City Substation (Project Variant) - Placement of Facilities	Cranes	1
	Lift/bucket trucks	1
	Jack Hammer	1
	Air Compressors	2
	Generator Sets	2
New City Substation (Project Variant) - Equipment and Gate Installation	Tractors/Loaders/Backhoes	1
	Cranes	1
	Generator Sets	1
	Air Compressors	2
Incoming and Outgoing Lines (Project Variant) - Trenching	Tractors/Loaders/Backhoes	1
	Plate Compactors	1
	Concrete/Industrial Saws	1
	Excavators	1
	Generator Sets	1
	Air Compressors	2
	Jack Hammer	1
	Paver	1
	Water Trucks	1
	Roller	1
	Cable Pulling equipment	2

NOTES:

a. Air Quality analyses assumed underground work and therefore air quality analysis assumptions do not include overhead equipment listed above.
b. A pile driver or excavator with attachment would be used to construct access pits for trenchless installation of the distribution express feeders, if needed. Trenchless installation methods (such as jack-and-bore or horizontal directional drilling) require pits at both the launching and receiving ends of the bore.

SOURCE: SFPUC 2024, **Attachment A**.

1.3 Project Variant (New City Substation)

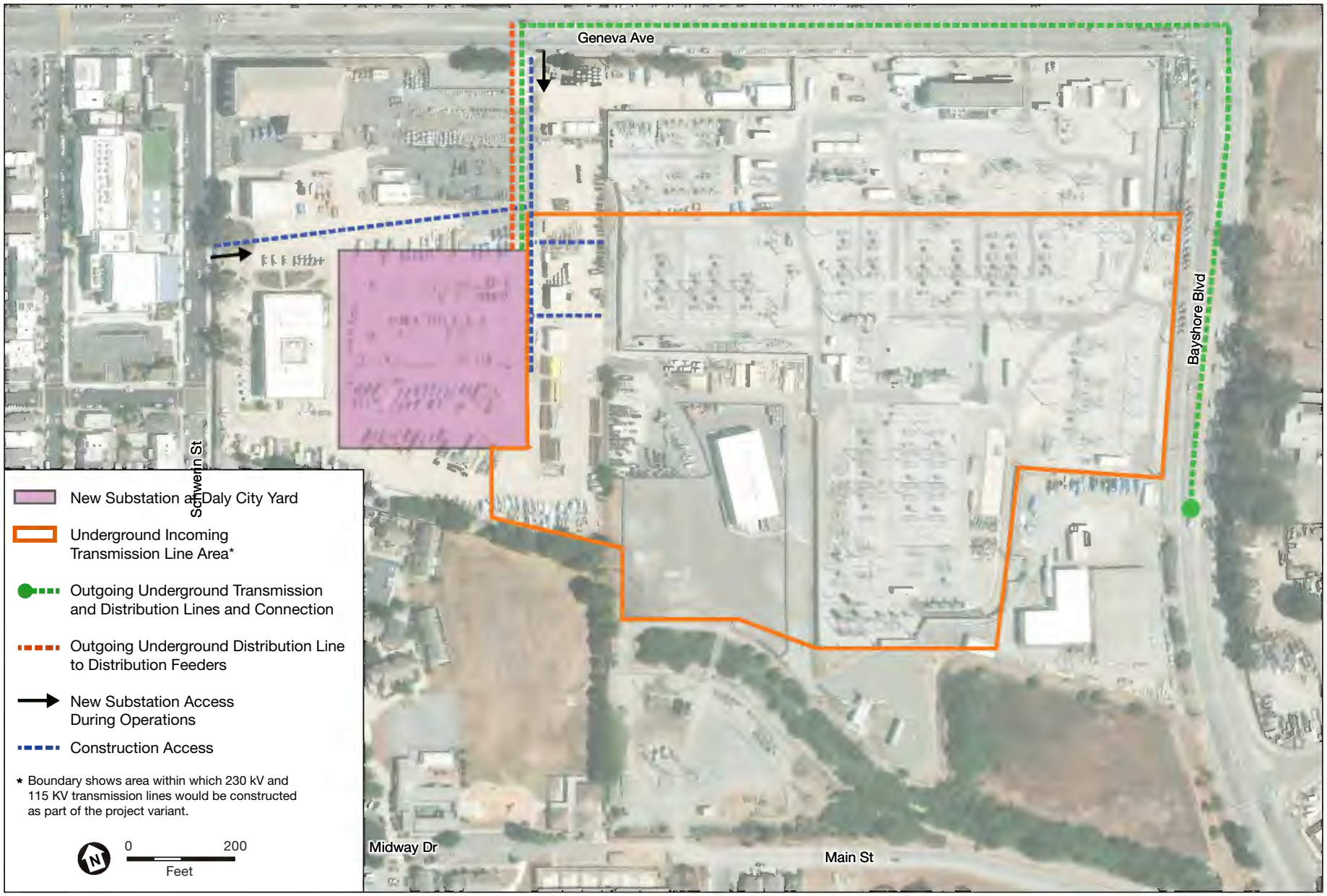
As a variant of the project, instead of the Martin Substation separation component, a new, gas-insulated substation (the new City Substation) would be constructed at PG&E's adjacent Daly City Yard, as shown on **Figure 3**. The components of the project variant would be the same as those of the proposed project except that (1) the variant would include construction of the new City Substation instead of the separation work at the existing Martin Substation, (2) the distribution express feeders would originate from the new City Substation, and (3) the variant would also include installation of new incoming transmission lines from the Martin Substation to the new City Substation and outgoing distribution and transmission lines from the new City Substation to the existing distribution and transmission system. **Table 4**, **New City Substation Components and Excavation Volumes**, summarizes the new City Substation components.

TABLE 4
NEW CITY SUBSTATION COMPONENTS AND EXCAVATION VOLUMES

Component	Quantity	Maximum Excavation Width and Length (feet)	Maximum Excavation Depth (feet)
Gas Insulated Switchgear Buildings			
230 kV Enclosed Gas Insulated Switchgear (Building)	1	60x120	7
115 kV/12 kV Enclosed Gas Insulated Switchgear (Building)	1	60x225	7
Transformers			
115 kV Transformers and oil containment	4	44x44	7
230 kV Transformers and oil containment	2	60x46	7
New Transmission and Distribution Lines			
Outgoing 230 kV, 115 kV, and 12 kV Cable Trenches from new City Substation to Bayshore Boulevard	3	3,000x5	8
Incoming 230 kV and 115 kV Transmission line trench from Martin Substation to new City Substation	2	1,000x8	8
Vaults for cable splicing (each)	6	20x11	15
Other Improvements			
Lighting and Fencing	Various	Post Holes	4-6
Grading (including road)	1	360x300	2

The new City Substation would include gas-insulated switchgear buildings that would contain high-voltage components (e.g., circuit breakers and disconnect switches) within two main two- to three-story structures (with maximum height of 30 feet). These features would differ from the existing Martin Substation, which is an outdoor, air-insulated transmission and distribution substation. The 60-foot by 120-foot building for the 230 kV enclosed gas insulated switchgear and the 60-foot by 225-foot structure for the 115 kV enclosed gas insulated switchgear would likely be constructed of concrete or other material and treated architecturally to integrate with surrounding industrial facilities.

The 30-foot-tall structures would be installed on a pile-supported foundation, consisting of approximately 100, 16-inch diameter piles installed up to 80 feet below ground surface.



SOURCE: Google Earth Aerial Imagery

PG&E Asset Acquisition Project

Figure 3
New City Substation (Project Variant) at Daly City Yard

Six transformers would be located outdoors around the gas-insulated structure, separated by firewalls. Two 230 kV transformers (up to 420 *Megavolt Ampere [mVA]*[11] each) and associated oil containment, and four 115 kV transformers (up to 45 mVA each) and associated oil containment, would be located within the boundaries of the new substation. Transformers at the City Substation would step down the voltage (e.g., 230 to 115 kV; 115 to 12 kV) and ultimately connect to the distribution network serving San Francisco. Similar to the transformers installed for the project, the new City Substation transformers would include cooling fans that would operate approximately five hours each day between May 1 and October 31.

The two 230/115 kV transformers would be installed on a pile-supported foundation consisting of approximately 50 16-inch-diameter piles installed up to 80 feet below ground surface. The four 115/12 kV transformers would be installed on a pile-supported foundation consisting of approximately 64 24-inch-diameter piles installed up to 80 feet below ground surface.

New underground transmission lines would be constructed to connect the new substation to the PG&E Martin Substation to maintain interconnection with PG&E and to connect the new substation to the existing distribution system lines in Bayshore Boulevard. Underground 230 kV and 115 kV transmission or distribution lines would be rerouted or constructed to connect the new City Substation to the Martin Substation (incoming lines) and to the existing 230 kV and 115kV transmission lines that serve San Francisco (outgoing lines from the Martin Substation). Under the project variant, the distribution express feeders would originate from the distribution facilities in the City Substation. Both 230 and 115 kV transmission lines from PG&E's Martin Substation would connect directly into the City Substation. Additionally, it would be necessary to perform underground construction work to reroute and reconnect the 12kV distribution feeders that mainly or exclusively serve customers in San Francisco. These would be disconnected from the existing PG&E Martin Substation and reconnected to the City Substation as the source for these distribution lines.

Table 5, **Project Variant Construction Schedule**, presents the proposed schedule for construction of the new City Substation (project variant).

TABLE 5
PROJECT VARIANT CONSTRUCTION SCHEDULE

Construction Activity	Approximate Duration	Year 1 (2026)	Year 2 (2027)	Year 3 (2028)
New City Substation *Instead of Martin Substation Separation* *Two crews of five workers each*	26 months			
All other activities would occur as shown in Table 2, except Martin Substation Separation				

[11] A Megavolt Ampere (mVA) is a unit of measurement of power in an electrical circuit. It is used to quantify the total power in an electrical circuit, considering both the active (real) power and the reactive power.

1.4 Project Variant Construction

Construction tasks using heavy machinery, and other major construction work, would typically occur during daytime hours.[12] It is estimated that the construction of the substation would take approximately 26 months, assuming daytime construction between 7 a.m. and 5 p.m. but could also extend to 8 p.m. Pile driving activities would occur for up to approximately 12 weeks and would only occur during daytime hours.

After completion, the new City Substation would be connected to the existing transmission system at the Martin Substation in a planned stepwise fashion, in which the supply and loads would be transferred using the existing systems' switching capability and capacity. As the current system has built-in redundancies, the existing transmission connections to the Martin Substation would be used to maintain customer power during the stepwise transfer to the new substation. During the connection to the existing transmission system, nighttime construction may be required to stay on schedule with possible planned outages. Tasks such as outage switching, cable splicing, electrical connections, low-voltage wiring, and relay modifications could be completed at night. These tasks would typically use hand tools, various electrical testing and metering devices, and task lighting. Connection of the system would take approximately two to four weeks.

Construction of the project variant would use the same equipment as the project, with the addition of pile drivers for building foundation construction.

1.5 Project Operations

Operation and maintenance of the system would involve routine inspections, meter readings, periodic testing, and as-needed repairs and replacement of existing equipment during regular maintenance cycles in accordance with generally accepted industry standards and manufacturers' recommendations. PG&E's existing operations and the City's current power operations operate 24 hours per day, seven days per week; no changes to operating hours are anticipated. The SFPUC anticipates approximately 400 employees may be hired for administration, operation, and maintenance of the electrical system and would be based at SFPUC offices, operations and maintenance service yards, and the operations control center. Approximately 183 staff would be based at the SFPUC's existing offices at 525 Golden Gate Avenue in San Francisco for approximately eight hours per day. Another 183 staff would be based at the operations and maintenance service yard(s) for approximately eight hours per day. Up to 183 operation and maintenance vehicles would be dispatched from the operations and maintenance service yards each day.[13] Approximately 35 staff would be based at the operations control center, spread across three shifts to cover 24-hour operations. New equipment or operations that could affect ambient noise at sensitive receptors consist of equipment at Martin Substation, equipment and vehicle traffic at the operations control center, equipment at the new City Substation (project variant), and increased vehicle traffic at the operations and maintenance service yard.

[12] Connection of the new City Substation to the electrical system could be delayed until all other construction work is complete.

[13] In some cases more than one staff person would occupy a given vehicle for operations and maintenance tasks, and therefore 183 vehicle trips each day is a conservative estimate.

2. Characteristics of Noise and Vibration

2.1 Noise Principles and Descriptors

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Sound pressure level is measured in decibels (dB), with 0 dB corresponding roughly to the lowest threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.[14] Although the decibel scale, a logarithmic scale, is used to quantify sound intensity, it does not in isolation accurately describe how sound intensity is perceived by human hearing. The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum; therefore, noise measurements are weighted more heavily toward frequencies to which humans are sensitive through a process referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).[15] Frequency A-weighting is typically applied to community noise measurements. All noise levels presented in this report are A-weighted unless otherwise stated.

2.2 Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. Community noise varies continuously over a period of time with respect to the contributing sound sources of the noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, nearby motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to characterize a community noise environment and evaluate cumulative noise effects. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

- L_{eq}: The L_{eq}, or equivalent sound level, is used to describe noise over a specified period of time in terms of a single numerical value; the L_{eq} of a time-varying signal and that of a steady signal are the same if they deliver the same acoustic energy over a given time. The L_{eq} may also be referred to as the average sound level.
- L_{max}: The maximum, instantaneous noise level experienced during a given period of time.
- L_{min}: The minimum, instantaneous noise level experienced during a given period of time.

[14] Randall F. Barron, *Industrial Noise Control and Acoustics* (2003), p. 240.

[15] All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

L_{dn}: Also termed the day-night average noise level (DNL), the L_{dn} is the average A-weighted noise level during a 24-hour day, obtained after an addition of 10 dB to measured noise levels between the hours of 10 p.m. to 7 a.m. to account for greater nighttime noise sensitivity.

CNEL: Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dB to measured noise levels between the hours of 7 p.m. to 10 p.m. and after an addition of 10 dB to noise levels between the hours of 10 p.m. to 7 a.m. to account for greater noise sensitivity in the evening and nighttime, respectively.

Community noise environments are generally perceived to be quiet when the day-night Ldn level is below 45 dBA, moderate in the 45 to 60 dBA range, and loud above 60 dBA. Very noisy urban residential areas are usually around 70 dBA Ldn. Human sound perception, in general, is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. A doubling of actual sound energy is required to result in a 3 dB (i.e., barely noticeable) increase in noise; in practice, this means that the volume of traffic on a roadway, for example, would typically need to double to result in a noticeable increase in noise.[16]

Table 6, **Representative Environmental Noise Levels**, presents representative noise sources and their corresponding noise levels in dBA at varying distances from the noise sources.

2.2.1 Effects of Noise on People

Noise is generally a loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people include subjective effects (e.g., dissatisfaction, annoyance), interference effects (e.g., communication, sleep, and learning interference), physiological effects (e.g., startle response), and physical effects (e.g., hearing loss). With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in controlled laboratory experiments, a change of 1 dB cannot be perceived;
- Outside of the laboratory, a 3 dB change in noise levels is considered to be a barely perceivable difference;
- A change in noise levels of 5 dB is considered to be a readily perceivable difference; and
- A change in noise levels of 10 dB is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. The decibel scale is based on logarithms, and therefore two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dB, the combined sound level would be 53 dB, not 100 dB.

[16] California Department of Transportation, Division of Environmental Analysis, *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (September 2013).

TABLE 6
REPRESENTATIVE ENVIRONMENTAL NOISE LEVELS

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet fly-over at 100 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck going 50 mph at 50 feet		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area during daytime		
Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban area during daytime	50	Dishwasher in next room
Quiet urban area during nighttime	40	Theater, large conference room (background)
Quiet suburban area during nighttime		
	30	Library
Quiet rural area during nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

NOTE: dBA = A-weighted decibel
SOURCE: California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol* (September 2013), p. 2-20.

2.2.2 Attenuation of Noise

Noise attenuates (decreases) with distance. Roadway noise sources tend to be arranged linearly. Therefore, noise from roadway vehicular traffic attenuates at a rate of approximately 3.0 to 4.5 dB per doubling of distance from the source, depending on the intervening surface (paved or vegetated, respectively).[17] Point sources of noise, such as stationary equipment or construction equipment, typically attenuate at a rate of approximately 6.0 to 7.5 dB per doubling of distance from the source.[18] For example, a sound level of 80 dBA at 50 feet from the noise source will be reduced to 74 dBA at 100 feet, 68 dBA at 200 feet, and so on.

[17] Ibid.

[18] The 1.5 dB variation in attenuation rate (6 dB versus 7.5 dB) can result from ground-absorption effects, which occur as sound travels over soft surfaces such as earth or vegetation (7.5 dB attenuation rate) versus hard surfaces such as pavement or hard-packed earth (6 dB rate).

Noise levels can also be attenuated by shielding the noise source or providing a barrier between the source and the receptor. With respect to the transmission of exterior noise to interior environments, noise attenuation effectiveness depends on exterior wall insulation, the window sound transmission class rating, and whether the windows are closed or open. Sound transmission class ratings indicate how well wall, ceiling, floor, door, or window assemblies attenuate airborne sound. It is not, however, a measure of how many decibels a wall can stop. For example, an exterior wall with a sound transmission class 45 rating does not result in a 45 dB reduction in exterior-to-interior sound transmission. Generally, the higher the sound transmission class rating, the more the sound is attenuated.[19]

The age of a structure is not necessarily a reliable predictor of the amount of attenuation the structure can provide. Residential structures have a wide range of noise reduction because of differences in materials, building techniques, and individual building plans. Typical residential buildings reduce noise from outside to inside in the range of 24 to 27 dB (with an average of 25 dB) with windows closed and 12 to 18 dB (with an average of 15 dB) with windows open.[20] Based on the typical residential buildings that exist within San Francisco, an assumption of a 25 dB noise reduction with windows closed and 15 dB noise reduction with windows open is reasonable.[21]

2.2.3 Health Effects of Environmental Noise

The World Health Organization is a recognized source of current knowledge regarding health impacts, including those generated by noise. According to the World Health Organization, one health effect is sleep disturbance, which can occur when continuous indoor noise levels exceed 30 dBA (L_{eq}) or when intermittent interior noise levels reach or exceed 45 dBA (L_{max}), particularly if background noise is low. With a bedroom window slightly open (a reduction from outside to inside of 15 dB), the World Health Organization criteria suggest that acceptable nighttime ambient noise levels should be 45 dBA (L_{eq}) or below, and short-term events should not generate noise in excess of 60 dBA (L_{max}). The World Health Organization also notes that maintaining noise levels within the recommended levels during the first part of the night helps people to fall asleep.[22]

Other potential health effects of noise identified by the World Health Organization include decreased performance on complex cognitive tasks, such as reading, attention, problem solving, and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, or shorter-term exposure to very high noise levels, for example, exposure several times a year to a concert with noise levels at 100 dBA). Noise can also disrupt speech intelligibility at relatively low levels; for example, in a classroom setting, a noise level as low as 35 dBA can disrupt clear understanding. Finally, noise can cause annoyance and can trigger emotional reactions like anger, depression, and anxiety. The World Health Organization reports that during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA, or moderately annoyed by activities with noise levels below 50 dBA.

[19] There is not a straightforward linear relationship between increasing sound transmission class and a reduction in exterior to interior noise because the amount of reduction varies considerably with the frequency range of noise.

[20] Governor's Office of Planning and Research, *State of California 2017 General Plan Guidelines,* Appendix D: Noise Element Guidelines, page 378*,* 2017, *http://opr.ca.gov/docs/OPR_Appendix_D_final.pdf,* accessed May 5, 2020.

[21] Ibid.

[22] World Health Organization, *Guidelines for Community Noise* (April 1999), Chapter 3, p. 46.

Vehicle traffic and continuous sources of machinery and mechanical noise contribute to unhealthy ambient noise levels. Short-term noise sources, such as large vehicle audible warnings, the crashing of material being loaded or unloaded, car doors slamming, and engines revving, contribute very little to 24-hour noise levels but are capable of causing sleep disturbance and annoyance. The effect of noise on receptors depends on both time and context. For example, long-term high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels at night can disturb sleep.

Long-term or permanent hearing loss may result from the cumulative effects of exposure to high noise levels. The potential for hearing loss increases with higher noise levels and lower durations of exposure. For example, hearing loss can occur with exposure to a noise level of 115 dBA for a period of 15 minutes or more.

2.2.4 Noise-Sensitive Receptors

Noise-sensitive receptors are defined as residences, hospitals, convalescent homes, schools,[23] churches, hotels, and motels.[24] Wildlife may also be sensitive to noise, however, because noise sensitivity of wildlife and habitats are species-specific and the project is in an urban area, sensitive wildlife are not included as noise-sensitive receptors for purposes of this analysis.

2.2.5 Fundamentals of Groundborne 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. Several different methods are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe physical vibration effects on buildings. Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors to vibration include structures (especially older masonry structures), people (especially residents, the elderly, and the infirm), and vibration-sensitive equipment.

Vibration decibels (VdB) is the unit used to assess effects of vibrations on people and to distinguish vibration decibels from sound decibels (dB). With the exception of long-term occupational exposure, vibration levels rarely affect human health. Instead, most people consider vibration to be an annoyance that can affect concentration or disturb sleep. People may tolerate infrequent, short-duration vibration levels, but human annoyance to vibration becomes more pronounced if the vibration is continuous or occurs frequently. High levels of vibration can damage fragile buildings or interfere with sensitive 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, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the exception of blasting, vibratory equipment, and pile-driving during construction.

[23] Childcare facilities and preschools are considered school uses for the purposes of assessing impacts to noise-sensitive uses.

[24] State of California Governor's Office of Planning and Research, *General Plan Guidelines* (2017). The city also considers hotels and motels, not included in the *General Plan Guidelines*, to be sensitive receptors.

A vibration velocity level of 75 VdB is considered to be the approximate dividing line between barely perceptible and distinctly perceptible levels for many people.[25]

The operation of heavy construction equipment, particularly pile drivers and other heavy-duty impact devices (such as pavement breakers), creates seismic waves that radiate along the surface of the ground and downward. These surface waves can be felt as ground vibration and result in effects that include annoyance to people and damage to structures. Ground-borne vibration generally attenuates rapidly with distance from the source of the vibration. This attenuation is a complex function of how energy is imparted into the ground as well as the subsurface soil and/or rock conditions through which the vibration is traveling. Variations in geology can result in different vibration levels, with denser soils generally resulting in more rapid attenuation over a given distance. The effects of ground-borne vibration on buildings include rumbling sounds as well as floor movement, window rattling, and items on shelves or hanging on walls shaking. Vibration is also caused by transit vehicles in the subway system and on the surface, including Muni light-rail vehicles and Bay Area Rapid Transit (BART) trains. In general, such vibration is only an issue when there are sensitive receptors located nearby. Because rubber tires and suspension systems reduce vibrations, rubber tire vehicles such as Muni buses, trucks, and automobiles rarely create substantial vibration absent a bump in the road surface.[26]

2.2.6 Vibration-Sensitive Receptors

Receptors that are sensitive to vibration include structures (especially older masonry structures), older utilities, people (especially residents, the elderly, and the sick), and equipment (e.g., magnetic resonance imaging equipment and high-resolution lithographic, optical, and electron microscopes).[27] The primary vibration-sensitive receptors in the project area are structures, which could be susceptible to damage, and people, which could be susceptible to vibration-related annoyance, especially during nighttime hours.

High levels of vibration can damage fragile buildings. Depending on the age and condition of the structure, as well as the type of vibration (transient, continuous, or frequent intermittent), vibration levels with a PPV as low as 0.08 to 0.5 in/sec can damage historic and older buildings.[28]

Regarding the potential effects of ground-borne vibration and noise for people, except for long-term occupational exposure, vibration levels rarely affect human health **Table 7** presents vibration levels that can result in human response.

[25] U.S. Department of Transportation, FTA, *Transit Noise and Vibration Impact Assessment Manual* (September 2018), accessed April 16, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-NO-0123_0.pdf.

[26] U.S. Department of Transportation, FTA, *Transit Noise and Vibration Impact Assessment Manual* (September 2018), p. 116, accessed April 16, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-NO-0123_0.pdf.

[27] Ibid.

[28] California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, Table 19, page 38, April 2020, *https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ env/tcvgm-apr2020-a11y.pdf*, accessed July 30, 2020.

TABLE 7
HUMAN RESPONSE TO DIFFERENT LEVELS OF GROUND-BORNE NOISE AND VIBRATION

Vibration Velocity Level	Groundborne Noise Level		Human Response
	Low Frequency[a]	Mid-Frequency[b]	
65 VdB	25 dBA	40 dBA	Approximate threshold of perception for many humans. Low-frequency sound usually inaudible; mid-frequency sound excessive for quiet sleeping areas.
75 VdB	35 dBA	50 dBA	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level annoying. Low-frequency noise acceptable for sleeping areas; mid-frequency noise annoying in most quiet occupied areas.
85 VdB	45 dBA	60 dBA	Vibration acceptable only with infrequent events. Low-frequency noise annoying for sleeping areas; mid-frequency noise annoying, even for infrequent events at institutional land uses such as schools and churches.

NOTES:

Vibration decibels (VdB) is the unit used to assess effects of vibrations on people and to distinguish vibration decibels from sound decibels (dB).

a. Approximate noise level when vibration spectrum peak is near 30 hertz.
b. Approximate noise level when vibration spectrum peak is near 60 hertz.

SOURCE: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf, accessed September 2, 2020.

3. Environmental Setting

3.1 Existing Sensitive Receptors and Measurement of Ambient Noise Levels

3.1.1 Sensitive Receptors

Sensitive receptors as discussed are locations where existing land uses are relatively sensitive to changes in ambient noise or vibration; specifically, residences, hospitals, convalescent homes, schools, and churches. In addition, planning department staff considers hotels and motels as noise sensitive receptors during nighttime hours. Schools are generally considered noise-sensitive during instruction hours of 7:30 a.m. to 4:00 p.m.

Construction activities, including demolition, excavation, grading, foundation construction, buildout of utilities and other infrastructure generate both noise and vibration that can affect nearby sensitive receptors. Operational noise sources which primarily include operation of mechanical equipment such as transformers and air conditioning equipment, increased vehicle traffic, and vehicle operations in service yards and parking areas could also affect sensitive receptors.

Sensitive receptors near the project site include single and multifamily residential uses along the distribution express feeders alignment and near Martin Substation. Single family residences are located along the entirety of the distribution alignment, some as close as 15 feet. The nearest sensitive receptors to Martin substation are residences across Geneva Avenue located approximately 200 feet north. Additionally, there are residential land uses approximately 80 and 40 feet to the west and south of the Daly City Yard property line, respectively. While there are hundreds of sensitive receptors within

900 feet[29] of the program-level component areas, receptors that are closest to Martin Substation, Daly City Yard, and the distribution express feeders alignment, are identified in **Table 8** below because the proposed locations of these project components are known. The sensitive receptor locations were used to determine noise measurement locations, which are presented in **Figure 4**. Noise measurement data are presented in **Table 9**. Commercial and industrial uses are considered noise sensitive if these uses are exposed to noise levels above 100 dBA.

At this time, specific construction locations associated with the local distribution system separation and the system reinforcements are unknown and, therefore, specific receptor locations cannot be identified. However, it is reasonable to assume, similar to the distribution express feeders alignment, receptors could be located as close as 15 feet from a given infrastructure activity. This is also true of the duct banks and vaults that would be constructed along the distribution express feeders alignment. However, measurement locations within the generalized geographical areas (depicted as polygons) have been identified as conservatively representative of receptors in these areas based on quieter locations away from arterial roadways.

3.1.2 Existing Ambient Noise Levels

To establish existing ambient noise conditions at sensitive receptors, baseline noise measurements were conducted near the sensitive receptor locations. Long-term noise measurements were taken in areas where receptors would be exposed to operational noise and short-term noise measurements are taken in areas where receptors would be exposed to construction noise only. Long-term measurements were collected by Type-2 sound level meters continuously for a period of 48 hours. Long -term noise measurement locations LT-1 through LT-5 were selected to capture the existing ambient conditions at the receptor locations surrounding Martin Substation and Daly City Yard, both of which could operate new transformers or other stationary equipment that could operate 24 hours per day. All long-term noise measurement locations are within Daly City because there are no Brisbane sensitive receptors within 900 feet of Martin Substation, and San Francisco sensitive receptors are farther from potential operations than Daly City sensitive receptors. Noise sources near Martin Substation consist of vehicle traffic on Geneva Avenue, Schwerin Street, and Bayshore Boulevard. Bayshore Boulevard is a major north-south arterial roadway. The following describes the rationale for selection of the long -term noise measurement locations:

- Location LT-1 is intended to capture the existing noise levels at the closest residences to Martin Substation to the north, across Geneva Boulevard.
- Location LT-2 is intended to capture the existing noise levels at the closest residences to the Daly City Yard to the north, across Geneva Boulevard.
- Location LT-3 is intended to capture the existing noise levels at the closest residences and elementary school to the west of the Daly City Yard.
- Location LT-4 is intended to capture the existing noise levels at the closest residences to Martin Substation to the south.
- Location LT-5 is intended to capture the existing noise levels at the closest residences (Midway Village Phase I development) to the Daly City Yard to the south. Due to site access limitations, only a short-term measurement was collected at this location.

[29] This distance was selected because typical construction noise levels can affect a sensitive receptor at a distance of 900 feet if there is a direct line-of-sight between a noise source and a noise receptor (i.e., a piece of equipment generating 85 dBA would attenuate to 60 dBA over a distance of 900 feet).

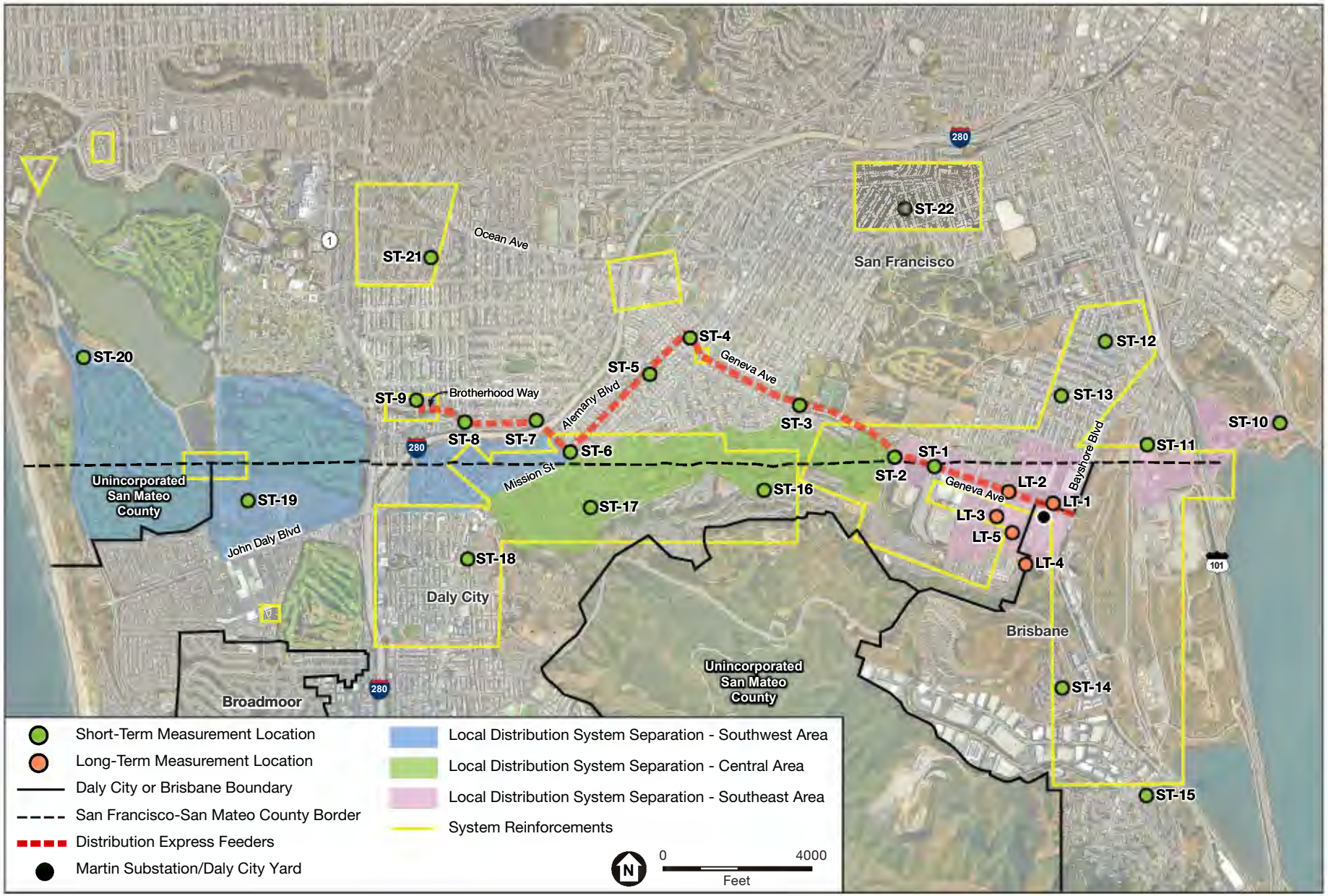
TABLE 8
SENSITIVE RECEPTORS WITHIN 900 FEET OF THE PROJECT SITE COMPONENTS

Type of Sensitive Receptor	Location[a]	Minimum Distance from Project Site Work Area	Representative Measurement Location[c]
Receptors Nearest Martin Substation and Daly City Yard			
Hotel and Motel Uses	3200 block of Geneva Avenue, Daly City	200 feet [b]	LT-1
Single Family Residential	3000 and 3100 block of Geneva Avenue, Daly City	200 feet	LT-1, LT-2
Bayshore Elementary School	155 Oriente Street, Daly City	80 feet	LT-3
Single Family Residential	800 block of Schwerin Street, Daly City	80 feet	LT-3
Midway Village Multi-family Residential	Midway Village on 800 block of Schwerin Street, Daly City	40 feet	LT-5
Single Family Residential	100 block Main Street, Daly City	400 feet	LT-4
Receptors Nearest to Distribution Express Feeders Alignment			
Hotel and Motel Uses	3200 block of Geneva Avenue, Daly City	15 feet	LT-1
Single Family Residential	3000 and 3100 block of Geneva Avenue, Daly City	15 feet	LT-1; LT-2
Single Family Residential	2600 and 2700 block of Geneva Avenue, Daly City	15 feet	LT-1
Single- and multi-family Residential	2200 to 2500 block of Geneva Avenue, Daly City	15 feet	ST-1
Single- and multi-family Residential	800 to 2100 block of Geneva Avenue, San Francisco	15 feet	ST-2; ST-3; ST-4
Single Family Residential	2200 to 2400 block of Alemany Boulevard, San Francisco	15 feet	ST-4; ST-5
Single Family Residential	400 to 900 block Huron Avenue, San Francisco	15 feet	ST-5; ST-6
Single Family Residential	100 block of Sickles Avenue, San Francisco	15 feet	ST-6
Single Family Residential	100 to 200 block of Sagamore Street, San Francisco	15 feet	ST-7; ST-8
Single Family Residential	Termini of Bright, Head, Victoria, and Ramsell Streets, San Francisco	120 feet	ST-9
Single Family Residential	100 block of Arch Street, San Francisco	120 feet	ST-9
Receptors Nearest to Local Distribution System Separation or System Reinforcements Work			
Multi-family Residential	Candlestick Point, San Francisco	15 feet	ST-10
Single Family Residential	Little Hollywood, San Francisco	15 feet	ST-11
Single Family Residential	Harkness Avenue, San Francisco	15 feet	ST-12
Single Family Residential	Visitacion Valley, San Francisco	15 feet	ST-13
Single Family Residential	Mission Blue Neighborhood, Brisbane	15 feet	ST-14
Single Family Residential	Central Brisbane	30 feet	ST-15
Single Family Residential	Southern Hills Neighborhood, Daly City	15 feet	ST-16
Single Family Residential	Crocker Neighborhood, Daly City	15 feet	ST-17
Single Family Residential	Hillside Neighborhood, Daly City	15 feet	ST-18
Single Family Residential	Westlake Neighborhood, Daly City	15 feet	ST-19
Multi-family Residential	John Muir Drive, San Francisco	15 feet	ST-20
Single Family Residential	Urbano Drive, San Francisco	15 feet	ST-21
Single Family Residential	Excelsior Neighborhood, San Francisco	15 feet	ST-22

NOTES:

a. There are no sensitive receptors within areas of unincorporated San Mateo County within 900 feet of project components.
b. For the project variant, this distance is reduced to 20 feet from trenching of transmission line on Geneva Avenue.
c. Refer to Figure 4 for measurement locations. LT – Long-term measurement; ST – Short-term measurement.

SOURCES: ESA, 2023; Google Earth (Imagery Date 9/11/2017) for parcel data (address and distance to the site).



SOURCE: Appendix E; Google Earth Aerial Imagery

PG&E Asset Acquisition Project

Figure 4
Noise Monitoring Locations

TABLE 9
SUMMARY OF LONG- AND SHORT-TERM NOISE MEASUREMENTS IN THE PROJECT SITE VICINITY

	Location	Date and Time Period	Daytime[a] L_{eq} dB	Nighttime[b] L_{eq} dB	CNEL	L_{dn}	Noise Sources
Long Term Measurements (24 hours)							
LT-1	3175 Geneva Avenue, on Talbert Street	2/27/24 24-hour measurement	66	64	69	69	Vehicle and bus traffic on Geneva Avenue
LT-2	2929 Geneva Avenue, on Schwerin Street	2/27/24 24-hour measurement	72	65	72	71	Vehicle and bus traffic on Schwerin Street and Geneva Avenue
LT-3	792 Schwerin Street, on Otilia Street	2/27/24 24-hour measurement	72	65	72	71	Vehicle traffic on Schwerin Street and Otilia Street
LT-4	Across 100 Main Street	5/29/2024 24-hour measurement	63	57	65	64	Vehicle traffic on Main Street
LT-5[c]	Residences to the south of Daly City Yard (Midway Village)	2/26/24 10:09 a.m. to 10:24 a.m.	51	-	-	-	Trucks backing up in Daly City Yard and vehicle traffic on Schwerin Street
Short-Term Measurements (15 minutes)							
ST-1	2201 Geneva Avenue	2/26/24 10:39 a.m. to 10:54 a.m.	68.7	NA	NA	NA	Vehicle and bus traffic on Geneva Avenue and Santos Street, amplified music across Santos Street, and nearby pedestrians talking
ST-2	103 Walbridge Street	2/26/24 11:00 a.m. to 11:15 a.m.	72.3	NA	NA	NA	Vehicle and bus traffic on Geneva Avenue and Carter Street, distant chainsaw used for tree removal
ST-3	600 Prague Street	2/28/24 11:18 a.m. to 11:33 a.m.	68.4	NA	NA	NA	Vehicle and bus traffic on Geneva Avenue and Prague Street, and nearby pedestrians talking
ST-4	820 Geneva Avenue	2/28/24 11:43 a.m. to 11:58 a.m.	69.6	NA	NA	NA	Vehicle and bus traffic on Geneva Avenue and Alemany Boulevard, and nearby pedestrians talking
ST-5	98 Ottawa Avenue	2/28/24 12:03 p.m. to 12:18 p.m.	62.5	NA	NA	NA	Trucks backing up in Daly City Yard and vehicle traffic on Schwerin Street
ST-6	996 Huron Avenue	2/28/24 12:28 p.m. to 12:43 p.m.	65.2	NA	NA	NA	Vehicle and bus traffic on Alemany Boulevard and Ottawa Avenue, and nearby pedestrians talking
ST-7	106 Sagamore Street	3/1/24 9:22 a.m. to 9:38 a.m.	71.1	NA	NA	NA	Vehicle and bus traffic on Sagamore Street and on U.S. 280
ST-8	Orizaba Avenue, on Sagamore Street	3/1/24 9:46 a.m. to 10:01 a.m.	72.4	NA	NA	NA	Vehicle and bus traffic on Sagamore Street and Alemany Boulevard
ST-9	116 Arch Street	3/1/24 10:11 a.m. to 10:26 a.m.	64.4	NA	NA	NA	Distant traffic on Brotherhood Way
ST-10	4010 Crescent Court, on Harney Way	2/26/24 12:47 p.m. to 1:02 a.m.	59.9	NA	NA	NA	Vehicle traffic on Harney Way and distant bird vocalization
ST-11	465 Wheeler Avenue	2/26/24 12:19 p.m. to 12:34 p.m.	65.4	NA	NA	NA	Neighborhood vehicle traffic, street sweeper, and distant bird vocalization
ST-12	353 Harkness Avenue	2/26/24 11:42 a.m. to 12:07 p.m.	57.8	NA	NA	NA	Neighborhood vehicle traffic and nearby pedestrians talking

TABLE 9
SUMMARY OF LONG- AND SHORT-TERM NOISE MEASUREMENTS IN THE PROJECT SITE VICINITY

	Location	Date and Time Period	Daytime[a] L_{eq} dB	Nighttime[b] L_{eq} dB	CNEL	L_{dn}	Noise Sources
ST-13	241 Leland Avenue	2/26/24 11:29 a.m. to 11:45 a.m.	58.4	NA	NA	NA	Neighborhood vehicle traffic and nearby pedestrians talking
ST-14	163 Cliff Swallow Ct	2/26/24 1:23 p.m. to 1:38 p.m.	59.8	NA	NA	NA	Neighborhood vehicle traffic and nearby pedestrians talking
ST-15	30 Mariposa Street	2/26/24 1:48 p.m. to 2:03 p.m.	56.4	NA	NA	NA	Neighborhood vehicle traffic and distant bird vocalization
ST-16	464 S Hill Boulevard	2/28/24 1:15 p.m. to 1:31 p.m.	60.6	NA	NA	NA	Neighborhood vehicle traffic and distant string trimmer
ST-17	500 Bellevue Avenue	2/28/24 12:52 p.m. to 1:07 p.m.	59.5	NA	NA	NA	Neighborhood vehicle traffic and nearby pedestrians talking
ST-18	66 Alp Avenue	3/1/24 1:06 p.m. to 1:22 p.m.	63.3	NA	NA	NA	Vehicle traffic on Hillside Boulevard and Mission Street
ST-19	66 Cliffside Drive	3/1/24 11:57 a.m. to 12:12 p.m.	54.7	NA	NA	NA	Neighborhood vehicle traffic and nearby pedestrians talking
ST-20	615D John Muir Drive	3/1/24 11:22 a.m. to 11:37 a.m.	60.1	NA	NA	NA	Vehicle and bus traffic on John Muir Drive and nearby pedestrians talking
ST-21	701 Urbano Drive, on De Soto Street	3/1/24 10:42 a.m. to 10:58 a.m.	52.1	NA	NA	NA	Neighborhood vehicle traffic and nearby pedestrians talking
ST-22	1750 Silliman Street	2/28/24 9:50 a.m. to 10:05 a.m.	55.8	NA	NA	NA	Neighborhood vehicle traffic and distant bird vocalization

NOTES: NA = data point not applicable to short term measurements. LT = Long Term. ST = Short Term.

a. Daytime hours are 7 a.m. to 10 p.m.
b. Nighttime hours are 10 p.m. to 7 a.m.
c. No access for long-term measurement at LT-5. Short-term data reported.

Short-term noise measurement locations were selected to capture the existing daytime ambient conditions at the receptor locations at regular intervals along the distribution express feeders alignment and within representative areas where local distribution system separation and system reinforcements work would occur. Short-term noise measurement locations are within the Cities of San Francisco, Daly City, and Brisbane. Twenty-two short-term (20-minute) noise measurements were collected to establish daytime noise levels for evaluation of construction noise impacts from construction of the distribution express feeders, local distribution system separation, and system reinforcements. Noise measurement data are presented in Table 9.

3.2 Existing Groundborne Vibration Levels

The only sources of vibration in the project area are from the Muni T-Third Street light-rail and Caltrain operations within and west of Bayshore Boulevard, and BART rail operations in the local distribution system separation area that parallels I-280. Light-rail passenger trains such as the Muni T-Third Street generate a vibration level of 69 VdB (0.01 in/sec PPV) at a distance of 80 feet[30] from the rail centerline. A

[30] U.S. Department of Transportation, FTA, *Transit Noise and Vibration Impact Assessment Manual* (September 2018), p. 137, accessed April 16, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-NO-0123_0.pdf.

vibration velocity level of 75 VdB (0.04 in/sec PPV) is considered to be the approximate transition zone between barely perceptible and distinctly perceptible levels for many people.[31]

3.3 Sensitive Structural Receptors – Vibration

Construction-related vibration could adversely affect adjacent and nearby buildings, particularly historic, older, or masonry structures, which tend to be fragile and thus relatively more susceptible to vibration impacts. Receptors sensitive to vibration include structures, special buildings as defined by the FTA[32] (e.g., concert halls, TV and recording studios, and theaters), people (especially residents, the elderly and the infirm), and equipment (e.g., magnetic resonance imaging equipment, high-resolution lithographic, optical and electron microscopes).[33] An electronic review of hospitals and recording studios within San Francisco, Daly City, and Brisbane revealed that there were no apparent major or research hospitals or recording studios located within 500 feet of project work. The potential for historic structures to exist adjacent to proposed construction areas is likely, given the extensive work areas.

4. Noise and Vibration Effects

This section describes the noise and vibration analysis for the project and project variant. It describes the methods used to determine whether the project or project variant would exceed effects criteria and summarizes recommended reduction measures.

4.1 Methodology

The CEQA Guidelines do not establish quantitative thresholds for the purposes of assessing potential noise and vibration related impacts. The environmental checklist in Appendix G of the CEQA Guidelines suggests that a project's noise impacts be considered with respect to thresholds established in the local general plan or noise ordinance, or applicable standards of other agencies. Specifically, as they relate to noise and vibration, the criteria in the checklist ask whether the project would result in:

- 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.
- Generation of excessive groundborne vibration or groundborne noise levels.
- For a project located within the vicinity of a private airstrip or an airport land use plan area, or, where such a plan has not been adopted, in an area within 2 miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels.

The criteria used in this memorandum for assessing the potential effects from the project or project variant are based on City and County of San Francisco, City of Brisbane, and City of Daly City regulatory

[31] U.S. Department of Transportation, FTA, *Transit Noise and Vibration Impact Assessment Manual* (September 2018), p. 120, accessed April 16, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-NO-0123_0.pdf.

[32] U.S. Department of Transportation, FTA, *Transit Noise and Vibration Impact Assessment Manual* (September 2018), p. 124, accessed April 16, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

[33] U.S. Department of Transportation, FTA, *Transit Noise and Vibration Impact Assessment Manual* (September 2018), p. 124, accessed April 16, 2021, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

guidance and on criteria developed by state and federal agencies for noise and vibration impacts (refer to **Attachment B**, *Noise and Vibration Methods and Criteria Memorandum*).

Groundborne noise refers to noise generated by vibrations from outside a structure but experienced inside the structure. Groundborne noise can be a problem in situations where the primary airborne noise path is blocked, such as in the case of a subway tunnel passing near homes or other noise-sensitive structures. The project or project variant would not include uses that would generate appreciable levels of groundborne noise, therefore, groundborne noise is not discussed further.

The project site is not within the vicinity (i.e., within 2 miles) of a private airstrip or an airport land use plan area. San Francisco International Airport is over 5 miles southeast of the project site.[34] Therefore, the project or project variant would not result in the long-term exposure of people residing or working in the area to excessive airport-related noise levels and this topic is not discussed further.

4.1.1 Construction Noise

Daytime Construction

Construction activities, including demolition, excavation, grading, foundation construction, buildout of utilities infrastructure, street improvements, and building construction, generate both noise and vibration that can affect nearby sensitive receptors (primarily residential uses, churches, and schools). Construction is conservatively estimated to occur in phases over the course of approximately three years although construction could occur later depending on the entitlement process. However, applying the most condensed construction schedule is conservative (i.e., would result in the nosiest conditions) because it assumes the maximum equipment operations and truck hauling in a given phase of construction as well as overlapping of construction phases.

Construction noise levels were estimated using the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM). Attachment B identifies the criteria and analysis methodologies for construction noise, operational noise, and cumulative noise. All jurisdictions for each of the project component's locations are identified, and separate standards and criteria for daytime and nighttime work are also identified. **Table 10** provides a matrix of the noise ordinances applicable to the project. **Table 11** lists the noise and vibration analysis quantitative criteria applied.

The potential for construction activities associated with the Martin Substation separation, distribution express feeders, local distribution system separation, and system reinforcements to overlap for some receptor areas are assessed qualitatively in Section 4.3 Project Analysis.

Nighttime Construction

The nighttime construction analysis considers the potential for nighttime construction activities to result in sleep disturbance at nearby sensitive receptor locations. The potential for sleep disturbance is evaluated based on whether nighttime construction activities would result in indoor noise levels of 45 dBA or more (assuming windows closed) at sensitive receptor locations.[35]

[34] San Francisco International Airport, 2019 Noise Exposure Map (August 13, 2015).

[35] The Noise and Vibration Methods and Criteria Memorandum (Attachment A) assumed that nighttime work would only involve use hand tools, various electrical testing and metering devices, and task lighting and did not establish criteria by which to assess the severity of construction noise during nighttime hours.

TABLE 10
NOISE ORDINANCES APPLICABLE TO THE PROPOSED PROJECT

Jurisdiction	Noise Source	Municipal Code	Requirement Summary
San Francisco	Construction	Police Code Section 2907	Prohibits noise levels greater than 80 dBA at 100 feet from single equipment per the San Francisco noise ordinance. Does not apply to impact equipment provided that such impact tools and equipment have intake and exhaust mufflers and that pavement breakers and jackhammers are equipped with acoustically attenuating shields or shrouds.
	Nighttime Construction	Police Code Section 2908	Prohibits construction work between the hours of 8 p.m. of any day and 7 a.m. of the following day to erect, construct, demolish, excavate for, alter or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA at the nearest property plane, unless a special permit has been applied for and granted.[36]
	Operational Stationary Sources from Industrial or Commercial Land Use	Police Code Section 2909 (b)	Prohibits noise produced by any machine or device, on commercial or industrial property, that results a noise level that exceeds the local ambient by more than 8 dBA at any point outside of the property plane.
	Nighttime Operational Sources	Police Code Section 2909 (d)	Restricts interior noise to 45 dBA between 10 p.m. and 7 a.m. and 55 dBA between 7 a.m. and 10 p.m. These are the absolute maximum allowable level of interior noise produced from any combination of mechanical device(s) under one ownership/use originating from outside the dwelling unit.
Daly City	Construction (Daytime)	No Quantitative Standard	None
	Construction (Nighttime) and Operation	Section 9.22.030	Noise disturbance prohibited between 10 p.m. and 6 a.m.
Brisbane	Construction	Section 8.28.060 Exceptions allowed via Section 8.28.080	Except where work is performed within the right-of-way under an encroachment permit (which is exempt),[37] construction work must meet at least one of the following noise limitations: • No individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet from the source • The noise level at any point outside of the property plane of the project shall not exceed eighty-six (86) dBA

[36] Nighttime construction may be allowed if a special permit therefor has been applied for and granted by the Director of Public Works or the Director of Building Inspection. In granting such special permit the Director of Public Works or the Director of Building Inspection shall consider: if construction noise in the vicinity of the proposed work site would be less objectionable at night than during daytime because of different population levels or different neighboring activities if obstruction and interference with traffic, particularly on streets of major importance, would be less objectionable at night than during daytime; if the kind of work to be performed emits noises at such a low level as to not cause significant disturbance in the vicinity of the work site, if the neighborhood of the proposed work site is primarily residential in character wherein sleep could be disturbed: if great economic hardship would occur if the work were spread over a longer timers if the work will abate or prevent hazard to life or property; y; and if the proposed night work is in the general public interest. The Director of Public Works or the Director of Building Inspection shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise emissions, as required in the public interest

[37] The Public Works Director/City Engineer for the City of Brisbane stated that there are no performance standards or limits applied to construction work performed within the right-of-way under an encroachment permit. Ayers, Julia, Principal Planner, City of Brisbane Community Development Department, e-mail communication to Julie Moore, Principal Environmental Planner at the City of San Francisco Department of Environmental Planning, December 18, 2024.

TABLE 10
NOISE ORDINANCES APPLICABLE TO THE PROPOSED PROJECT

Jurisdiction	Noise Source	Municipal Code	Requirement Summary
	Nighttime Construction	Section 8.28.060 Exceptions allowed via Section 8.28.080	Construction prohibited except for the hours between 7 a.m. and 7 p.m. Monday through Friday, and 9 a.m. to 7 p.m. on weekends and holidays
	Operation	Section 8.28.030. Exceptions allowed via Section 8.28.080.	Prohibits noise produced by any machine or device that results a noise level that exceeds the local ambient by more than 10 dBA for 10 minutes or more in a single-family residential zoning district.
San Mateo County	Construction	Section 4.88.360(e)	No quantitative standards. Construction activities allowed between 7 a.m. and 6 p.m. weekdays and 9 a.m. and 5 p.m. Saturdays.

TABLE 11
NOISE AND VIBRATION ANALYSIS QUANTITATIVE CRITERIA

Topic	Quantitative Criteria Applied
Quantitative Criteria Applied in San Francisco	
Daytime Construction Noise	Noise levels greater than 80 dBA at 100 feet from single equipment per the San Francisco noise ordinance Combined noise levels[a] greater than 90 dBA for residential uses and other noise-sensitive uses and 100 dBA for commercial and industrial land uses, using FTA combined equipment approach Combined noise levels[b] greater than 10 dBA above ambient at residential and other noise-sensitive uses, using FTA combined equipment approach
Nighttime Construction Noise	>45 dBA indoor noise levels at night, per the recommendations of the World Health Organization. [c] San Francisco Police Code section 2908 prohibits nighttime construction (between 8 p.m. and 7 a.m.) that generates noise exceeding the ambient noise level by 5 dBA at the nearest property line unless a special permit has been issued by the City and County of San Francisco.
Construction Roadway Noise	3 dBA or greater increase when sensitive receptors are located in noise-degraded environments 5 dBA or greater increase for commercial/industrial receptors, unless existing noise level exceeds 70 dBA
Operational Stationary Noise	>8 dBA increase at any point outside of the property plane >45 dBA at interior of nearest noise-sensitive receptor at night per San Francisco Noise ordinance >55 dBA at interior of nearest noise-sensitive receptor during day per San Francisco Noise ordinance
Operational Roadway Noise	3 dBA or greater increase when sensitive receptors are located in noise degraded environments 5 dBA or greater increase (commercial/industrial receptors, unless existing noise level exceeds 70 dBA)
Construction Vibration	Building damage criteria per Caltrans criteria presented in Table 12 FTA criteria presented in Table 13
Quantitative Criteria Applied in Daly City and Unincorporated San Mateo County	
All topics	The analysis applies the same quantitative criteria as in San Francisco because Daly City and San Mateo County municipal codes do not include quantitative criteria.

TABLE 11
NOISE AND VIBRATION ANALYSIS QUANTITATIVE CRITERIA

Topic	Quantitative Criteria Applied
Quantitative Criteria Applied in Brisbane	
Construction Noise	Construction noise is allowed during the hours of 7 a.m. to 7 p.m. weekdays as long as construction meets at least one of the following criteria:[d] • No individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 feet from the source thereof. • The noise level at any point outside of the property plane of the project shall not exceed 86 dBA. Combined noise levels[a] greater than 90 dBA for residential uses and other noise-sensitive uses and 100 dBA for commercial and industrial land uses, using FTA combined equipment approach Combined noise levels[a] greater than 10 dBA above ambient at residential and other noise-sensitive uses, using FTA combined equipment approach
Operational Noise	For single-family residential, noise levels shall not be more than 10 dBA above ambient for a cumulative period of more than 10 minutes per hour or more than 20 dBA above ambient for more than 3 minutes per hour. For multi-family residential, noise levels shall not be more than 10 dBA above ambient 3 feet from any wall, floor, or ceiling in any dwelling unit for a cumulative period of more than 10 minutes per hour or more than 20 dBA above ambient for more than 3 minutes per hour. For commercial and industrial uses, noise levels shall not be more than 10 dBA above ambient for a cumulative period of more than 10 minutes per hour or more than 20 dBA above ambient for more than 3 minutes per hour.

NOTES:
a. The analysis calculates noise levels for the two noisiest pieces of equipment expected to be used simultaneously, consistent with the FTA general assessment approach.
b. All receptors referred to in this impact analysis except commercial receptors are considered to be noise sensitive for purposes of this criterion. Existing noise-sensitive receptors within 900 feet of the project components are composed of residences, hotels, motels, and the Bayshore Elementary School, as listed in Table 3.2-4. Commercial and industrial receptors are considered sensitive if they are exposed to noise levels above 100 dBA.
c. This criterion is also consistent with San Francisco's criteria applicable to nighttime noise from operational equipment.
d. Consistent with City of Brisbane practice in planning documents, this analysis focuses on the second criterion.

4.1.2 Construction Roadway Noise

Haul and vendor truck trips would be generated by: construction of the Martin Substation separation; trenching activities for the distribution express feeders, the local distribution system separation, and system reinforcements; and construction of the new City Substation (project variant). The discussion of increased traffic noise focuses on existing alignment locations, existing roadway volumes on roadways (as available) and the potential for an increase in roadway traffic that could lead to a 3 dBA increase in ambient noise. A 3 dBA increase is used as the threshold because the existing noise levels in the urbanized areas of the relevant roadways already exceed the land use compatibility standards for residential uses. For construction truck trips into and out of Martin Substation or Daly City Yard (for the new City Substation) and for the distribution express feeders, the analysis focuses on potential noise along Geneva Avenue, Bayshore Boulevard, Alemany Boulevard, John Daly Boulevard, Lake Merced Boulevard, and Schwerin Street (potential staging area access). For truck trips generated by the local distribution system separation and system reinforcements, operations control center, and operations and maintenance service yards, the analysis focuses on the estimate of hourly truck trips generated and the degree to which their contribution would be equivalent to the existing measured noise levels at representative locations in each area. If the contribution of hourly construction trucks would be equivalent

to the existing measured daytime noise level, then the potential exists for a doubling of sound energy and an increase of 3 dBA.

4.1.3 Groundborne Vibration

Groundborne vibration levels resulting from construction activities at the project site were estimated using data published by Caltrans in its Transportation and Construction Vibration Guidance Manual (2020). Potential vibration levels resulting from project or project variant construction are identified for offsite structures, based on their distance from construction activities. The potential vibration levels at sensitive locations are analyzed against the vibration criteria established by Caltrans to assess whether an exceedance of allowable vibration levels would occur. Vibration propagation is estimated using the equations published by Caltrans which include its recommended equation for when there is no specific information on soil types.[38]

The CEQA Guidelines do not define the levels at which groundborne vibration are considered "excessive." Therefore, with respect to construction-related vibration effects on residential and institutional land uses (e.g., schools, churches, libraries), the vibration criteria for structural damage established in Caltrans' *Transportation and Construction Vibration Guidance Manual* and shown in **Table 12**, **Caltrans Vibration Damage Potential Threshold Criteria**, are used in this analysis with respect to groundborne vibration during construction. With respect to annoyance from construction-related vibration, the analysis considers whether construction-related vibration could result in levels that exceed the FTA criteria for vibration effects on people, using the category 2 criteria (residential) presented in **Table 13**, **Federal Transit Administration General Assessment Criteria for Groundborne Vibration**.

TABLE 12
CALTRANS VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

NOTE:

Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

SOURCE: Caltrans, *Transportation and Construction Vibration Guidance Manual* (April 2020)

[38] The Caltrans-recommended vibration equation is PPVequipment = PPVreference at 25 feet x (25/Distance)^1.1 (Caltrans 2020)

TABLE 13
FEDERAL TRANSIT ADMINISTRATION GENERAL ASSESSMENT CRITERIA FOR GROUNDBORNE VIBRATION

Land Use Category	Impact Levels (VdB; relative to 1 micro-inch per second)		
	Frequent Events[a]	Occasional Events [b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations	65[d]	65[d]	65[d]
Category 2: Residences and buildings where people normally sleep	72	75	80
Category 3: Institutional land uses with primarily daytime use	75	78	83

NOTES:
a. "Frequent events" is defined as more than 70 vibration events from the same source per day.
b. "Occasional events" is defined as 30 to 70 vibration events from the same source per day.
c. "Infrequent events" is defined as fewer than 30 vibration events from the same source per day.
b. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define the acceptable vibration levels.

SOURCE: U.S. Department of Transportation, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

Given the nature of the project or project variant as electrical equipment, any "excessive" groundborne vibration generated would be generated during project construction and would have the potential to affect adjacent structures. Once construction is complete, the project or project variant would not involve the use of heavy machinery that is associated with large commercial or industrial uses. As such, no sources of "excessive" groundborne vibration are anticipated as part of operation of the project or project variant.

4.1.4 Operational Stationary Noise

Stationary Sources Proposed within the City of San Francisco

Stationary equipment within the City of San Francisco would primarily result from a backup diesel generator and heating, ventilation, and air conditioning (HVAC) equipment for the operations control center. Given that there would only be a single generator which would be operated up to 50 hours per year for maintenance purposes, the analysis is qualitative in nature and assumes that maintenance operations will be restricted to daytime hours.

It is assumed that the existing building that would house the operations control center would have existing HVAC equipment. If the existing system were upgraded as part of the project, it would be sized to serve the same square footage of interior space. However, the HVAC specifications are not known at this time and the potential exists for the replacement HVAC system to have increased cooling demand. Therefore, the analysis assumes a rooftop mounted HVAC package associated with industrial land use.

San Francisco Noise Ordinance Section 2909 regulates fixed source noise. Specifically, on public property, Section 2909(b) prohibits noise produced by any machine or device, on commercial or industrial property, a noise level that exceeds the local ambient by more than 8 dBA at any point outside of the property plane.

The standards in Section 2909(d) - 45 dBA between 10:00 p.m. and 7:00 a.m. and 55 dBA between 7:00 a.m. and 10:00 p.m. - are the absolute maximum allowable level of interior noise produced from any combination of mechanical device(s) and audio systems(s) under one ownership/use originating from outside the dwelling unit. The standards in this section may not apply to areas in which the ambient noise

level exceeds the limits. This interior noise standard of 45 dBA is applied to evaluate potential operational nighttime noise impacts to residential land uses and the potential for sleep disturbance.

Stationary Sources Proposed within the City of Daly City

Operational noise generated within the City of Daly City would result from the project variant under which the new City Substation would operate in the Daly City Yard. All receptors within 900 feet of the Daly City Yard are located in the City of Daly City, so receptors in San Francisco are not anticipated to be affected. Because the City of Daly City does not have quantitative operational noise standards, this analysis applies the City of San Francisco's thresholds for assessing operational noise from stationary sources within the City of Daly City.

Stationary Sources Proposed within the City of Brisbane

Operational noise generated within the City of Brisbane would result from the Martin Substation separation. This analysis applies the City of Brisbane standards. The most stringent restriction of the Brisbane municipal code prohibits noise produced by any machine, animal or device or any combination of same, in any commercial or industrial zoning district from generating a noise level more than 10 dBA above the local ambient to any receiver for a cumulative period of more than 10 minutes in any hour (section 8.28.030). This noise criterion is applied in the stationary noise analysis for sources proposed within Brisbane (Martin Substation).

4.1.5 Operational Roadway Noise

Increases in roadway noise levels for selected study roadway segments near the project site are assessed based on trip generation estimated for the project. The roadway segments selected for analysis are expected to be most directly impacted by project-related traffic. For this analysis, these roadway segments include the streets that are nearest to the project site and adjacent to the identified noise-sensitive receptors (e.g., residences near the project site). These streets, when compared to roadways located farther from the project site, would experience the greatest percentage increase in traffic generated by the project or project variant. The noise levels were calculated using the algorithms of the FHWA's Traffic Noise Model.

Caltrans identifies an increase in traffic noise of 3 dBA as barely perceptible and an increase of 5 dBA as clearly perceptible. Therefore, permanent increases in ambient noise levels of 5 dBA or more are considered to be unacceptable. Additionally, it is widely accepted by both FTA and the Federal Interagency Committee on Noise that thresholds should be more stringent for environments that are already noise impacted.[39] Accordingly, a quantitative analysis is used to assess the potential for noticeable (3 dBA) increases in roadside noise levels, assuming existing residential uses along the primary roadway used are outside of the clearly acceptable land use compatibility category of the General Plan. For commercial/industrial receptors, the analysis considers a 5 dBA increase to be noticeable unless the existing noise level exceeds the 70 dBA, clearly acceptable land use compatibility category for such uses, in which case the criterion for increase in roadside near commercial/industrial land uses is 3 dBA.

[39] Caltrans, Technical Noise Supplement to the Traffic Noise Analysis Protocol, September 2013, p. 2-44

4.1.6 Cumulative

Cumulative Construction Noise

Construction activities under the project could potentially coincide with construction activities associated with other cumulative projects which may include but are not limited to Baylands North, Brisbane Baylands Specific Plan, Park Merced and locations of routine infrastructure repair, maintenance, and improvement projects along the San Fracisco-San Mateo County border. Construction activities under the project combined with construction of cumulative projects have the potential to result in a combined increase in construction noise. The potential for projects to overlap, resulting in combined or prolonged increases in ambient noise, are assessed in consideration of a construction noise influence area generally defined as the area 900 feet from a construction site.

Construction of multiple projects consecutively could increase the duration of construction noise levels that would be 10 dBA above the ambient noise level or 90 dBA at sensitive receptors or above standards presented in Table 11. Cumulative construction noise and vibration effects are assessed based on a list-based approach of cumulative projects located within a 900-foot area of the project site and are expected to be under construction at the same time as the proposed project or variant. The operations control center and operations and maintenance service yards, which do not have a specific site identified, were assumed to occur adjacent to one of a list of reasonably foreseeable large construction projects in southeast San Francisco (from draft EIR Table 3.1-3). Cumulative projects that meet these criteria and could affect the same noise-sensitive receptors (those located adjacent to or near the project site or along shared construction haul routes).

Cumulative Operational Roadway Noise Levels

With respect to traffic noise, project traffic contributions are added to the 2050 roadway noise levels estimated for the San Francisco Housing Element 2022 Update EIR which identified significant and unavoidable cumulative traffic noise effects along some roadway segments.

Cumulative Operational Stationary Source Noise

Cumulative operational noise contributions of the project and project variant would primarily result from equipment and operations generated by the operations control center and service yard and stationary noise of the electrical transformers (at Martin Substation or the new City Substation), cooling equipment (both associated with the transformers and HVAC for the operations control center) and generator (for the operations control center). Project contributions to cumulative stationary source noise impacts are assessed qualitatively given that specific contributions of other cumulative projects are not known quantitatively.

4.2 Project Construction Analysis

4.2.1 Construction Noise

Construction Noise Analysis – Daytime

Project or project variant construction would require the use of heavy equipment. During each stage of a given construction phase, there would be a different mix of equipment. Construction activity noise levels at and near the project site would fluctuate depending on the type, number, and duration of use of the various pieces of construction equipment.

Table 14, **Maximum Noise Levels from Construction Equipment**, shows the hourly noise levels (L_{max}) produced by common construction equipment based on a distance of 50 feet between the equipment and noise receptor. It should be noted that L_{max} noise levels associated with the construction equipment would only be generated when equipment is operated at full power. Typically, the operating cycle for construction equipment would involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings. The L_{max} noise levels shown in Table 14 would, therefore, be expected to occur only occasionally throughout the construction day.

TABLE 14
MAXIMUM NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level at 15 Feet (dB, L_{max})	Noise Level at 25 Feet (dB, L_{max})	Noise Level at 50 Feet (dB, L_{max})	Noise Level at 100 Feet (dB, L_{max})
Air Compressor	88	84	78	72
Auger Drill Rig	95	90	84	78
Backhoe	88	84	78	72
Cable Pulling Equipment	96”	91	85	79
Compactor	94	89	83	77
Concrete Saw	100	89	90	84
Crane	91	87	81	75
Dump Truck	87	83	76	70
Excavator	91	87	81	75
Front End Loader	90	85	79	73
Generator	91	87	81	75
Jackhammer	99	95	89	83
Lift/bucket trucks	85	81	75	69
Line Truck (Crane-and Augur-Mounted)	91	87	73	67
Paver	88	83	77	71
Plate Compactor	94	89	76	71
Pile Driver (impact or vibratory)	112	107	101	95
Pump	91	87	81	75
Roller	91	86	80	74
Street Sweeper	92	78	82	76
Tractor	95	90	84	78
Water Wagon (Water Buffalo)	81	76	74	68

SOURCE: Federal Highway Administration, *Roadway Construction Noise Model User’s Guide*,2006.

The criteria used to evaluate daytime construction noise are specified in each subsection below and summarized in Table 10 and Table 11. A conservative estimate of construction noise levels was conducted using the general assessment approach recommended by the FTA and applied for each phase of construction to determine the resultant noise levels for the two noisiest pieces of equipment expected to be used simultaneously.

The estimated noise levels at the offsite sensitive receptors were calculated using the FHWA’s RCNM and were based on the concurrent operation of the two noisiest equipment identified for each phase. The following subsections assess each of the phases of construction and identify the two loudest pieces of equipment. The resultant noise levels (adjusted for utilization and distance) at each sensitive receptor are

also presented in the respective tables and then compared to the relevant criteria for daytime construction from Tables 10 and 11. The tables also identify whether the construction activities would result in a 10 dBA increase over the ambient measured noise levels at sensitive receptors.

Martin Substation Separation

Above- and below-ground components required at Martin Substation for City and PG&E systems to function independently include transformers, circuit breakers, metering devices, one control house with associated equipment, and underground duct banks and vaults. To fully separate at Martin Substation, SFPUC and PG&E would also need independent 115 kV bus sections on the existing transmission bus.[40] Excavations of from 4 to 15 feet in depth would be required for these additional substation elements.

Each of the five transmission line terminal relocations would typically require a new section of underground line in the substation installed in a duct bank. Relocation transmission lines would be expected to be sequential as relocations would be completed as each position becomes accessible. However, some tasks could be completed concurrently (e.g., reconnection work while new foundation pads are curing). Construction of the new control house would involve excavation, pouring concrete for the foundation, placement of the prefabricated structure, trenching, and installation and connection of cables and other utilities to install the pre-engineered/fabricated control house building. Overall, the separation work would be anticipated to occur over 33 months.

Martin Substation is located in Brisbane, but all sensitive receptors within 900 feet of Martin Substation are located within Daly City. During the Martin Substation separation work, offsite sensitive receptors in Daly City would include residences across Geneva Avenue, Mylo Hotel, Geneva Motel, Bridgepoint Inn Daly City, Bayshore Elementary School, residences across Schwerin Street, Midway Village, and residences across Main Street. Of these locations, the nearest sensitive receptor would be residences at 3100 Block of Geneva Avenue at approximately 200 feet from the proposed work in Martin Substation. Additionally, there is a commercial use within 15 feet of the Martin Substation at 2800 Bayshore Boulevard in Brisbane.

The City of Brisbane Municipal Code requires that construction activities meet at least one of two noise standards with respect to construction noise. The first standard prohibits operation of individual pieces of equipment from producing a noise level exceeding 83 dBA at a distance of 25 feet. This standard is equivalent to a noise level of 71 dBA at a distance of 100 feet.

The second City of Brisbane standard with respect to construction noise prohibits the generation of noise exceeding 86 dBA at any point outside of the property plane of the project.

As shown in Table 14, many pieces of standard construction equipment generate a noise level exceeding 83 dBA at a distance of 25 feet. Therefore, compliance of Martin Substation work with Brisbane Municipal Code Section 8.28.060 (A) would require construction noise not to exceed 86 dBA outside the property plane. The following analysis assesses potential construction noise relative to the 86 dBA property plane limitation and addresses whether construction activities would result in an increase in ambient noise levels greater than 10 dBA.

[40] A transmission bus at a substation is a node or common connection where multiple transmission lines and transformers are connected with circuit breakers. For reliability and operational flexibility, there are multiple buses at a substation, which are also segmented into sections that are interconnected with circuit breakers.

As shown in **Table 15**, **Exterior Noise at Offsite Sensitive Uses from Project Construction – Martin Substation**, the estimated construction noise levels generated by project construction activities at Martin Substation would range from 57 to 73 dBA L_{eq} at the nearest sensitive receptors and 77 dBA L_{eq} at the nearest property plane.

Daytime construction noise levels would not exceed 86 dBA outside the property plane and would not exceed the FTA's 90 dBA criterion for daytime construction noise at a residential receptor or 100 dBA at commercial receptors. However, as shown in Table 15, daytime construction noise levels would result in an increase of greater than 10 dBA over existing levels at the Midway Village residences, primarily because the existing ambient noise levels in this area are low. Site excavation activities are expected to occur over a period of approximately 15 weeks, while concrete foundation work is expected to occur over a period of approximately 13 weeks.

Martin Substation Staging

Due to the limited space at Martin Substation, the Daly City Yard would serve as the primary staging/ laydown area for separation work at Martin Substation, which would be the only work associated with the substation occurring in Daly City. No excavation would be required during staging activities, and the area would support storage of construction equipment, material, stockpiles, and employee parking. Prior to any work or staging at the Daly City Yard, existing trailers and other PG&E equipment would need to be relocated. Sensitive receptors in Daly City and San Francisco are present within 900 feet of Daly City Yard. This work would be subject to the Daly City noise ordinance which, as discussed above, has no quantitative limits or restrictions on daytime construction hours.

Table 16, **Exterior Noise at Offsite Sensitive Uses from Project Construction – Staging Activity (Daly City Yard)**, shows that noise levels generated during staging activities would range from 57 to 60 dBA L_{eq} at the nearest sensitive receptor. Construction staging activity noise levels would not exceed the FTA's 90 dBA criteria for daytime construction noise at a residential receptor or 100 dBA at a commercial receptor nor would the noise result in an increase of greater than 10 dBA over existing noise levels at the nearest receptors.

Distribution Express Feeders Construction Noise

Underground construction for the distribution express feeders would generally be completed using a cut-and-cover method (open trenching) within temporarily closed roadway lanes, except at the San Jose Boulevard crossing where a trenchless method, such as jack-and-bore, could be used. Trenchless construction methods require pits at both the launching and receiving ends of the bore. The pit dimensions would be approximately 40 feet long, 20 feet wide and 20 feet deep. These pits would have to be shored with interlocking sheet piles that would likely require use of a vibratory pile driver. Construction of the distribution express feeders would proceed at approximately 40 feet per day. During construction of the distribution express feeders, the nearest sensitive receptors in Daly City would include single- and multi-family residences and hotel and motel uses (Mylo Hotel, Geneva Motel, and Bridgepoint Inn Daly City) on Geneva Avenue; and the nearest sensitive receptors in San Francsico would include single- and multi-family residences on Geneva Avenue, Alemany Boulevard, Huron Avenue, Sickles Avenue, Sagamore Street, and at the termini of Bright, Head, Victoria, Ramsell streets, and on Arch Street. These sensitive receptors could be as close as approximately 15 feet from construction of the distribution express feeders.

TABLE 15
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM PROJECT CONSTRUCTION – MARTIN SUBSTATION

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Existing Measured Daytime Noise Level (dBA Leq)	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA Leq)	Exceed 86 dBA Property Line Standard?	Resultant Noise Level (Existing + Construction) (dBA Leq)	Increase over Existing (dBA Leq)	Exceed Ambient + 10 dBA Standard?
Site Excavation (Including Trenching)								
Northern Property Plane	115	66	Jackhammer/ Concrete Saw	77	No	77	+11	NA
Residences at Midway Village (LT-5)	460	51		65	No	65	+14	**Yes**
Residences at 3100 Block of Geneva Avenue (LT-1)	200	66		73	No	74	+8	No
Residences at 800 Block of Schwerin Street (LT-3)	820	72		60	No	72	<1	No
Residences at 100 Block of Main Street (LT-4)	850	63		61	No	65	+2	No
Concrete Foundations								
Northern Property Plane	115	66	Tractor/ Generator	75	No	76	+10	NA
Residences at Midway Village (LT-5)	460	51		65	No	65	+14	**Yes**
Residences at 3100 Block of Geneva Avenue (LT-1)	200	66		73	No	74	+8	No
Residences at 800 Block of Schwerin Street (LT-3)	820	72		58	No	72	<1	No
Residences at 100 Block of Main Street (LT-4)	850	63		60	No	65	+2	No
Backfill and Grading								
Northern Property Plane	115	66	Tractor/ Generator	75	No	76	+10	NA
Residences at Midway Village (LT-5)	460	51		65	No	65	+14	**Yes**
Residences at 3100 Block of Geneva Avenue (LT-1)	200	66		73	No	74	+8	No
Residences at 800 Block of Schwerin Street (LT-3)	820	72		58	No	72	<1	No
Residences at 100 Block of Main Street (LT-4)	850	63		60	No	65	+2	No
Placement of Facilities								
Northern Property Plane	115	66	Jack Hammer/ Generator	75	No	76	+10	NA
Residences at Midway Village (LT-5)	460	51		64	No	64	+13	**Yes**
Residences at 3100 Block of Geneva Avenue (LT-1)	200	66		72	No	73	+7	No
Residences at 800 Block of Schwerin Street (LT-3)	820	72		59	No	72	<1	No

TABLE 15
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM PROJECT CONSTRUCTION – MARTIN SUBSTATION

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Existing Measured Daytime Noise Level (dBA Leq)	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA Leq)	Exceed 86 dBA Property Line Standard?	Resultant Noise Level (Existing + Construction) (dBA Leq)	Increase over Existing (dBA Leq)	Exceed Ambient + 10 dBA Standard?
Residences at 100 Block of Main Street (LT-4)	850	63		59	No	65	+2	No
Equipment and Gate Installation								
Northern Property Plane	115	66	Jack Hammer/ Tractor	76	No	76	+10	NA
Residences at Midway Village (LT-5)	460	51		63	No	63	+12	**Yes**
Residences at 3100 Block of Geneva Avenue (LT-1)	200	66		70	No	73	+7	No
Residences at 800 Block of Schwerin Street (LT-3)	820	72		60	No	72	<1	No
Residences at 100 Block of Main Street (LT-4)	850	63		57	No	64	+1	No

NOTES:

Bolded values exceed the 10 dBA over ambient criterion during daytime hours.

NA = not applicable, as there are no receptors at the property plane. The property plane is only used to assess compliance with the City of Brisbane's ordinance and not the increase over ambient criterion.

a. The approximate distances are measured from the nearest edge of the construction activity to the nearest sensitive-receptor property line.

TABLE 16
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM PROJECT CONSTRUCTION – STAGING ACTIVITY (DALY CITY YARD)

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Existing Measured Daytime Noise Level (dBA Leq)	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA Leq)	Exceed 90 dBA Daytime Standard?	Resultant Noise Level (Existing + Construction) (dBA Leq)	Increase over Existing (dBA Leq)	Exceed Ambient + 10 dBA Standard?
Staging Activities								
Midway Village (LT-5)	350	51	Loader/Dump Truck	60	No	60	+9	No
Geneva Residences (ST-1)	500	69	Loader/Dump Truck	57	No	69	<1	No

NOTES:

Bolded values exceed the 10 dBA over ambient criterion during daytime hours.

a. The approximate distances are measured from the nearest edge of the construction activity to the nearest sensitive-receptor property line.

Compliance with Standards Contained in Section 2907(a) of the San Francisco Police Code

Section 2907 of the San Francisco Police Code prohibits operation of any powered construction equipment (non-impact), regardless of age or date of acquisition, if the operation of any such equipment emits noise at a level in excess of 80 dBA when measured at a distance of 100 feet from such equipment. As shown in Table 14, the only non-impact construction equipment that would generate noise levels greater than the San Francisco Police Code standards would be concrete saws.

Compliance with FTA Daytime Criterion and Increase Over Ambient Standards

The FTA daytime construction assessment criterion (i.e., 90 dBA 1-hour L_{eq} at the nearest noise-sensitive receptor), is assessed using the noise level resulting from simultaneous operation of the two loudest pieces of equipment. FTA also has a 100 dBA general construction assessment criterion applicable to commercial and industrial land uses. Potential construction noise impacts are assessed for two scenarios. The first scenario evaluates the noise levels near proposed locations of pile driving for trenchless construction pits. The second scenario evaluates the noise levels of standard trenching equipment assuming a worst-case distance of 15 feet.

Scenario 1: Noise from Trenchless Construction Shoring

Table 17, **Exterior Noise at Offsite Sensitive Uses from Pile Driving – Distribution Express Feeders**, shows the estimated construction noise level contributions that would occur at the nearest offsite sensitive uses during pile driving for construction of the distribution express feeders. As shown in Table 17, noise from pile driving would exceed the FTA 90 dBA daytime noise criteria at an assumed worst-case distance of 15 feet. Further, this criterion would be exceeded for any receptor within 85 feet of pile driving activity. With respect to the FTA 100 dBA criterion applicable to commercial uses, this criterion would be exceeded for any receptor within 26 feet of pile driving activity.

Additionally, as shown in Table 17, the increase over ambient noise levels from sheet pile driving would be greater than 30 dBA at 15 feet. Further, the 10 dBA over ambient criterion would be exceeded for receptors in the area within 250 feet of pile driving activity.

Scenario 2: Noise from Standard Trenching Equipment

Table 18, **Exterior Noise at Offsite Sensitive Uses from Project Construction – Standard Trenching – Equipment for Distribution Express Feeders**, shows the estimated construction noise level contributions that would occur at the nearest offsite sensitive uses from standard trenching equipment.

As shown in Table 18, the estimated construction noise levels generated by the project would be up to 96 dBA L_{eq} at the nearest sensitive receptors during concrete cutting activity. Daytime construction noise levels would result in noise levels that would exceed the FTA's 90 dBA criterion for daytime construction noise at residential receptors within 30 feet of trenching. With respect to the FTA 100 dBA criterion applicable to commercial uses, this criterion would not be exceeded at the worst-case distance of 15 feet of trenching. Table 18 also shows noise levels of other standard trenching phases.

Additionally, as shown in Table 18, the increase over ambient noise levels from trenching would be greater than 20 dBA at 15 feet for trench excavation. Further, the 10 dBA over ambient criterion would be exceeded for receptors in the area within 280 feet of trenching. However, the combined duration of concrete cutting and excavation activity at any sensitive receptor along the distribution express feeders would occur for a very limited duration. Noise from backfill and repaving activity would be below FTA 90 dBA criterion but would exceed 10 dBA over ambient noise levels for the nearest receptors.

TABLE 17
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM PROJECT SHEET PILE DRIVING – DISTRIBUTION EXPRESS FEEDERS

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Existing Measured Daytime Noise level (dBA L_{eq})	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA L_{eq})	Exceed 90 dBA Daytime Standard?	Resultant Noise Level (Existing + Construction) (dBA L_{eq})	Increase over Existing (dBA L_{eq})	Exceed Ambient + 10 dBA Standard?
Sagamore Street Residences, S.F. (ST-7)	15	71	Vibratory Pile Driver/Tractor	**104**	**Yes**	**104**	**+33**	**Yes**

NOTES:

Bolded values exceed the 10 dBA over ambient criterion during daytime hours.

a. The approximate distances are measured from the nearest edge of the construction activity to the nearest sensitive-receptor property line.

TABLE 18
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM PROJECT CONSTRUCTION – STANDARD TRENCHING – EQUIPMENT FOR DISTRIBUTION EXPRESS FEEDERS

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Existing Measured Daytime Noise level (dBA L_{eq})	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA L_{eq})	Exceed 90 dBA Daytime Standard?	Resultant Noise Level (Existing + Construction) (dBA L_{eq})	Increase over Existing (dBA L_{eq})	Exceed Ambient + 10 dBA Standard?
Trench Opening Activity								
Geneva Avenue Residences Daly City	15	66 to 68	Concrete Saw/ Jackhammer	96	Yes	96	+28 to +30	**Yes**
Residences Along Feeders Route in San Francisco	15	63 to 71	Concrete Saw/ Jackhammer	96	Yes	96	+25 to +33	Yes
Trench Excavation								
Geneva Avenue Residences Daly City	15	66 to 68	Tractor/ Excavator	92	Yes	92	+24 to +26	**Yes**
Residences Along Feeders Route in San Francisco	15	63 to 71	Tractor/ Excavator	92	Yes	92	+21 to +29	**Yes**
Concrete Pour, Backfill and Repaving								
Geneva Avenue Residences Daly City	15	66 to 68	Excavator/Roller	89	No	89	+21 to +23	**Yes**
Residences Along Feeders Route in San Francisco	15	63 to 71	Excavator/Roller	89	No	89	+ 18 to +26	**Yes**

NOTES:

Bolded values exceed the 10 dBA over ambient criterion during daytime hours.

a. Assumed worst-case distance from the nearest edge of the construction activity to the nearest sensitive-receptor property line.
b. Existing daytime noise levels in San Francisco based on nearest offsite sensitive receptors (measurements LT-1, ST-3, ST-4, ST-5, ST-6, and ST-7).

Local Distribution System Separation Construction Noise

Local distribution system separation activities would involve overhead work that would require bucket trucks, line trucks, and cranes to remove existing poles and install guy wires. Overhead work, including pole installation, would proceed at a rate of approximately 300 feet of overhead line per day. Underground construction would include excavating trenches, severing wires and safely terminating wire segments, installing duct banks or vaults, adding new wire segments or equipment, disconnecting/reconnecting wires, backfilling the trenches, and returning the ground surface to existing grade. Excavations would be completed using a cut-and-cover method (trenching). Trenching would proceed at about 40 feet per day and typically a maximum open trench length of 100 to 400 feet on each city block would occur at any one time. The potential areas within which local distribution system separation work would occur are indicated by the colored polygons in Figure 4.

During construction of the local distribution system separation components, the nearest offsite sensitive receptors in San Francisco would include residences at Candlestick Point, residences at Little Hollywood neighborhood, Visitacion Valley residences, John Muir Drive residences, Ingleside Terraces neighborhood residences, and residences at Excelsior neighborhood. The nearest offsite sensitive receptors in Daly City would include residences at Southern Hills neighborhood, residences at Crocker neighborhood, residences at Hillside neighborhood, residences at Westlake neighborhood.

Table 19, **Exterior Noise at Offsite Sensitive Uses from Project Construction – Local Distribution System Separation or System Reinforcements**, shows the estimated construction noise level contributions that would occur at the nearest offsite sensitive receptors during construction of local distribution system separation components (as well as the system reinforcements discussed in the next section). Noise levels shown are based on equipment for underground work as it would represent the loudest possible activity requiring louder equipment, compared to overhead work.

As shown in Table 19, the estimated construction noise levels generated by the project would be up to 96 dBA L_{eq} for impact equipment. Additionally, trench excavation work would generate noise of up to 92 dBA at the same receptors. Daytime construction noise levels would result in noise levels that would exceed the FTA's 90 dBA criterion for daytime construction noise at a residential receptor. Further, this criterion would be exceeded for any receptor within 30 feet of trench-opening activity. With respect to the FTA 100 dBA criterion applicable to commercial uses, this criterion would not be exceeded at the worst-case distance of 15 feet of trenching.

Additionally, as shown in Table 19, the increase over ambient noise levels from trench excavation would be greater than 40 dBA at times at 15 feet. Further, the 10 dBA over ambient criterion would be exceeded for receptors in the area within 280 feet of trenching.

Noise from backfill and repaving activity would be below FTA 90 dBA criterion but would exceed 10 dBA over ambient noise levels for the nearest receptors.

TABLE 19
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM PROJECT CONSTRUCTION – LOCAL DISTRIBUTION SYSTEM SEPARATION OR SYSTEM REINFORCEMENTS

Representative Sensitive Receptors	Distance to Receptor (feet)[a]	Existing Measured Daytime Noise Level (dBA Leq)	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA Leq)	Exceed 90 dBA Daytime Standard?	Resultant Noise Level (Existing + Construction) (dBA Leq)	Increase over Existing (dBA Leq)	Exceed Ambient + 10 dBA Standard?
Trench Opening Activity								
Residences in San Francisco	15	52 to 68	Concrete Saw/ Jackhammer	96	Yes	96	+28 to +44	**Yes**
Residences in Daly City	15	55 to 72	Concrete Saw/ Jackhammer	96	Yes	96	+24 to +41	**Yes**
Brisbane Residences (ST-14 and ST-15)	15	56 to 60	Concrete Saw Jackhammer	96	Yes	96	+32 to +36	**Yes**
Trench Excavation								
Residences in San Francisco	15	52 to 68	Tractor/ Excavator	92	Yes	92	+24 to +40	**Yes**
Residences in Daly City	15	55 to 72	Tractor/ Excavator	92	Yes	92	+20 to +37	**Yes**
Brisbane Residences (ST-14 and ST-15)	15	56 to 60	Tractor/ Excavator	92	Yes	92	+32 to +36	**Yes**
Concrete Pour, Backfill and Repaving								
Residences in San Francisco	15	52 to 68	Excavator/Roller	89	No	89	+21 to +37	**Yes**
Residences in Daly City	15	55 to 72	Excavator/Roller	89	No	89	+17 to +34	**Yes**
Brisbane Residences (ST-14 and ST-15)	15	56 to 60	Excavator/Roller	89	No	89	+25 to +29	**Yes**

NOTES:

Bolded values exceed the 10 dBA over ambient criterion during daytime hours.

a. The approximate distances are measured from the nearest edge of the construction activity to the nearest sensitive-receptor property line.

System Reinforcements Construction Noise

System reinforcements could be implemented concurrently with local distribution system separation work. Underground construction would be similar to that described for the distribution express feeders and the local distribution system separation work above. Noise levels shown are based on equipment for underground work as it would represent the loudest possible activity (requiring louder equipment), compared to overhead work.

Table 19 shows the estimated construction noise that would occur at the nearest offsite sensitive receptors during construction of system reinforcements. The nearest offsite receptors in San Francisco are Geneva Avenue residences, Alemany Boulevard residences, Huron Avenue residences, Sickles Avenue residences, and Sagamore Street residences. The nearest offsite receptors in Daly City are residences at Southern Hills Neighborhood, residences at Crocker Neighborhood, residences at Hillside Neighborhood, residences at Westlake Neighborhood. The nearest offsite sensitive receptors in Brisbane include residences at Mission Blue Neighborhood, and Central Brisbane residences. While there is a portion of system reinforcements in the southwest area that would occur in unincorporated San Mateo County, land uses in this area consist primarily of the Olympic Club golf course and would not be considered noise-sensitive.

As shown in Table 19, the estimated construction noise levels generated by the project would be up to 96 dBA L_{eq} for impact equipment at the nearest sensitive receptors. Additionally, trench excavation work would generate noise of up to 92 dBA at the nearest sensitive receptors. Daytime construction would result in noise levels that would exceed the FTA's 90 dBA criterion at a residential receptor. Further, this criterion would be exceeded for any receptor within 30 feet of trench-opening activity. With respect to the FTA 100 dBA criterion applicable to commercial uses, this criterion would not be exceeded at the worst-case distance of 15 feet of trenching.

Additionally, as shown in Table 19, the increase over ambient noise levels from trenching would be greater than 40 dBA at 15 feet. Further, the 10 dBA over ambient criterion would be exceeded for receptors in the area within 280 feet of trenching.

Aggregate Noise from Overlapping Construction Elements

The potential exists for construction activities associated with the Martin Substation separation, distribution express feeders, local distribution system separation, and system reinforcements to overlap. Therefore, there may be times when these activities occur near each other and construction crews from separate project components could be active simultaneously. However, (1) the likelihood of such an occurrence would be relatively low because the geographic areas for each of these three project components is extensive and (2) if it were to occur, the duration of overlap within proximity to a given receptor would be relatively short because, as discussed above, the linear nature of construction activities for these elements would limit the duration of exposure. As a result, aggregate noise from overlapping work is not anticipated to result in increases in noise beyond those already disclosed above.

Operations Control Center Construction Noise

While the building selected for the operations control center may require some exterior utility construction work, the majority of work would be interior renovations. Interior renovation work would generally not require off-road construction equipment and noise would be shielded within the buildings' enclosure. Exterior construction would primarily consist of excavation to upgrade utility connections for the building.

This would involve equipment and work durations similar to the standard trenching equipment for the distribution express feeders discussed above. The closest receptors could be immediately adjacent (15 feet away) or across the street (approximately 60 feet). At these distances the highest construction noise levels for trenching work (associated with excavation) could be 96 or 84 dBA, respectively. Consequently, construction noise associated with the operations control center exterior work would likely not exceed FTA criteria but could, occasionally, exceed 10 dBA over the existing ambient noise level, depending on location.

Modifications to Retain PG&E Access at Potrero Substation

The City would acquire the electrical equipment at Martin and Potrero Substations, and would make site modifications, such as fencing and driveway additions or improvements, where necessary to allow PG&E continued access to its non-electrical facilities. Fencing and other access modifications at the Martin Substation would be included in the Martin Substation work discussed above. The two loudest equipment would be a crane and jack hammer. Receptors would be 300 feet or farther away from the Potrero Substation site. At this distance the noise levels from construction equipment would be 67 dBA, which is similar to existing ambient noise levels in the area.[41]

New City Substation (Project Variant) Construction

Pile driving would be required for construction of the project variant during site excavation which is estimated to occur over a 15-week period. **Table 20**, **Exterior Noise At Offsite Sensitive Uses From Construction – New City Substation (Project Variant)**, shows the noise levels that would be generated during the five primary phases of construction for the substation as well as the estimated duration of each phase. As shown in Table 20, the estimated construction noise levels generated by the project variant would range from 70 to 82 dBA L_{eq} at the nearest sensitive receptor. Construction noise levels would not exceed the FTA's 90 dBA criteria for daytime construction noise at a residential receptor or 100 dBA at a commercial receptor but would result in an increase of greater than 10 dBA over existing noise levels at the nearest receptors for all construction phases.

Construction Noise Analysis - Nighttime

Night work may be required at Martin Substation to stay on schedule. Tasks such as outage switching, cable splicing, electrical connections, low voltage wiring, and relay modifications could be completed at night to help stay on schedule. These tasks would typically use hand tools, various electrical testing and metering devices, and task lighting. These tools and meters are not noise intensive. These tasks may be completed at night without substantial disturbance to the public. Construction tasks using heavy machinery, pile driving, and other major construction work would occur only during normal day time hours. Night work is not anticipated for any other project components.

However, for the jack-and-bore launching and receiving pits across San Jose Avenue as part of the work for the distribution express feeders, there could be dewatering of excavated areas that would require the operation of pumps to ensure that work areas are dry. Pumps would be powered by generators that would result in nighttime noise levels of up to 88 dBA Leq at a worst-case distance of 15 feet, assuming a standard generator. This noise level would result in an interior noise level of 77 dBA, assuming a 15 dBA exterior to interior noise reduction attributable to standard building construction materials and windows open. This would exceed the 45 dBA interior noise level standard for residential uses.

[41] San Francisco Planning Department, Potrero Power Station Mixed-Use Development Project Draft Environmental Impact Report, October 2018, p. 4.F-8.

TABLE 20
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM CONSTRUCTION – NEW CITY SUBSTATION (PROJECT VARIANT)

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Duration (weeks)	Existing Measured Daytime Noise Level (dBA Leq)	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA Leq)	Exceed 90 dBA Daytime Standard?	Resultant Noise Level (Existing + Construction) (dBA Leq)	Increase over Existing (dBA Leq)	Exceed Ambient + 10 dBA Standard?
Site Excavation & Preparation									
Midway Village (LT-5)	200	15	51	Tractor/ Pile Driver	82	No	82	+31	**Yes**
Bayshore Elementary School (LT-3)	300	15	72	Tractor/ Pile Driver	79	No	80	+8	No
Concrete Foundations									
Midway Village (LT-5)	200	13	51	Tractor/ Generator	70	No	70	+19	**Yes**
Bayshore Elementary School (LT-3)	300	13	72	Tractor/ Generator	66	No	73	+1	No
Backfill and Grading									
Midway Village (LT-5)	200	4	51	Tractor/ Generator	70	No	70	+19	**Yes**
Bayshore Elementary School (LT-3)	300	4	72	Tractor/ Generator	66	No	73	+1	No
Placement of Facilities									
Midway Village (LT-5)	200	1	51	Jackhammer/ Generator	71	No	71	+20	**Yes**
Bayshore Elementary School (LT-3)	300	1	72	Jackhammer/ Generator	68	No	74	+2	No
Electrical Equipment/Gate Install									
Midway Village (LT-5)	200	30	51	Tractor/ Generator	70	No	70	+19	**Yes**
Bayshore Elementary School (LT-3)	300	30	72	Tractor/ Generator	66	No	73	+1	No

TABLE 20
EXTERIOR NOISE AT OFFSITE SENSITIVE USES FROM CONSTRUCTION – NEW CITY SUBSTATION (PROJECT VARIANT)

Nearest Offsite Sensitive Receptor	Distance to Receptor (feet)[a]	Duration (weeks)	Existing Measured Daytime Noise Level (dBA Leq)	Loudest Two Noise Sources	Estimated Construction Noise Level (dBA Leq)	Exceed 90 dBA Daytime Standard?	Resultant Noise Level (Existing + Construction) (dBA Leq)	Increase over Existing (dBA Leq)	Exceed Ambient + 10 dBA Standard?
Trench Opening									
Geneva Avenue (LT-2)[b]	80	1	72	Concrete Saw/ Jackhammer	81	No	82	+10	No
Trench Excavation									
Geneva Avenue (LT-2)[b]	80	4	72	Tractor/ Excavator	78	No	79	+7	No

NOTES:

Bolded values exceed the 10 dBA over ambient criterion during daytime hours.

a. The approximate distances are measured from the nearest edge of the construction activity to the nearest sensitive-receptor property line.
b. 2929 Geneva Avenue, across Schwerin Street from the Daly City Yard (new City Substation location).

4.2.2 Construction Roadway Noise

Haul and vendor truck trips would be generated by construction activities at Martin Substation; by trenching activities for the distribution express feeders, the local distribution system separation, and system reinforcements; and during construction of the new City Substation (project variant). Hourly truck trip increments have been calculated based on the volumes provided by SFPUC.

Table 21, **Construction Truck Trip Assumptions for the Project**, shows the number of daily truck trips associated with each of the project construction activities. As shown in the table, the number of average daily truck trips associated with all project components except the distribution express feeders and new City Substation (project variant) would be 16 or fewer daily one-way trips which, when spread across a workday, would not meaningfully increase noise levels on local roadways (two truck trips per hour or less). Consequently, only truck trips associated with the distribution express feeders and new City Substation (project variant), which would be higher than 16 daily one-way trips, are quantitatively assessed in this analysis which is described and analyzed below.

TABLE 21
CONSTRUCTION TRUCK TRIP ASSUMPTIONS FOR THE PROJECT

Construction Activity[a]	Total Estimated Truck Trips and Average Daily Trips (One-way)[a,b]	Estimated Workers (Daily)	Estimated Construction Duration
Martin Substation Separation	Total: 2,960 Maximum Daily Average: 12	10 *2 crews*	33 months *20 feet/day, trenching*
Distribution Express Feeders	Total: 10,440 Maximum Daily Average: 40	12 *2 crews*	12 months *40 feet/day/ crew*
Local Distribution System Separation	Total: 1,560 Maximum Daily Average: 4	12 *2 crews*	24 months *40 feet/day/ crew, trenching*
System Reinforcements	Total: 6,590 Maximum Daily Average: 12	10 *2 crews*	28 months *40 feet/day/ crew, trenching*
Operations Control Center	Total: 800 Maximum Daily Average: 16	20 *4 crews*	14 months (<2 months for the exterior work)
Modifications to Retain PG&E Access to Non-Electrical Facilities	Total: 115 Maximum Daily Average: 6	6 *2 crews*	1 month
Operations and Maintenance Service Yards; Materials and Equipment Storage	Total: 160 Maximum Daily Average: 4	6 *2 crews*	2 months
New City Substation (Project Variant)	Total: 12,980 Maximum Daily Average: 54	10 *2 crews*	26 months *20 feet/day, trenching*

NOTES:

a. Telecommunications equipment construction would not require additional ground disturbance beyond that already identified for other project components.
b. Assumes 18 cubic yards per load for soil export, 8 cubic yards per load for soil import and concrete deliveries, 8,000 feet of cable per truck for cable deliveries, 1 vault per truck for vault deliveries, and 8 cubic yards of material for other deliveries. Concrete deliveries for trenches assume up to 75 percent of the trench would be filled by concrete. Total import volume for vaults assumes the total excavation dimensions would be filled, although portions of the excavation would be replaced by vaults themselves. For duct banks, truck trips associated with cables and conduits assume 12 cables (3 in each conduit in 4 conduits) and 7 conduits.

SOURCE: SFPUC

The potential exists for simultaneous construction work on the Martin Substation separation or the new City Substation (project variant), the distribution express feeders, the local distribution system separation and system reinforcements in the same general area of southern San Francisco and contribute truck and worker traffic to the designated construction truck haul routes. Consequently, an aggregate analysis of all truck and worker trips along the designated haul routes was conducted.[42]

In areas along the border west of the Martin Substation, the conservative estimate of construction work for the distribution express feeders, local distribution system separation, and system reinforcements is estimated to generate 56 daily one-way truck trips and 34 daily one-way worker trips. Distributing these trips over the assumed 10-hour workday results in 5.6 truck trips and 3.4 worker trips per hour. Noise measurements conducted along the distribution express feeders alignment (ST-1 through ST-9) indicate that the lowest noise levels occur along Alemany Boulevard at ST-5 with a recorded value of 63 dBA, which is a roadway that would be affected by the project's construction noise. Approximately 5.6 additional hourly heavy-duty trucks and 3.4 worker vehicles per hour would contribute an additional 50 dBA to this roadway (see Attachment C.2), resulting in an increase of 0.3 dBA to the hourly noise level which would be a less than 3 dBA increase. All other roadways have greater existing ambient noise levels and would experience an even smaller increase in noise.

Construction work for the new City Substation (project variant), distribution express feeders, local distribution system separation, and system reinforcement is estimated to generate 110 daily one-way truck trips and 44 worker daily one-way worker trips. Distributing these trips over the assumed 10-hour workday results in approximately 11 truck trips and 4.4 worker trips per hour. Existing noise on Geneva Avenue near the proposed construction access to the new City Substation was measured as 72 dBA. The approximately 11 additional hourly heavy-duty trucks and 4.4 worker vehicles would contribute an additional 53 dBA to this roadway (see Attachment C.2), resulting in an increase of 0.5 dBA to the hourly noise level which would be a less than 3 dBA increase.

Average daily construction trips for each of these project components were allocated to the designated haul routes and the resulting noise level contributions added to the existing measured or modeled levels along these roadways to assess whether noise levels would increase by 3 dBA or more. **Table 22**, **Roadway Noise Levels with Project Construction Truck and Worker Traffic in the Project Vicinity**, presents the result of this modeling. All roadways are predicted to experience an increase of less than 1 dBA.

[42] Estimated construction traffic associated with the new City Substation (project variant) is higher than traffic for the Martin Substation separation; for this reason, the analysis uses construction traffic associated with the new City Substation (project variant) for work in the vicinity of Martin Substation.

TABLE 22
ROADWAY NOISE LEVELS WITH PROJECT CONSTRUCTION TRUCK AND WORKER TRAFFIC IN THE PROJECT VICINITY

Roadway Segment[a,b]	Existing (dBA, Leq)	Applicable Standard	Existing + Project (dBA, Leq)	Difference between Existing + Project and Existing (dBA)	Exceed 3 dBA Standard?
Bayshore Boulevard from Geneva Avenue to Guadalupe Canyon Parkway	80[c]	3 dBA or greater increase	80.0	0.02	No
Bayshore Boulevard from Geneva Avenue to Arleta Avenue	80[c]	3 dBA or greater increase	80.0	0.01	No
Bayshore Boulevard from Arleta Avenue to Blanken Avenue	80[c]	3 dBA or greater increase	80.0	0.01	No
Bayshore Boulevard from Blanken Avenue to Hester Avenue	80[c]	3 dBA or greater increase	80.0	0.01	No
Geneva Avenue from Bayshore Boulevard to Schwerin Street	72	3 dBA or greater increase	72.0	0.03	No
Bayshore Boulevard from Geneva Avenue to Guadalupe Canyon Parkway[d]	80[c]	3 dBA or greater increase	80.0	0.04	No
Bayshore Boulevard from Geneva Avenue to Arleta Avenue[d]	80[c]	3 dBA or greater increase	80.0	0.01	No
Bayshore Boulevard from Arleta Avenue to Blanken Avenue[d]	80[c]	3 dBA or greater increase	80.0	0.01	No
Bayshore Boulevard from Blanken Avenue to Hester Avenue[d]	80[c]	3 dBA or greater increase	80.0	0.01	No
Geneva Avenue from Bayshore Boulevard to Schwerin Street[d]	72	3 dBA or greater increase	72.1	0.05	No
Geneva Avenue from Schwerin Street to Cow Palace	72	3 dBA or greater increase	72.0	0.03	No
Geneva Avenue from Cow Palace to Carter Street	72	3 dBA or greater increase	70.0	0.03	No
Geneva Avenue from Carter Street to Prague Street	68	3 dBA or greater increase	68.1	0.07	No
Geneva Avenue from Prague Street to Alemany Street	70	3 dBA or greater increase	70.0	0.03	No
Alemany Boulevard from Geneva Avenue to Ottawa Avenue	63	3 dBA or greater increase	63.2	0.22	No
Alemany Boulevard from Ottawa Avenue to Sickles Avenue	71	3 dBA or greater increase	71.0	0.04	No
Alemany Boulevard from Sickles Avenue to Sagamore Street	71	3 dBA or greater increase	71.0	0.04	No
Alemany Boulevard from Sagamore Street to St Charles Avenue	72	3 dBA or greater increase	72.0	0.03	No
Alemany Boulevard from St Charles Avenue to Junipero Serra Boulevard	80[c]	3 dBA or greater increase	80.0	<0.01	No
John Muir Drive from Lakewood Apartments Driveway to Lake Merced Boulevard	60	3 dBA or greater increase	60.5	0.53	No
Lake Merced Boulevard from Brotherhood Way to Lake Merced Boulevard	70[c]	3 dBA or greater increase	70.1	0.06	No
Lake Merced Boulevard from John Muir Drive to John Daly Boulevard	70[c]	3 dBA or greater increase	70.0	0.03	No

TABLE 22
ROADWAY NOISE LEVELS WITH PROJECT CONSTRUCTION TRUCK AND WORKER TRAFFIC IN THE PROJECT VICINITY

Roadway Segment[a,b]	Existing (dBA, Leq)	Applicable Standard	Existing + Project (dBA, Leq)	Difference between Existing + Project and Existing (dBA)	Exceed 3 dBA Standard?
John Daly Boulevard from Lake Merced Boulevard to Junipero Serra Freeway	75[c]	3 dBA or greater increase	75.0	0.01	No
Geneva Avenue from Alemany Boulevard to San Jose Avenue	70	3 dBA or greater increase	70.0	0.03	No
Geneva Avenue from San Jose Avenue to Junipero Serra Freeway	80[c]	3 dBA or greater increase	80.0	<0.01	No

NOTES:

a. Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the algorithms of the Federal Highway Administration Traffic Noise Prediction Model.
b. Roadway segments on Bayshore Boulevard and Geneva Avenue from Bayshore Boulevard to Schwerin Street include truck trips and worker trips from construction phases for the Martin Substation separation, distribution express feeders, local distribution system separation, and system reinforcements, all other roadway segments include truck trips associated with distribution express feeders, local distribution system separation, and system reinforcements.
c. Modeled Traffic Noise Levels Under 2020 Conditions from the San Francisco Housing Element EIR to represent existing noise level data of roadway segment.
d. New City Substation (Project Variant).

SOURCE: ESA 2024

4.2.3 Groundborne Vibration

Martin Substation Separation

The various PPV levels for the types of construction equipment that would operate during project construction are identified in **Table 23**, **Vibration Levels for Construction Equipment at Martin Substation**. This table presents the reference vibration level at a distance of 25 feet as published by FTA as well as the estimated distances at the closest onsite and offsite structures near the Martin Substation separation site. Vibratory rollers used by SFPUC are smaller than those used for large-scale (i.e., freeway or airport runway paving) compacting activities which are published by FTA. SFPUC uses 12-ton or smaller rollers to perform vibratory compaction in urban streets. Based on a study of documented vibration from a 12-ton roller[43], ESA has calculated a conservative estimate of the maximum vibration levels (see Attachment C Supporting Materials for Noise Analysis). These calculations indicate that a 12-ton roller has been demonstrated to result in a maximum vibration level of 0.433 PPV at 4.6 feet. This source data has been used to calculate the values in Table 23 below.

As shown in Table 23, the maximum vibration level at offsite structures would be below the most stringent criteria of 0.25 PPV for historic structures. There are two on-site historic structures, one within the Martin Substation yard (Martin Substation building) and one within the Daly City Yard (Martin Substation warehouse). Under the project, construction work at Martin Substation could occur adjacent to the Martin Substation building. Only when a vibratory roller is required for this work would there be the potential for such equipment to result in building damage at the closest vibration sensitive (historic) buildings. Specifically, vibration levels could exceed 0.25 PPV during operation of vibratory rollers within 8 feet of the Martin Substation building.

[43] Nedoma, et.al., Alternative Approaches to Measurement of Ground Vibrations Due to the Vibratory Roller: A Pilot Study. December 9, 2019. Available online at: https://pmc.ncbi.nlm.nih.gov/articles/PMC6960872/

TABLE 23
VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT AT MARTIN SUBSTATION

Equipment	Estimated Peak Particle Velocity (inches per second)				
	At 8 Feet (Martin Substation Building)	At 25 Feet (FTA reference level)	At 60 Feet	At 200 Feet (Geneva Residences)	At 500 Feet (Midway Village/Martin Substation Warehouse)
Jackhammer	0.123	0.035	0.013	0.004	0.001
Vibratory roller (12 ton)	0.249	0.067	0.026	0.007	0.002

SOURCES: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual* (September 2020); Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual* (2018); Nedoma et.al., 2019.

With respect to non-historic structures, the vibration building damage criterion for modern industrial or commercial buildings is 0.5 PPV while the building damage criterion for older residential structures is 0.3 PPV. The nearest residential structures to the Martin Substation would be across Geneva Avenue, 200 feet away. At this distance vibration from vibratory rollers would be reduced to 0.007 PPV, below the applicable criterion. The non-historic industrial/commercial building criterion would be exceeded if vibratory rollers were to be operated within 4 feet of a structure, but there are no such structures within this distance within the Martin Substation site work areas.

Distribution Express Feeders, Local Distribution System Separation, and System Reinforcements

The distribution express feeders would include sheet pile driving (vibratory pile driver) for jack-and-bore pits, use of compaction equipment (vibratory rollers), and jackhammers. These construction activities have the potential to generate low levels of groundborne vibration. As such, existing structures located within 60 feet[44] of the distribution express feeders, local distribution system separation, or system reinforcements could be exposed to some degree of groundborne vibration related to construction activities. **Table 24**, **Vibration Levels for Construction Equipment – Linear Trenching**, shows levels of vibration generated by proposed equipment for the distribution express feeders and for the underground work associated with the local distribution system separation and system reinforcements.

With respect to pile driving for the jack-and-bore pits, pit locations closer than 60 feet to historic structures have the potential to exceed the most stringent 0.25 PPV criterion for historic structures, pit locations 50 feet or closer would have the potential to exceed the 0.30 PPV criterion for older residential structures and pit locations closer than 32 feet would have the potential to exceed the 0.50 PPV criterion for modern industrial/commercial buildings.

With respect to all other construction activities for the distribution express feeders, local distribution system separation and system reinforcements, structures located closer than 8 feet from construction of underground lines would be of concern with respect to potential building damage from construction-related vibration, due to the potential for vibratory rollers to exceed the 0.25 PPV criterion for historic structures. Therefore, operation of vibratory rollers within 4 feet of modern structures and within 8 feet of

[44] At a distance of 60 feet, vibration from construction equipment associated with the maximum vibration potential (pile driving) would be attenuated to below the impact criterion established for building damage to historic structures (0.25PPV).

historic structures, or pile driving activity within 60 feet of historic structures, could result in building damage at the closest vibration sensitive buildings.

TABLE 24
VIBRATION LEVELS FOR CONSTRUCTION EQUIPMENT – LINEAR TRENCHING

Equipment	Estimated Peak Particle Velocity (inches per second)				
	At 8 Feet (Residential streets in Brisbane, Daly City, and San Francisco)	At 25 Feet (FTA reference level)	At 32 Feet	At 50 Feet	At 60 Feet
Jackhammer	0.123	0.035	0.027	0.016	0.013
Vibratory roller (12-ton)	0.249	0.067	0.051	0.031	0.026
Pile driver (vibratory)	2.28	0.644	0.495	0.303	0.246

SOURCES: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual* (September 2020); Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual* (2018); Nedoma et.al., 2019

Vibration may also affect underground structures and gas pipelines. In the absence of a city-adopted significance criterion for groundborne vibration affecting utilities, the city is relying on the criteria recommended by the American Association of State Highway and Transportation Officials for underground optical-fiber cables, which is 4.0 PPV. Underground or restrained concrete structures can withstand vibration of 10.0 PPV before the appearance of threshold cracks (AASHTO 2004). For pile driving to exceed these criteria, pile driving activities would have to occur within 5 and 2.5 feet, respectively, of the utilities. A review PG&E's existing underground gas pipeline maps[45] indicates that the nearest pipeline to the jack-and bore locations is at Alemany Boulevard and Sickles Avenue south of I-280, over 200 feet away from the pipeline. Therefore, this topic is not evaluated quantitatively.

Additionally, construction-period vibration can adversely affect the operations of vibration-sensitive equipment (e.g., magnetic resonance imaging equipment; high-resolution lithographic, optical and electron microscopes). Neither the site reconnaissance conducted by field technicians during noise measurement activities nor a review of satellite imagery in Google Earth revealed the presence of hospitals, research laboratories, or recording studios within 500 feet[46] of the project boundary. Thus, vibration impacts to vibration-sensitive equipment are not evaluated quantitatively in this memorandum.

Operations Control Center Construction Vibration

While the building selected for the operations control center may require some degree of exterior utility construction work, the vast majority work would be interior renovations. Interior renovation work would generally not require off-road construction equipment. However, closure of utility trenches may use vibratory compaction. Vibration levels could exceed 0.25 PPV if operation of vibratory rollers were to be used within 8 feet of an historic structure.

[45] https://www.pge.com/en/about/pge-systems/gas-systems.html#tabs-fc6b80548f-item-727cbee02b-tab

[46] At a distance of 500 feet, vibrations generated by a pile driver would be attenuated to below the threshold for impacts to vibration-sensitive equipment of 65 VdB or 0.14 PPV.

New City Substation (Project Variant)

Site preparation for the new City Substation at Daly City Yard includes pile driving. Other construction activities would likely include the use of compaction equipment (vibratory rollers), jackhammers, and loaded haul trucks. These construction activities have the potential to generate low levels of groundborne vibration. With respect to pile driving, the nearest off-site structures would be 200 feet away south of the project site (at Midway Village) and sufficiently distant to avoid potential structural impacts. Two onsite structures are present within the Daly City Yard, the closest of which is a modern industrial/commercial building approximately 70 feet from the substation footprint. At this distance, vibrations from pile driving would be reduced to 0.21 PPV and therefore below all vibration criteria. Vibration at the Martin Substation warehouse would be less than 0.21 PPV because the building is approximately 200 feet from the new City Substation (project variant) location.

Trenching work along Geneva Avenue associated with the outgoing distribution connection to Bayshore Boulevard would occur within approximately 40 feet of the Martin Substation building in Martin Substation, or as close as 15 feet from the nearest structures on Geneva Avenue. Use of a vibratory roller would be required during paving activities. As shown in Table 24, at 40 feet vibration levels would be below 0.25 PPV, which is the criterion applicable to historic structures. Trenching activities for the outgoing distribution and transmission lines from the new City Substation to the existing distribution and transmission system would be approximately 15 feet from the nearest structures across Geneva Avenue. Use of 12-ton vibratory rollers for trenching within 8 feet of buildings could exceed 0.25 in/sec PPV. Trenching activities for the incoming transmission lines from Martin Substation to the new City Substation would be more than 80 feet from the nearest buildings on Geneva Avenue and use of 12-ton vibratory rollers would not exceed 0.25 in/sec PPV at the buildings.

4.3 Project Operational Analysis

4.3.1 Operational Noise

Martin Substation Separation

Proposed above-ground project components at Martin Substation include a control house, line relocations, six sets of new meters, and two new transformers and one relocated transformer. Underground equipment housing structures, such as duct banks and vaults, would not result in operational noise because the ground attenuates sound. Of the proposed equipment, the two new transformers would be new sources that would emit noise during operation. Transformer noise consists of two components: a pure-tone or "hum" noise and noise from cooling fans.[47] Appendix D to the state of California General Plan Guidelines[48] contains a table of recommended adjustments to standards for land use noise compatibility. For noisy urban residential communities near relatively busy roads or industrial areas, such as Geneva Avenue, a 5 dBA accommodation is recommended, while for sources with a "pure tone character," a 5 dBA penalty is recommended. Because these two conditions cancel out each adjustment, no adjustment is warranted to determine compliance with the relevant noise criteria. Based on the type of transformers

[47] The cooling fans typically would only operate under emergency conditions (e.g., if the system overheats).

[48] Governor's Office of Planning and Research, *State of California 2017 General Plan Guidelines, Appendix D: Noise Element Guidelines, Page 375,* 2017. This document is available online at: http://opr.ca.gov/docs/OPR_Appendix_D_final.pdf.Accessed February 8, 2023.

proposed, each transformer could generate up to 55 dBA at 6 feet;[49] when combined, two transformers would generate noise levels of 58 dBA.[50]

All receptors within 900 feet of Martin Substation are located in Daly City. As stated in Attachment B and noted in Table 10, the City of Daly City does not have quantitative operational noise standards and, because the new or modified stationary sources would exist within Brisbane, the analysis applies the City of Brisbane standards.[51] The most stringent restriction of the Brisbane municipal code prohibits noise produced by any machine, animal or device or any combination of same, in any commercial or industrial zoning district from generating a noise level more than 10 dBA above the local ambient to any receiver for a cumulative period of more than 10 minutes in any hour.

The exact location of new transformers on the Martin Substation site is currently unknown, but for the purposes of analysis it is assumed to be no closer than 6 feet from the property line at Geneva Avenue. Assuming proposed transformers would be 6 feet from the closest property line of Martin Substation to the north, the transformer noise at the northern property line would be 58 dBA. The ambient L_{90} noise level recorded at the northern property line (LT-2) was 48 dBA. Therefore, transformer noise from the project would not exceed 10 dBA over the ambient noise level at the closest property line. Nor would transformer noise result in an interior noise level at the nearest residence in excess of 45 dBA.

Operations Control Center

Stationary equipment at the operations control center within San Francisco that could generate noise would consist of a backup diesel generator and heating, ventilation, air conditioning (HVAC) equipment. It is anticipated that should a new or replaced backup diesel generator be required for the operations control center, it would be a single generator which would be operated no more than the permitted limit of 50 hours per year for maintenance purposes and these maintenance operations would be restricted to daytime hours. Therefore, noise from operation of the generator would not result in a substantial temporary or permanent increase in noise levels. The rest of this analysis focuses on noise from any potential HVAC systems.

It is assumed that the existing building that would house the operations control center would have existing HVAC equipment. However, if the HVAC equipment is replaced as part of the project, then the potential exists for the replacement HVAC system to have increased cooling demand. However, it is not anticipated that any increased cooling demand would require substantially louder HVAC equipment. Noise from HVAC equipment and exhaust fans can produce sound levels ranging between 70 and 75 dBA at 50 feet, depending on the size of the unit.[52] However, any fixed stationary noise sources, such as any changes to building HVAC equipment would be required to comply with Police Code section 2909. The location of the operations control center is currently unknown, and consequently, the analysis assumes noise-sensitive uses would be adjacent to the operations control center. San Francisco Police Code section 2909

[49] National Electrical Manufacturers Association. 2019. NEMA Standards Publication TR 1-2013 (R2019) Transformers, Step Voltage Regulators and Reactors.

[50] OMNI calculator, sound pressure distance attenuation calculator. Available at: https://www.omnicalculator.com/physics/distance-attenuation

[51] Greater than 10 dBA above local ambient to any receiver for more than 10 minutes in any hour; however, because noise source would be steady-state, this analysis applies the San Francisco Police Code section 2909 (c) which is the same standard regardless of the duration in an hour.

[52] Hoover and Keith, Noise Control for Buildings and Manufacturing Plants, Equipment and Products, 1981.

(b) generally prohibits fixed mechanical equipment noise and music in excess of 8 dBA more than the ambient noise level from commercial sources. Modeled ambient roadway noise in southeastern San Francisco ranges from 60 Ldn or less to over 80 Ldn.[53] Typical HVAC equipment and exhaust fans can produce sound levels ranging from 70 to 75 dBA at 50 feet, which could be more than 8 dBA higher than ambient noise in potential operations control center locations (where existing noise could be 60 dBA or lower at night).

Operations and Maintenance Service Yard

The City would secure 150,000 to 200,000 square feet of maintenance and storage facilities to house equipment, trucks, and parking and to provide offices for workers in an existing building. Operational hours would generally be 6:00 a.m. to 4:00 p.m. Occasionally, maintenance tasks would be needed during system outages or in emergencies which would require nighttime activity in the operations and maintenance service yards. Operational noise sources within the service yards would be limited to vehicle movements and equipment loading similar to other commercial or industrial uses in the area, and therefore would not substantially increase ambient noise. Occasionally, a backhoe or forklift would be used to load spools or poles onto trucks. Operations would be required to comply with San Francisco Police Code 2909(b) which limits noise generation on commercial and industrial properties to no more than 8 dBA over existing ambient levels at any point outside the property plane.

Similar to the operations control center, the operations and maintenance service yards locations are currently unknown, and consequently, the analysis assumes noise-sensitive uses would be adjacent to the operations and maintenance service yards. Based on backhoe noise generation of 78 dBA at 50 feet, early morning use of such equipment could result in a noise level that would exceed the interior noise level standard of 45 dBA at residential uses located at distances of 400 feet or less without the presence of a solid barrier or wall[54]. Therefore, nighttime operation activities at the operations and maintenance service yards could exceed the standard in the noise ordinance if activities occur within 400 feet of residences.

New City Substation (Project Variant)

Proposed above-ground components at the new City Substation, which would be located at Daly City Yard, include two switchgear buildings, four 115 kV and two 230 kV transformers, and new transmission and distribution lines. Of the proposed equipment, the six new transformers would emit noise during operation. Based on the type of transformers proposed, each transformer could generate up to 55 dBA at 6 feet.[55] When combined, six transformers would generate noise levels of 63 dBA at 6 feet.

All receptors within 900 feet of the Daly City Yard are located in Daly City, so receptors in San Francisco are not anticipated to be affected. Because the City of Daly City does not have quantitative operational noise standards, the City of San Francisco's thresholds are applied for assessing impacts from operational noise from stationary sources within Daly City. San Francisco Police Code section 2909(b) generally prohibits fixed mechanical equipment noise and music in excess of 8 dBA above the ambient noise level from commercial or industrial sources. San Francisco Police Code section 2909 (d) restricts interior noise

[53] San Francisco Planning Department, San Francisco Housing Element 2022 Update Environmental Impact Report, November 2022.

[54] Assuming an exterior to interior noise reduction of 15 dB with windows open.

[55] National Electrical Manufacturers Association. 2019. NEMA Standards Publication TR 1-2013 (R2019) Transformers, Step Voltage Regulators and Reactors.

to 45 dBA between 10 p.m. and 7 a.m. and 55 dBA between 7 a.m. and 10 p.m. These are the absolute maximum allowable levels of interior noise produced by any combination of mechanical device(s) under one ownership or use originating from outside the dwelling unit.

The proposed footprint of new City Substation would be approximately 200 feet from the closest property line of the Daly City Yard to the south. At this distance transformer noise at the western property line would be reduced to 30 dBA. The ambient L_{90} noise level measured at the southern property line (LT-5) was 41 dBA. This noise level would increase the existing ambient noise level by less than 1 dB during operations. Therefore, transformer noise from the project variant would not exceed 8 dBA over the ambient noise level at the closest property line. Nor would transformer noise result in an interior noise level at the nearest residence in excess of 45 dBA.

4.3.2 Operational Roadway Noise

Approximately 400 new employees and maintenance activities would generate new traffic trips that could increase noise levels along roadways used to access work locations. New employee trips would be based at 525 Golden Gate Avenue (existing SFPUC offices), the operations control center, and service yard. However, no location has presently been identified for the operations control center and service yard components.

For traffic noise assessment, a quantitative analysis is used to assess the potential for noticeable (3 dBA increases in roadside noise levels, assuming existing residential uses along the primary roadway used to access the operations control center or operations and maintenance service yards are outside of the clearly acceptable land use compatibility category of the general plan. For commercial/industrial receptors, the analysis applies a 5 dBA increase unless the existing noise level exceeds the 70 dBA clearly acceptable land use compatibility category for such uses, in which case the criterion for commercial/industrial is 3 dBA.

525 Golden Gate Avenue

The project is expected to generate 183 additional vehicle trips to 525 Golden Gate Avenue per day. The Travel Demand Memorandum for the project indicates that these additional workers would result in an additional 15 peak hour vehicle trips per day[56]. These trips are compared to the existing volumes on Golden Gate Avenue to determine whether there would be a doubling in traffic, which would result in a 3 dBA increase.

Peak hour traffic volumes on Golden Gate Avenue are documented to be 599 vehicles.[57] The project's addition of 15 peak hour trips would increase traffic volumes by 3 percent. This increased traffic volume is well below the doubling of traffic volumes needed to produce a 3 dBA increase in traffic noise (i.e., a doubling of traffic volumes, or a 100 percent increase). Therefore, traffic noise associated with proposed workers at 525 Golden Gate Avenue would not exceed the identified criterion.

[56] Refer to Travel Demand Memorandum in Appendix H.

[57] SFMTA Corridor Counts 2014-2018 Spreadsheet.

Operations Control Center Traffic

Up to 35 workers per 24-hour day, spread across three shifts, would commute to the operations control center, resulting in 20 peak hour vehicle trips.[58] The operations control center would be located in an industrial, commercial or mixed-use district that could be adjacent to residential uses.

Because no location has presently been identified for the operations control center, the analysis of increased traffic noise focuses on a potential commercially or industrially zoned property location where the existing traffic noise background is the lowest identified (60 dBA or less)[59] within the southeastern part of San Francisco, and the potential for a doubling in traffic volumes that could lead to a 3 dBA increase, assuming existing residential uses along the primary roadway used to access the operations control center are outside of the clearly acceptable land use compatibility category of the general plan. For commercial/industrial receptors, the analysis applies a 5 dBA increase unless the existing noise level exceeds the 70 dBA clearly acceptable land use compatibility category for such uses, in which case the criterion for commercial/industrial is 3 dBA.

In areas where the ambient noise level is and remains below the applicable noise compatibility standard, an increase of 5 dBA or more would be considered a clearly perceptible increase. The roadway segments analyzed and the noise increases resulting from the project are shown in **Table 25**, **Peak Hour Traffic Noise Level Increases in the Project Vicinity for the Operations Control Center**.

TABLE 25
PEAK HOUR TRAFFIC NOISE LEVEL INCREASES IN THE PROJECT VICINITY FOR THE OPERATIONS CONTROL CENTER

Receptor Land Use Type[a]	Compatibility Standard[b]	Existing (dBA, L_{eq})	Applicable Standard	Existing + Project (dBA, L_{eq})	Difference between Existing and Existing + Project (dBA)	Exceed Standard?
Operation Control Center[c]						
Residential	60	60	5 dBA increase in an area <60 dBA Ldn	60.3	0.31	No
Residential	60	60	5 dBA increase in an area <60 dBA Ldn	60.3	0.3	No

NOTES:
a. Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the algorithms of the Federal Highway Administration (FHWA) Traffic Noise Prediction Model.
b. Compatibility standards are taken from San Francisco's General Plan Noise Element. Refer to Table B-5 in Attachment C of this memorandum.
c. The analysis considered the vehicle mix based on truck percentages of 3% medium trucks (MT) and 2% heavy trucks (HT).
SOURCE: ESA 2024

As shown in Table 25, the addition of the project's traffic volumes would result in traffic noise increases of less than 1 dBA and less than the criteria of a 3 or 5 dBA increase.

[58] Refer to Travel Demand Memorandum in Appendix H.

[59] San Francisco Planning Department, San Francisco Housing Element 2022 Update Environmental Impact Report, November 2022

Operations and Maintenance Service Yard Traffic

The service yard is anticipated to have 183 employees who are conservatively assumed to arrive and depart during the same peak hour and therefore would generate 156 peak hour vehicle trips.[60] Similar to the operational control center, because no location has presently been identified for the service yard component, the analysis of increased traffic noise focuses on existing industrially-zoned locations of sufficient size, existing roadway volumes on roadways, and the potential for a doubling in traffic volumes that could lead to a 3 dBA increase, assuming existing residential uses along the primary roadway used to access the service yard are outside of the clearly acceptable land use compatibility category of the general plan.

The roadway segments analyzed and the results of the noise increases resulting from the project are shown in **Table 26**, **Peak Hour Traffic Noise Level Increases in the Project Vicinity for the Service Yards**.

TABLE 26
PEAK HOUR TRAFFIC NOISE LEVEL INCREASES IN THE PROJECT VICINITY FOR THE SERVICE YARDS

Receptor Land Use Type[a]	Compatibility Standard[b]	Existing (dBA, L_{eq})	Applicable Standard	Existing + Project (dBA, L_{eq})	Difference between Existing and Existing + Project (dBA)	Exceed Standard?
Service Yards[c]						
Residential	60	60	5 dBA increase in an area <60 dBA Ldn	62.0	2.0	No

NOTES:
a. Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the algorithms of the Federal Highway Administration (FHWA) Traffic Noise Prediction Model.
b. Compatibility standards are taken from San Francisco's General Plan Noise Element. Refer to Table B-5 in Attachment C of this memorandum.
c. The analysis considered the vehicle mix based on truck percentages of 3% medium trucks (MT) and 2% heavy trucks (HT).

SOURCE: ESA 2024

As shown in Table 26, the addition of the project's traffic volumes would result in traffic noise increases of less than the applicable 5 dBA criterion.

4.4 Cumulative Noise Analysis

4.4.1 Cumulative Construction Equipment Noise During Daytime Hours

Draft EIR Table 3.1-3, Projects Considered in Cumulative Impact Analysis, (refer to EIR Section 3.1, Overview) lists the cumulative projects considered in this analysis. As discussed in Section 4.3.1, Martin Substation separation activities or construction of the new City Substation (project variant) could increase ambient noise by more than 10 dBA during daytime construction.

Martin Substation separation construction or construction of the new City Substation (project variant) could occur concurrently with the following cumulative projects within 900 feet of sensitive receptors affected by work at Martin Substation or Daly City Yard: Baylands North, Midway Village Redevelopment, and Cormorant Battery Storage Facility. Construction activities under the proposed project combined with construction of these cumulative projects have the potential to result in a combined temporary increase in

[60] For the service yards, it was assumed that each worker would generate four daily trips, two commuter trips (one inbound and one outbound) to the site, plus two service related trips (one inbound and one outbound) during the work period; only the commuter trips have been assumed to occur during the peak hours

ambient noise. Construction of multiple projects consecutively could increase the duration of construction noise levels that would be 10 dBA above the ambient noise level or 90 dBA at sensitive receptors or above standards presented in Table 10. Depending on the intensity of construction noise levels, the frequency for which construction noise exceeds criteria, frequency of overlapping construction activities, and the duration of activity, noise from Martin Substation separation or the new City Substation along with cumulative project construction activities could occur for an extended duration.

As discussed in Section 4.3.1, although daytime construction noise from the distribution express feeders, local distribution system separation, or system reinforcements could result in an increase of greater than 10 dBA over existing levels at the nearest sensitive receptors within Daly City and San Francisco, the duration of this activity at any sensitive receptor along the distribution express feeders, local distribution system separation, or system reinforcements would occur for a very limited duration (5 days out of the 40 days of construction per block). Local distribution system separation and system reinforcements work could occur within 900 feet of all cumulative projects listed in draft EIR Table 3.1-3, and therefore could result in a temporary cumulative increase in ambient noise that could exceed 10 dBA above the ambient noise level or 90 dBA at sensitive receptors or otherwise exceed standards presented in Table 10.

For nighttime construction noise impacts it is assumed that some of the cumulative projects listed in draft EIR Table 3.1-3 could require nighttime construction that may occur concurrently with generator use for the proposed project. Cumulative nighttime noise from the proposed project and cumulative projects could result in an interior noise level that exceeds the 45 dBA interior noise level standard of section 2909 (d) of the San Francisco Police Code.

The operations control center location is not currently known but would be within southeastern San Francisco. Exterior work at the operations control center could occur concurrently with cumulative projects listed in draft EIR Table 3.1-3 in southeastern San Francisco. Exterior work would potentially exceed 10 dBA over the existing ambient noise level, depending on location, and therefore, the project combined with cumulative projects could result in a temporary cumulative increase in ambient noise that could exceed standards presented in Table 11.

4.4.2 Cumulative Vibration

The Baylands North, Midway Village Redevelopment, and Cormorant Battery Storage Facility projects could occur approximately 900 feet from the construction activities associated with the Martin Substation or Daly City Yard, and all cumulative construction projects could occur within 900 feet from the construction activities associated with the distribution express feeders, local distribution system separation, and system reinforcements Vibration impacts are based on instantaneous PPV levels, and worst-case groundborne vibration levels from construction are generally determined by whichever individual piece of equipment generates the highest vibration levels. Unlike the analysis for average noise levels, in which noise levels of multiple pieces of equipment can be combined to generate a maximum combined noise level, instantaneous peak vibration levels do not combine in this way. Vibration from multiple construction sites, even if they are located close to one another, would not combine to raise the maximum PPV. For this reason, the impact of construction vibration from multiple development projects located near one another would not combine to further increase vibration levels. In essence, vibration effects are highly localized. Thus, vibration impacts resulting from construction of multiple future development projects

that may occur simultaneously with the proposed project would not combine so as to increase vibration impacts on existing adjacent buildings or structures.

4.4.3 Cumulative Operational Noise

Similar to in the project-level analysis, cumulative operational noise contributions of the project and project variant would result from operation of transformers at the Martin Substation, operation of stationary equipment at the Operations Control Center, operational activities within the service yard and operation of transformers at the New City Substation. Additionally, localized traffic increases near 525 Golden Gate Avenue, the operations control center, and the operations and maintenance service yard could increase roadway noise in these locations. Project contributions to cumulative stationary source noise impacts are assessed qualitatively given that specifics of the contributions of other cumulative projects are not known quantitatively. With respect to traffic noise, project traffic contributions are added to the 2050 roadway noise levels estimated for the San Francisco Housing Element 2022 Update EIR which identified significant and unavoidable cumulative traffic noise impacts along some roadway segments.

Stationary Noise Sources

Stationary Noise Sources – Martin Substation and New City Substation (Project Variant)

Martin Substation separation construction could occur concurrently with the following cumulative projects within 900 feet of sensitive receptors affected by work at Martin Substation or Daly City Yard: Baylands North, Baylands Specific Plan, Midway Village Redevelopment, and Cormorant Battery Storage Facility.

As discussed in the project level analysis, new transformers at Martin Substation and the new City substation (project variant) would contribute minimally to the surrounding noise environment. Transformers are predicted to contribute 30 dBA or less to existing ambient noise levels at the most highly impacted receptors in an area where the existing noise level currently exceeds 60 dBA.

Stationary Noise Sources – Operations Control Center and Service Yards

As programmatic elements of this analysis, neither the location of the Operations Control Center or Service Yard are currently known. With regard to operation of stationary mechanical equipment associated with cumulative projects, noise from these types of equipment is generally only noticeable in a localized area near the source. Both the operations control center and operations and maintenance service yards would likely be located within the southeastern portion of San Francisco. In the situation that one or more individual cumulative projects are developed near the operations control center site or service yards site, these projects would be required to comply with the noise ordinance limits specified in San Francisco Police Code Section 2909. While routine infrastructure repair, maintenance, and improvement projects would generally not introduce new sources of permanent noise, any additional noise-generating equipment would be required to comply with the noise ordinance.

Cumulative Traffic Noise

The cumulative traffic noise analysis assumes the operations control center or operations and maintenance service yards could be located in an area where the existing traffic noise background is the lowest identified within the City (60 dBA or less) within the southeastern portion of San Francico. The 2050

modeled roadway noise levels developed for the San Francisco Housing Element 2022 Update EIR indicate that by 2050, noise levels in southeastern San Francisco would increase from the less than 60 dBA category to between the 60 to 65 dBA category for some roadways and residential uses along this roadway would transition from the "clearly acceptable" land use noise compatibility condition to the "conditionally acceptable" category. The San Francisco Housing Element 2022 Update EIR indicated that, on average, roadway noise within the South Bayshore Planning District would decrease, yet some roadways within the district would experience an increase that would exceed 3 dBA and, overall, citywide traffic noise was a significant and unavoidable impact. As discussed in Section 4.3.2, above, noise from operations control center-related traffic and traffic associated with workers at 525 Golden Gate Avenue would increase noise levels by less than 1 dBA and noise from service yard-related traffic would increase noise levels by 2 dBA.

Enclosures:

- Attachment A: Construction Equipment Tables
- Attachment B: Noise and Vibration Methods and Criteria Memorandum
- Attachment C: Supporting Materials for Noise Analysis
  - Attachment C.1 – Construction Noise Modeling Output
  - Attachment C.2 – Traffic Noise Modeling Output
  - Attachment C.3 – Noise Measurement Summaries and Output

This page intentionally left blank

Attachment A
Construction Equipment Tables

Table 1a
Martin Substation Construction Information
SFPUC PG&E Asset Acquisition Project
San Francisco, CA

Start Date	1/1/2026

Table 1a-1: Construction Schedule[1]

Project Component	**Separation Component**	**Year**	**Typical Duration (Weeks) and Type**						Notes
			Site Excavation**	**Trenching**	**Concrete Foundation**	**Backfill and Grading**	**Placement of Facilities**	**Equipment and Gate Installation**	
Martin Substation	Install new control house	2026	2	Included in the Site Excavation Subphase	4		1	3	vendor trucks - assume all arrive during site excavation in year 1. 13 weeks.
	Relocating line A into City Yard to spare position on transmission bus	2026	4			1		9	
	Relocate transformer	2026	3		6	1		8	
	Relocate line B	2026	4			1		5	
	Relocate line B	2027						2	
	Relocate line C	2027	4			1		7	
	Relocate line D	2027	4			1		9	
	Relocate line E	2027	4			1		6	
	Install 6 revenue meters at SFPUC interconnection points with PG&E* Add first new transformer	2027	3		9	1		6	Combined revenue meters with first transformer. concrete trucks - schedule should be 28 weeks because meter install overla
	Add first new transformer (cont.)	2028			3			6	
	Add second new transformer	2028	3		6	1		10	
	Year 1 Summary		13		10	3	1	25	
	Year 2 Summary		15		9	4	0	30	
	Year 3 Summary		3		9	1	0	16	
							1	71	

* Will occur concurrently with other foundation work in 2027
**Assume all vendor truck trips occur during site excavation in year 1.

Table 1a-2: Construction Subphase and Off-Road Equipment (Martin Substation)

Construction Subphase	**Equipment Type**	**Fuel**	**Number**	**Horsepower**	**Hours/Day**	**Utilization**	**Unmitigated Tier**	**Mitigated Tier**	**Notes**
Site Excavation (Include Trenching)	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Excavators	Diesel	2	36	8	100%	No Specific Tier	Tier 4 Final	*Number was previously 1, though it is in this subphase twice in the previous*
	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Concrete/Industrial Saws	Diesel	1	33	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Diesel	1	14	24	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Jack Hammer	Electric	1	83	8	100%	No Specific Tier	Tier 4 Final	
	Paver	Diesel	1	81	8	100%	No Specific Tier	Tier 4 Final	
	Water Buffalo with pump on trailer	Diesel	2	4	8	100%	No Specific Tier	Tier 4 Final	
	Street Sweeper	Diesel	2	24	8	100%	No Specific Tier	Tier 4 Final	
	Roller	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final	
	Cable Pulling equipment	Diesel	2	200	8	100%	No Specific Tier	Tier 4 Final	
Concrete Foundation	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final	
	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Diesel	2	14	24	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
Backfill and Grading	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	*Off-Highway Trucks has been removed from this subphase.*
	Water Buffalo with pump on trailer	Diesel	2	4	8	100%	No Specific Tier	Tier 4 Final	
	Street Sweeper	Diesel	2	24	8	100%	No Specific Tier	Tier 4 Final	
	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
Placement of Facilities	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final	
	Lift/bucket trucks	Diesel	1	46	8	100%	No Specific Tier	Tier 4 Final	
	Jack Hammer	Electric	1	83	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final	
Equipment and Gate Installation	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Jackhammer	Electric	1	--	8	100%	No Specific Tier	Tier 4 Final	
	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Diesel	1	14	8	100%	No Specific Tier	Tier 4 Final	

Installation	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final

Table 1a-3 On-Road Construction Trips

Project Component	Parameters	Haul (Export)[2]	Haul (Import)[2]	Vendor		Workers[1]
				Concrete	Vault, Cable and Others	
Martin Substation	Total Round Trips	440	258	732	50	--
	Daily Average Round Trips	--	--	--	--	10
	Haul Truck Capacity (cyd/truck)	18	8	--	--	--
	One-Way Trip Length (miles)	4.2	20/50	8.4 (CalEEMod default)		11.7 (CalEEMod default)

Notes

Revised - rounding and typo

18 **8**

Notes

1. Based on Table 2-10 of Project Description.
2. All Martin Subtation and Variant excavated soil was assumed to be delivered to the Pier 96 rail terminal. The export length of 4.2 mi is because we assumed trucking to Pier 96 for transport by rail thereafter. As with the MND AQTR, two scenarios were analyzed for Martin and Variant soil import: a 20-mile trip length and a 50-mile trip length. The analysis assumed 50 miles of soil import for a conservative estimate.

References

SFPUC

[Ramboll] Construction trip data used in the AQ analysis

Phase	Year	Construction Days	Worker Trip Rates (one-way trips/day)[1]	Vendor Trip Rates (one-way trips/day)[1]	Hauling Trip Number (one-way trips/phase)[1]	Trip Lengths (miles/one way trip)		
						Worker	Vendor	Hauling[2]
Site Excavation and Preparation	2026	66	20	24	465	11.7	8.4	21
	2027	76	20	0	536	11.7	8.4	21
	2028	15	20	0	106	11.7	8.4	21
Concrete Foundations	2026	51	20	0	0	11.7	8.4	21
	2027	65	20	0	0	11.7	8.4	21
	2028	45	20	0	0	11.7	8.4	21
Backfill and Grading	2026	15	20	0	106	11.7	8.4	21
	2027	20	20	0	141	11.7	8.4	21
	2028	6	20	0	42	11.7	8.4	21
Placement of Facilities	2026	5	20	0	0	11.7	8.4	21
Electrical Equipment/Gate Install	2026	126	20	0	0	11.7	8.4	21
	2027	151	20	0	0	11.7	8.4	21
	2028	81	20	0	0	11.7	8.4	21

1. Note that we doubled the trips for estimating total one-way trips; We divided the total one-way trips by construction days for vendor and hauling trips as only the total trips for the Project component were provided.
2. This is a weighted average for import haul length and export haul length. Import trip length of 50 miles were used in the analysis for a more conservative estimate. Note that we will update the export length from 3.3 mile to 4.2 miles for the next rerun.

Table 1b
Project Variant (New Substation) Construction Information
SFPUC PG&E Asset Acquisition Project
San Francisco, CA

Table 1b-1: Construction Schedule			
Phase	**Subphase**	**Duration**	**Unit**
Variant	Site Excavation & preparation	24	weeks
	Trenching	45	weeks
	Concrete Foundations	28	weeks
	Backfill and Grading	12	weeks
	Placement of Facilities	24	weeks
	Electrical Equipment/Gate Install	16	weeks

Table 1b-2: Construction Subphase and Off-Road Equipment (Variant)										Notes
Construction Subphase	**Equipment Type**	**CalEEMod default Equipment**	**Fuel**	**Number**	**Horsepower**	**Hours/Day**	**Utilization**	**Unmitigated Tier**	**Mitigated Tier**	
Site Excavation and Preparation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Excavators	Excavators	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final	
	Off-Highway Trucks[1]	Off-Highway Trucks	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final	Was 376 in previous spreadsheet
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Pile Driver	Bore/Drill Rigs	Diesel	1	83	8	100%	No Specific Tier	Tier 4 Final	
Concrete Foundations	Cranes	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final	
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Generator Sets	Diesel	2	14	24	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Off-Highway Trucks[1]	Off-Highway Trucks	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final	Was 376 in previous spreadsheet; was previously 100%
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final	
Backfill and Grading	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Off-Highway Trucks[1]	Off-Highway Trucks	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final	Was 376 in previous spreadsheet; was previously 100%
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
Placement of Facilities	Cranes	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final	
	Lift/bucket trucks	Aerial Lifts	Diesel	1	46	8	100%	No Specific Tier	Tier 4 Final	
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final	
Electrical Equipment/Gate Install	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Cranes	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Generator Sets	Diesel	1	14	8	100%	No Specific Tier	Tier 4 Final	
	Air Compressors	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
Trenching	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final	
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final	
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	33	8	100%	No Specific Tier	Tier 4 Final	
	Excavators	Excavators	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final	
	Generator Sets	Generator Sets	Diesel	1	14	24	100%	No Specific Tier	Tier 4 Final	
	Off-Highway Trucks[1]	Off-Highway Trucks	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final	Was 376 in previous spreadsheet; was previously 100%
	Air Compressors	Air Compressors	Electric	2	37	8	100%	No Specific Tier	Tier 4 Final	
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	100%	No Specific Tier	Tier 4 Final	
	Paver	Pavers	Diesel	1	81	8	100%	No Specific Tier	Tier 4 Final	
	Roller	Rollers	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final	
	Cable Pulling equipment	Other Construction Equipment	Diesel	2	200	8	100%	No Specific Tier	Tier 4 Final	

Table 1b-3 Off-Highway Truck Assumptions[1]								
Fleet Type	**Components**	**Daily Usage**	**Trip Length[1]**	**Idling Time**	**Vehicle Speed**	**Trip Hour**	**Daily Trip Rate**	**Daily Trip VMT**
		hours/day	**mi/trip**	**min/trip**	**mi/hr**	**hr/trip**	**trip/day**	**mi/day**

HHDT	Variant	4.0	1.07	5.0	5.0	0.30	14	15.0

Table 1b-4 On-Road Construction Trips

Project Component/Variant	Parameters	Haul (Export)[2]	Haul (Import)[2]	Vendor		Workers[1]
				Concrete	Vault, Cable and Others	
Project Variant (New City Substation)	Total Round Trips	1943	656	3717	175	--
	Daily Average Round Trips	--	--	--	--	10
	Haul Truck Capacity (cyd/truck)	18	8	--	--	--
	One-Way Trip Length (miles)	4.2	20/50	8.4 (CalEEMod default)		11.7 (CalEEMod default)

18 8

Phase	Subphase	Duration	Unit	Note		
Variant	Trenching (included in the Site Excavation & Preparation subphase of the Variant)	225	days	1000 feet @ 20 ft/day; 9000 feet @ 40 ft/day	3,000 feet x 3 duct banks (outgoing transmission/distribution lines) from Advisian excavation table assume 40 feet per day; 1,000 feet x 1 duct bank (incoming transmission lines) instead of 40 feet per day	1 crew working on trenches and the other crew is working elsewhere on the substation

Notes

1. As Off-Highway Trucks are used as water trucks, emissions from water trucks are calculated outside of CalEEMod assuming heavy heavy duty truck (HHDT) from EMFAC2021, the ARB Emission Factors model for on-road emissions. Water trucks are assumed to travel repeatedly the greater length of the construction site at a speed of 5 miles per hour, and idle for 5 minutes at the end of each trip. See detailed assumptions in the table above.

2. All Martin Subtation and Variant excavated soil was assumed to be delivered to the Pier 96 rail terminal. The export length of 4.2 mi is because we assumed trucking to Pier 96 for transport by rail thereafter. The analysis conservatively assumed 50 miles of soil import.

References

SFPUC

Table 2
Construction Details for Distribution Express Feeders, Local Distribution System Separation, and System Reinforcements
SFPUC PG&E Asset Acquisition Project
San Francisco, CA

Clarification on AQ methodology	"Linear Components" refer to all Project Components that do not have defined locations of construction and/or detailed construction schedule for each location. These three components are: Distribution Express Feeders, Local Distribution System Separation and System Reinforcements. Ramboll will assume trenching (the highest emitting construction activity) for these project components for the purposes of estimating criteria pollutants emissions and health risk impacts.

Start Date	1/1/2026

Table 2-1 Linear Work Parameters

Project Component	Approximate Length Where Underground Work Could Occur [Feet]	Crews[1]	Crew Size[1]	Estimated Construction Duration [Month]	Speed of Work [Feet/Day]	Most Intense Construction Activities per Day for 2 Crews	Extent of Work
Distribution Express Feeders	20,064	2	6	12	40	See below.	Provide GIS files for polygons. These are for the evaluation of existing+Project
Local Distribution System Separation	20,500	2	6	24	40		
System Reinforcements	22,068	2	5	28	40		

Table 2-2 Most Intense Daily Construction Activities for Off-Road Equipment (2 crews)

Equipment	CalEEMod® Equipment[2]	Fuel	Number	Horsepower	Hours/Day	Utilization	Notes
Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	84	8	50%	*Off-Highway Trucks has been removed.*
Excavators	Excavators	Diesel	2	36	8	50%	
Water Buffalo with pump on trailer	Pumps	Diesel	2	4	8	100%	
Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	100%	
Plate Compactors	Plate Compactors	Diesel	2	8	8	50%	
Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	2	33	8	10%	
Generator Sets	Generator Sets	Diesel	2	14	24	100%	
Air Compressors	Air Compressors	Electric	2	37	8	--	
Roller	Rollers	Diesel	2	36	8	25%	
Jack Hammer	Bore/Drill Rigs	Electric	2	83	8	--	
Paver	Pavers	Diesel	2	81	8	25%	
Cable Pulling equipment	Other Material Handling Equipment	Diesel	2	200	8	25%	

Table 2-3 On-Road Construction Trips

Project Component/Variant	Parameters	Haul (Export)	Haul (Import)	Vendor		Workers[1]
				Concrete	Vault, Cable and Others	
Distribution Express Feeders	Total Round Trips	1,576	1,457	2,090	98	--
	Daily Average Round Trips	--	--	--	--	12
Local Distribution System Separation	Total Round Trips	236	247	285	10	--
	Daily Average Round Trips	--	--	--	--	12
System Reinforcements	Total Round Trips	974	548	1644	128	--
	Daily Average Round Trips	--	--	--	--	10
Haul Truck Capacity (cyd/truck)		18	8	--	--	--
One-Way Trip Length (miles)		50	20	8.4 (CalEEMod default)		11.7 (CalEEMod default)

Notes
1. Based on Table 2-10 of Project Description.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.

References
SFPUC

[Ramboll] Construction trip data used in the analysis

Project Component	Year	Construction Days	Worker Trip Rates[1] (one-way trips/day)	Vendor Trip Rates[1] (one-way trips/day)	Hauling Trip Number[1] (one-way trips/phase)
Distribution Express Feeders	2026	261	24	17	6,066
Local Distribution System Separation	2026	261	24	1.1	483
	2027	261	24	1.1	483
System Reinforcements	2026	261	20	5.8	1,309
	2027	261	20	5.8	1,309
	2028	85	20	5.8	426

1. Note that we doubled the trips for estimating total one-way trips; We divided the total one-way trips by construction days for vendor and hauling trips as only the total trips for t
2. This is a weighted average for import haul length and export haul length. Import trip length of 50 miles were used in the analysis for a more conservative estimate. Note that we

Table 3
Construction Details for Exterior Work for Operations Control Center
SFPUC PG&E Asset Acquisition Project
San Francisco, CA

Table 3-1 Daily Activities of Off-Road Construction Equipment[1]

Project Component[2]	Start Date	Duration [Month]	Equipment Type	CalEEMod® Equipment[2]	Fuel	Number	Horsepower[2]	Hours/Day	Utilization	Notes
Exterior Work for Operations Control Center	1/1/2026	2	Excavator	Excavators	Diesel	1	36	8	100%	
			Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	
			Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	33	8	100%	
			Water Buffalo with pump on trailer	Pumps	Diesel	2	4	8	100%	
			Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	100%	
	1/1/2026	2	Jackhammer		Electric	1	83	8	100%	ESA added based on comment from SFPUC in Noise memo.

Table 3-2 On-Road Construction Trips[1]

Parameters	Haul (Export)	Haul (Import)	Vendor		Workers[2]
			Concrete	Vault, Cable and Others	
Total Round Trips (Exterior Work Only)	51	116	58	41	--
Daily Average Round Trips	--	--	--	--	20
Haul Truck Capacity (cyd/truck)	18	8	--	--	--
One-Way Trip Length (miles)	50	20	8.4 (CalEEMod default)		11.7 (CalEEMod default)

Notes:

1. Construction details for OCC were not previously provided. Equipment that are likely to be diesel from Table 2-10 of the Project Description are listed here. Table 3-2 trips for exterior work only. Interior work would require approximately 135 non-concrete vendor trips during the 12 months of interior work.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.

References

SFPUC

[Ramboll] Construction trip data used in the analysis

Project Component	Construction Days	Vendor Trip Rates[1] (one-way trips/day)
Operations Control Center	42	4.7

1. Note that we doubled the trips for estimating total one-way trips and then divided by the number of construction days.

Table 4
Construction Details for Modifications to Retain PG&E Access to Non-Electrical Facilities
SFPUC PG&E Asset Acquisition Project
San Francisco, CA

Table 4-1 Daily Activities of Off-Road Construction Equipment

Project Component	Start Date	Duration [Month]	Equipment Type	CalEEMod® Equipment[1]	Fuel	Number	Horsepower	Hours/Day	Utilization
Electrical Equipment/Gate Install	1/1/2026	1	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%
			Jack Hammer	Bore/Drill Rigs	Electric	1	--	8	100%
			Cranes	Cranes	Diesel	1	367	8	100%
			Generator Sets	Generator Sets	Diesel	1	14	8	100%
			Air Compressors	Air Compressors	Diesel	1	37	8	100%

Table 4-2 On-Road Construction Trips

Parameters	Haul (Export)	Haul (Import)	Vendor		Workers[3]
			Concrete[2]	Vault, Cable and Others	
Total Round Trips	5	0	22	30	--
Daily Average Round Trips	--	--	--	--	6
Haul Truck Capacity (cyd/truck)	18	8	--	--	--
One-Way Trip Length (miles)	50	20	8.4 (CalEEMod default)		11.7 (CalEEMod default)

Notes:

1. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.
2. To be consistent with other project components, concrete trucks are taken out of the off-road equipment list and are assumed to have one round trip per day for 22 workdays in a month.
3. Based on Table 2-10 of Project Description.

References

SFPUC

[Ramboll] Construction trip data used in the analysis

Project Component	Construction Days	Vendor Trip Rates[1] (one-way trips/day)
Modifications to Retain PGE Access to Non-Electrical Facilities	22	4.7

1. Note that we doubled the trips for estimating total one-way trips and then divided by the number of construction days.

Table 5
Construction Details for Operations and Maintenance Service Yards; Materials and Equipment Storage
SFPUC PG&E Asset Acquisition Project
San Francisco, CA

Table 5-1 Daily Activities of Off-Road Construction Equipment

Project Component	Start Date	Duration [Month]	Equipment Type	CalEEMod® Equipment[1]	Fuel	Number	Horsepower	Hours/Day	Utilization
Exterior Work for Operations Control Center	1/1/2026	2	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	84	8	100%
			Cranes	Cranes	Diesel	2	367	8	100%
			Generator Sets	Generator Sets	Diesel	2	14	8	100%
			Air Compressors	Air Compressors	Diesel	2	37	8	100%
			Jackhammer	Bore/Drill Rigs	Electric	2	--	8	100%

Table 5-2 On-Road Construction Trips

Parameters	Haul (Export)	Haul (Import)	Vendor		Workers[2]
			Concrete	Vault, Cable and Others	
Total Round Trips	5	0	44	30	--
Daily Average Round Trips	--	--	--	--	6
Haul Truck Capacity (cyd/truck)	18	8	--	--	--
One-Way Trip Length (miles)	50	20	8.4 (CalEEMod default)		11.7 (CalEEMod default)

probably a typo

Notes:
1. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.

References
SFPUC

[Ramboll] Construction trip data used in the analysis

Project Component	Construction Days	Vendor Trip Rates[1] (one-way trips/day)
Operations and Maintenance Service Yards	42	3.5

1. Note that we doubled the trips for estimating total one-way trips and then divided by the number of construction days.

Attachment B

Noise and Vibration Methods and Criteria Memorandum

PG&E POWER ASSET ACQUISITION PROJECT

Noise and Vibration Methods and Criteria Memorandum

Introduction

This noise and vibration Methods and Criteria Memorandum is intended to support preparation of a Noise and Vibration Technical Memorandum for the PG&E Power Asset Acquisition Project (project). This memo describes the approach to noise and vibration analysis and identifies the significance criteria to be applied in the Noise and Vibration Technical Memorandum. Given the multi-jurisdictional nature of the project component locations, this memorandum discusses the federal, state and local standards that may apply for individual project element locations. Separate discussions for construction impacts, operational impacts, and cumulative impacts are presented. Separate standards and criteria for daytime and nighttime work are also identified. This memorandum also discusses the approach for applying work in one jurisdiction impacting receptors located in another adjacent jurisdiction. ESA understands the San Francisco Planning Department Environmental Planning Division (EP) will require a standalone Noise and Vibration Technical Memorandum.

Project Understanding

The City and County of San Francisco (the "City") is proposing to purchase Pacific Gas and Electric Company (PG&E)-owned electrical transmission and distribution assets (the "Assets") located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco (the "acquisition") and to carry out other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco (the "separation") (collectively, the "project"). "Assets" includes equipment, facilities, property, and records that would be acquired by the City including the following:

- PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer serving distribution lines, and related facilities);
- PG&E's 115 kilovolt1 (kV) and 230 kV transmission assets (substations, transmission lines, transformers, and related facilities needed for operations);

[1] Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

- certain PG&E distribution lines in Brisbane emanating from Martin Substation that serve customers in San Francisco;2
- a portion of the Martin Substation facilities (located in Brisbane) or interconnections3 needed to enable the San Francisco Public Utilities Commission (SFPUC) to control all power flows from Martin Substation into San Francisco; and
- other systems and equipment, materials, records, operating and maintenance facilities, property and other land-related agreements as necessary for safe and reliable operation, maintenance, repair, control, and protection of the acquired transmission and distribution system.

After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition, the City would acquire property rights as needed to operate and maintain the Assets and new City equipment, as needed, on public and private lands. This transaction would not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.[4]

In addition to acquiring the necessary transmission and distribution system and electrical facilities, the City would physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco-San Mateo County border), to allow both systems to be safely, reliably, and independently operated by SFPUC and PG&E. This EIR project description details project components that would involve physical changes to the environment: new underground and overhead power distribution/ transmission lines and system reinforcements, mostly within public rights-of-way; new equipment in existing electrical substations; an operations center and service yard; and other related work.[5] After system separation, the SFPUC would provide electricity service to customers in San Francisco currently served by PG&E; PG&E would continue to provide electricity service to its customers outside San Francisco. The construction portion of the project is anticipated to take approximately 3 to 5 years after the purchase and transfer of the Assets. It is anticipated that the City and PG&E would coordinate on the implementation of the project.

The noise and vibration analysis will focus on project components involving changes to the physical environment, and will evaluate potential environmental effects that would be anticipated as a result of those changes. Those project components are presented in **Figures 1 and 2** below and summarized in **Table 1**.

---

2 Existing distribution lines serving only San Francisco customers would be acquired by the City. Distribution lines serving only PG&E customers outside of San Francisco would remain with PG&E. Finally, some of the distribution lines serve both customers in San Francisco and customers outside of San Francisco. These feeders would be separated at the border and the City would construct new infrastructure to ensure each utility would have its own system and that all customers would continue to be served.

3 Interconnection is defined as an electrical connection between multiple entities.

4 In addition, the interconnection between the transmission system in San Francisco and the Trans Bay Cable (TBC), and TBC operation, would not be physically changed as a result of the acquisition.

5 As an example of related work, the City would acquire the PG&E Egbert Switching Station as part of the project. Egbert Switching station is a new transmission switching station planned to be constructed in San Francisco. The project was underway and is currently on hold. However, if the Egbert Switching Station is constructed, a revenue meter would be needed inside the switching station.

TABLE 1
PROJECT COMPONENTS

Project Component	Component Purpose	Component Description	Location
Proposed Project			
Martin Substation Separation	Martin Substation separation is needed to enable the City to transmit electricity to San Francisco customers from PG&E's transmission lines in San Mateo County. Once separated, the substation also would be used to step down transmission voltages to distribution service voltages to serve customers in San Francisco.	Reconfigure and partition the existing PG&E Martin Substation into two interconnected[6] utility systems —one serving San Francisco and one serving PG&E's remaining customers in San Mateo County.	Existing PG&E Martin Substation, at the intersection of Geneva Avenue and Bayshore Boulevard in Brisbane
Distribution Express Feeders[7]	Distribute electricity from Martin Substation to areas in San Francisco that are currently supplied by distribution lines originating from PG&E's existing Daly City Substation, a substation located in San Mateo County. The existing distribution lines from Daly City would be disconnected at the border after completion.	Install approximately 3.8 miles of duct banks[8] for new underground distribution express feeders from the Martin Substation, consisting of approximately 0.3 mile of duct banks in Brisbane, approximately 0.5mile in Daly City, and approximately 3 miles in San Francisco.	Geneva Avenue in Brisbane and Daly City Geneva Avenue, Alemany Boulevard, Huron Avenue, Sickles Avenue, Sagamore Street and Brotherhood Way in San Francisco
Local Distribution System Separation	Connect San Francisco customers to the City's electrical system and San Mateo County customers to PG&E.	Reconfigure and separate overhead and underground distribution lines around the county border, including approximately 3.9 miles of underground work.	Approximately 70 work areas generally along the San Francisco-San Mateo County border
System Reinforcements	Ensure for both systems electrical system reliability and ability to restore power in the event of outages.	Install and replace overhead and underground equipment to maintain service reliability on existing lines, including approximately 4.2 miles of underground work.	Approximately 25 works areas on both sides of the San Francisco-San Mateo County border
Modifications to Retain PG&E Access to Non-Electrical Facilities	Provide continued access for PG&E's operation of non-electrical facilities where such facilities would be located adjacent to electric facilities to be acquired by the City.	Modify fencing and ingress/egress, at certain sites with non-electrical facilities.	Martin Substation (on Geneva Avenue between Schwerin Street and Bayshore Boulevard in Brisbane). Potrero Substation (on Illinois Street between Humboldt and 23rd Street) and other substations in San Francisco.

6 Interconnection is defined as an electrical connection between multiple entities.

7 Generally, electrical distribution express feeders are large circuits that deliver electricity to electrical loads (i.e., customers). Distribution express feeders are circuits used to serve loads further away from the substation by bypassing other customers.

8 Duct bank is defined as an underground reinforced concrete trench designed to protect a series of conduits (PVC, HDPE or equivalent) housing electrical cables.

Project Component	Component Purpose	Component Description	Location
Operations Control Center	Office facility needed for dispatchers and operators. Centralize data on transmission and distribution systems status and security.	Modify interior of an existing building, upgrade utilities, install fencing and new standby diesel generator.	An existing commercial or office building in the southeastern part of San Francisco.
Operations and Maintenance Service Yards; Materials and Equipment Storage	Securely store equipment, trucks, and other supplies for operations and maintenance of the power grid in San Francisco, including vehicle parking spaces and containment for hazardous materials, such as transformer oils. In addition, provide offices for workers.	Modify existing yards (e.g., fencing).	Existing maintenance and storage properties, vacant parcels, or space at acquired substations in southeastern San Francisco.
Telecommunications Equipment	Provides a network to enable prompt and reliable exchange of information for the safe and secure operation, control, and protection of power system equipment	Install equipment at substations (e.g., remote terminal units) inside control room (no excavation). Install fiber optic cables between substations and other telecommunication aggregation points underground within existing or new duct banks. Install other telecommunications equipment (e.g., wireless mesh SMART devices) mounted in underground in vaults or on existing poles (no excavation).	Existing or proposed substations, control centers, underground duct banks, and mounted on poles throughout San Francisco and south of the border within the project boundaries.
Project Variant			
New City Substation	Interconnect the City's transmission system with PG&E's transmission system and maintain distribution service to San Francisco customers formerly served by PG&E from Martin Substation.	Construct a new substation at the site adjacent to the existing Martin Substation (Daly City Yard), instead of implementing the Martin Substation separation. Install new incoming transmission lines from Martin Substation to the new substation and outgoing distribution lines from the new substation to the existing distribution system serving customers in San Francisco.	Daly City Yard, 731 Schwerin Street, Daly City
All Other Components	The other components of the project variant would be the same as listed above for the proposed project.		

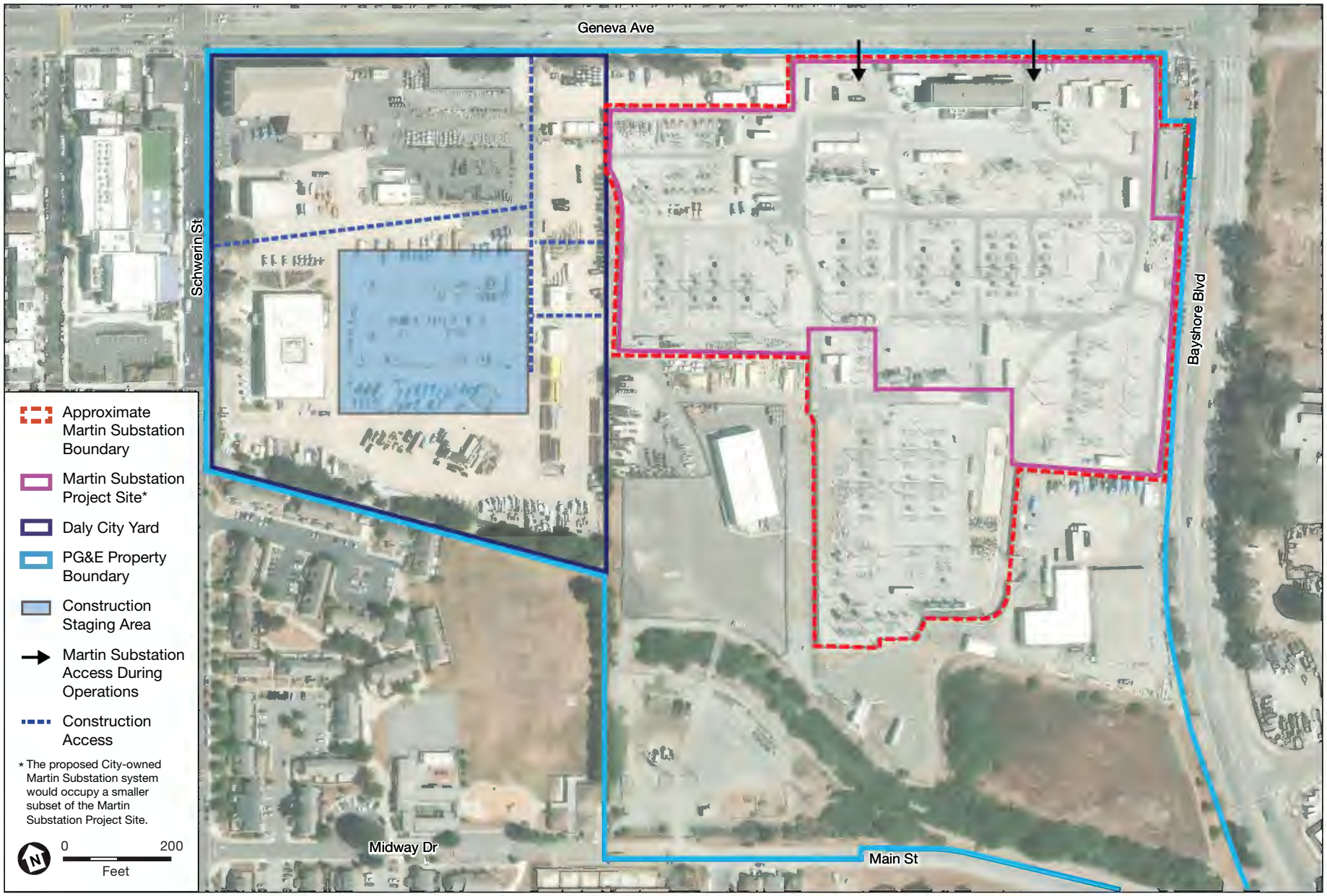
SOURCE: San Francisco Public Utilities Commission

SOURCE: ESA, 2022

Note: The project includes purchase of PG&E's transmission and distribution assets needed for the city to provide reliable electricity service to customers in San Francisco. Only major project components involving physical changes to the environment are shown. The project also includes work within existing substations, PG&E properties and storage and maintenance yards.

PG&E Asset Acquisition Project

Figure 1
Project Overview



SOURCE: ESA, 2023

PG&E Asset Acquisition Project

Figure 2
Martin Substation Project Site and Construction Staging Area

Receptor and Monitoring Locations

Identification of Sensitive Receptors

Sensitive receptors as discussed in this document are locations where existing land uses are relatively sensitive to changes in ambient noise or vibration; specifically, residences, hospitals, convalescent homes, schools, and churches. In addition, planning department staff considers hotels and motels as noise sensitive receptors during nighttime hours. Schools are generally considered noise-sensitive during instruction hours of 7:30 a.m. to 4:00 p.m.

Construction activities, including demolition, excavation, grading, foundation construction, buildout of utilities and other infrastructure generate both noise and vibration that can affect nearby sensitive receptors. Operational noise sources would primarily include operation of mechanical equipment such as transformers and air conditioning equipment, increased vehicle traffic, and vehicle operations in service yards and parking areas.

Sensitive receptors near the project site include single and multifamily residential uses along the distribution express feeder alignment and near Martin Substation. Single family residences are located along the entirety of the distribution alignment, some as close as 15 feet. The nearest sensitive receptors to the PG&E Martin substation are residences across Geneva Avenue located approximately 200 feet north. Additionally, there are residential land uses approximately 80 and 40 feet to the west and south of the Daly City Yard property line, respectively. While there are hundreds of sensitive receptors within 900 feet[9] of the primary project components, receptors that are closest to the Martin Substation and the distribution express feeder alignment, and would be most likely to experience changes in ambient noise caused by the project, are identified in **Table 2** below. The sensitive receptor locations were used to determine proposed noise monitoring locations, which are presented in **Figure 3** to be approved by EP prior to any noise monitoring being conducted.

At this time, specific construction locations associated with the local distribution system separation and the system reinforcement components are unknown and, therefore, specific receptor locations cannot be identified. However, it is reasonable to assume, similar to the distribution express feeder alignment, receptors could be located as close as 15 feet from a given infrastructure activity. This is also true of the duct banks and vaults that would be constructed along the distribution express feeder alignment. However, monitoring locations within the generalized geographical areas (depicted as polygons) have been identified as conservatively representative of receptors in these areas based on quieter locations away from arterial roadways.

[9] This distance was selected because typical construction noise levels can affect a sensitive receptor at a distance of 900 feet if there is a direct line-of-sight between a noise source and a noise receptor (i.e., a piece of equipment generating 85 dBA would attenuate to 60 dBA over a distance of 900 feet).

TABLE 2
EXISTING NOISE-SENSITIVE RECEPTORS WITHIN 900 FEET OF THE PROJECT SITE COMPONENTS

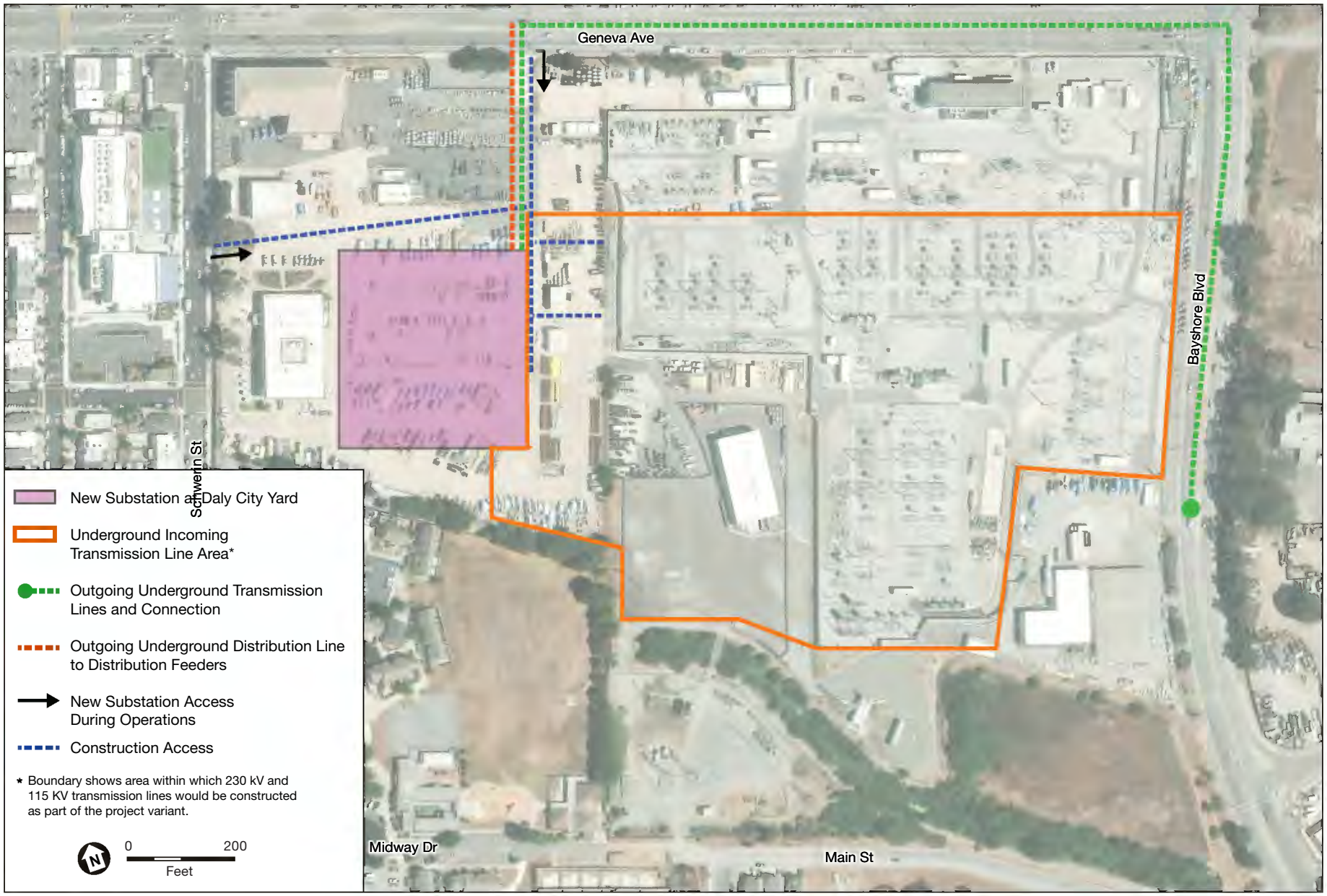
Type of Sensitive Receptor	Location [a]	Minimum Distance from Project Site Work Area	Representative Monitoring Location
Receptors Nearest Martin Substation and Daly City Yard			
Hotel and Motel Uses	3200 block of Geneva Avenue, Daly City	200 feet [b]	LT-1
Single Family Residential	3000 and 3100 block of Geneva Avenue, Daly City	200 feet	LT-1, LT-2
Bayshore Elementary School	155 Oriente Street, Daly City	80 feet	LT-3
Single Family Residential	800 block of Schwerin Street, Daly City	80 feet	LT-3
Midway Village Multi-family Residential	Midway Village on 800 block of Schwerin Street, Daly City	40 feet	LT-5
Single Family Residential	100 block Main Street, Daly City	400	LT-4
Receptors Nearest to Distribution Express Feeder Alignment			
Hotel and Motel Uses	3200 block of Geneva Avenue, Daly City	15 feet	LT-1
Single Family Residential	3000 and 3100 block of Geneva Avenue, Daly City	15 feet	LT-1; LT-2
Single Family Residential	2600 and 2700 block of Geneva Avenue, Daly City	15 feet	LT-1
Single- and multi-family Residential	2200 to 2500 block of Geneva Avenue, Daly City	15 feet	ST-1
Single- and multi-family Residential	800 to 2100 block of Geneva Avenue, San Francisco	15 feet	ST-2; ST-3; ST-4
Single Family Residential	2200 to 2400 block of Alemany Boulevard, San Francisco	15 feet	ST-4; ST-5
Single Family Residential	400 to 900 block Huron Avenue, San Francisco	15 feet	ST-5; ST-6
Single Family Residential	100 block of Sickles Avenue, San Francisco	15 feet	ST-6
Single Family Residential	100 to 200 block of Sagamore Street, San Francisco	15 feet	ST-7; ST-8
Single Family Residential	Termini of Bright, Head, Victoria, and Ramsell Streets, San Francisco	120 feet	ST-9
Single Family Residential	100 block of Arch Street, San Francisco	120 feet	ST-9

Type of Sensitive Receptor	Location [a]	Minimum Distance from Project Site Work Area	Representative Monitoring Location
Receptors Nearest to Local Distribution System Separation or System Reinforcement Work			
Multi-family Residential	Candlestick Point, San Francisco	15 feet	ST-10
Single Family Residential	Little Hollywood, San Francisco	15 feet	ST-11
Single Family Residential	Harkness Avenue, San Francisco	15 feet	ST-12
Single Family Residential	Visitacion Valley, San Francisco	15 feet	ST-13
Single Family Residential	Mission Blue Neighborhood, Brisbane	15 feet	ST-14
Single Family Residential	Central Brisbane	30 feet	ST-15
Single Family Residential	Southern Hills Neighborhood, Daly City	15 feet	ST-16
Single Family Residential	Crocker Neighborhood, Daly City	15 feet	ST-17
Single Family Residential	Hillside Neighborhood, Daly City	15 feet	ST-18
Single Family Residential	Westlake Neighborhood, Daly City	15 feet	ST-19
Multi-family Residential	John Muir Drive, San Francisco	15 feet	ST-20
Single Family Residential	Urbano Drive, San Francisco	15 feet	ST-21
Single Family Residential	Excelsior Neighborhood, San Francisco	15 feet	ST-22

NOTES:

a. There are no sensitive receptors within areas of unincorporated San Mateo County within 900 feet of project components.
b. For the variant, this distance is reduced to 20 feet from trenching of transmission line on Geneva Avenue.

SOURCES: ESA, 2023; Google Earth (Imagery Date 9/11/2017) for parcel data (address and distance to the site).



SOURCE: ESA, 2023

PG&E Asset Acquisition Project

Figure 3
Project Variant (New City Substation) at Daly City Yard

A specific location has not yet been identified for the operations control center (OCC) or the service yard. Currently, it is assumed that the OCC would consist of an existing building repurposed within the southeast area of San Francisco to provide office space for dispatchers and operators. Because the OCC would be within an existing building, operational noise sources associated with the OCC would be limited to worker vehicle trips along roadways and use of a standby diesel generator. For the analysis, it is assumed that up to 35 workers spread across 3 shifts per day (or approximately 24 worker trips per shift change) would commute to the OCC per day, and that the OCC would be located in an industrial, commercial or mixed-use district that could be adjacent to residential uses.[10] Operational noise sources associated with the service yard would also be limited to vehicle movements within the yard and worker vehicle trips along roadways. For the analysis, it is assumed that up to 183 workers would work at the service yard. A semi-quantitative analysis will be used to assess the potential for noticeable (3 decibel [(dBA]) increases in roadside noise levels, assuming residential uses along the primary roadway used to access the OCC and the service yard. EP has proposed to provide modeled values and a zoning overlay to assess traffic noise impacts.

To establish existing ambient noise conditions at sensitive receptors, baseline noise measurements are proposed near the sensitive receptors. Either long-term or short-term measurements are proposed, depending on whether the receptors would be exposed to noise during construction and operations, or during construction only. Long-term noise measurements are taken in areas where receptors would be exposed to operational noise and short-term noise measurements are taken in areas where receptors would be exposed to construction noise only. Long-term measurements will be collected by Type-1 sound level meters continuously for a period of 48 hours. Long -term noise monitoring locations LT-1 through LT-5 are proposed to capture the existing ambient conditions at the receptor locations surrounding the Martin Substation and Daly City Yard, both of which could operate new transformers or other stationary equipment that could operate 24 hours per day. All long-term noise monitoring locations are within the City of Daly City because there are no Brisbane sensitive receptors within 900 feet of Martin Substation, and San Francisco sensitive receptors are farther from potential operations than Daly City sensitive receptors.

- Location LT-1 is intended to capture the existing noise levels at the closest residences to the Martin Substation to the north, across Geneva Boulevard.
- Location LT-2 is intended to capture the existing noise levels at the closest residences to the Daly City Yard to the north, across Geneva Boulevard.
- Location LT-3 is intended to capture the existing noise levels at the closest residences and elementary school to the west of the Daly City Yard.
- Location LT-4 is intended to capture the existing noise levels at the closest residences to the Martin Substation to the south.
- Location LT-5 is intended to capture the existing noise levels at the closest residences (Midway Village Phase I development) to the Daly City Yard to the south.

[10] SFPUC estimate.

Short-term noise monitoring locations were selected to capture the existing daytime ambient conditions at the receptor locations at regular intervals along the distribution express feeder alignment and within representative areas where local distribution system separation and system reinforcement work would occur. Short-term noise monitoring locations are within the Cities of San Francisco, Daly City, and Brisbane. Up to 22 short-term (20-minute) noise measurements will be collected. Data from long-term monitoring locations can also be used to establish daytime noise levels for evaluation of construction noise impacts relative to distribution express feeders, local distribution system separation (LDSS), and system reinforcement work.

Vibration Receptors

Construction-period vibration could adversely affect adjacent and nearby buildings, particularly historic buildings or older masonry structures, which tend to be fragile and thus relatively more susceptible to vibration impacts. Vibration-inducing construction activities would include sheet pile driving (either impact or vibratory hammer) for jack-and-bore pits, use of compaction equipment (vibratory rollers), and drill rigs. Pile driving would also be required for the Variant.[11] A table will be presented that summarizes the vibration levels of proposed construction equipment known to generate vibration at various distances for all project components. Data in this table will be used to identify the distances at which vibration levels could affect historic structures and recommend appropriate measures to address the effects of vibration. Specific distances to adjacent older off-site structures of the proposed project work boundaries will be included to the degree that such identification is prepared in the Cultural Resources memorandum for historic structures.

Additionally, construction-period vibration can adversely affect the operations of vibration-sensitive equipment (e.g., magnetic resonance imaging equipment; high-resolution lithographic, optical and electron microscopes). As discussed above, a table will be presented that summarizes the vibration levels of proposed construction equipment known to generate vibration at various distances. Data in this table will be used to identify the distances at which vibration levels could affect vibration-sensitive equipment and recommend appropriate measures to address the effect of vibration.

Jurisdictions of Work Area and Receptors

Construction activities would occur in the following three jurisdictions:

- **The City of Brisbane** – All work within the Martin Substation would occur within the City of Brisbane (as shown on Figure 3). However, the receptors nearest to the Martin Substation are all located within the City of Daly City.

  A relatively small portion of the local distribution system separation and system reinforcements in the southeast area would also occur within the City of Brisbane and could potentially impact the nearest receptors within the Little Hollywood neighborhood of the City of San Francisco.

[11] While several types of construction equipment can cause some vibration, equipment used for pile driving, compaction, and drilling create vibration at sufficient levels to potentially damage adjacent structures.

- **The City of Daly City** – All work and activities in the Daly City Yard, inclusive of the project variant, would occur within the City of Daly City. Additionally, the segments of the distribution express feeder alignment on Geneva Avenue between Bayshore Boulevard and Santos Street would occur within, and affect the nearest receptors within, the City of Daly City.

  Portions of the local distribution system separation and system reinforcements in all three areas would also occur within the City of Daly City and potentially impact nearby receptors in both Daly City and San Francisco.

- **The City of San Francisco** - The segments of the distribution express feeder alignment on Geneva Avenue between Santos Street and Alemany Boulevard would occur within, and would affect the nearest receptors within, the City of San Francisco. Additionally, all remaining segments of the distribution express feeder alignment not on Geneva Avenue would occur within, and affect the nearest receptors within, the City of San Francisco.

  Portions of the local distribution system separation and system reinforcements in all three areas would also occur within the City of San Francisco and potentially impact nearby receptors in both Daly City and San Francisco.

Construction Noise Thresholds to be used for the Project Analysis

The noise analysis will assess the project's compliance with the noise ordinances of the cities of Brisbane, Daly City, and San Francisco and, where applicable, the noise ordinance for the County of San Mateo. The noise analysis will also assess construction noise based on the City of San Francisco thresholds and methodology.

County of San Mateo

Noise from construction activities is exempt from San Mateo County interior and exterior noise standards, provided it occurs within hours specified by San Mateo County Code Section 4.88.360(e), which are between 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 am. to 5:00 p.m. on Saturdays. Construction is prohibited on Sundays, Thanksgiving, and Christmas.

City of Brisbane

Noise from construction activities is restricted by Section 8.28.060 of the Brisbane Municipal Code. This section limits construction hours to between 7:00 a.m. and 7:00 p.m. on weekdays and 9:00 a.m. and 7:00 p.m. on weekends and holidays. Further, this section includes the following standards:

A. No individual piece of equipment shall produce a noise level exceeding eighty-three (83) dBA at a distance of twenty-five (25) feet from the source thereof.

B. The noise level at any point outside of the property plane of the project shall not exceed eighty-six (86) dBA.

City of Daly City

The Daly City municipal code does not have any restrictions on construction noise. Section 9.22.030 addresses disturbing the peace and has no quantitative limits; it prohibits noise disturbance between 10 p.m. and 6 a.m. The Daly City 2030 General Plan states that construction noises are regulated through the environmental review process by the Engineering and Planning Division. Typically, construction activities are limited to the daytime hours, 8 a.m. to 5 p.m., and prohibited on weekends and holidays. The general plan noise compatibility guidelines define normally acceptable noise levels for proposed residential use at 60 dBA CNEL.

In lieu of any available quantitative construction standards, the analysis of construction noise impacts generated by construction activities within the City of Daly City will apply the City of San Francisco thresholds and methodology, discussed below.

City and County of San Francisco

San Francisco Noise Ordinance Section 2907(a) limits noise from construction equipment to 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient distance. Exemptions to this requirement include impact tools with approved mufflers, pavement breakers, and jackhammers with approved acoustic shields; and construction equipment used in connection with emergency work. However, Section 2907(b) requires that all such equipment be used with manufacturer-approved acoustic shields.

Noise Ordinance Section 2908 prohibits nighttime construction (between 8:00 p.m. and 7:00 a.m.) that generates noise exceeding the ambient noise level by 5 dBA at the nearest property line unless the City and County of San Francisco has issued a special permit.

The use of multiple pieces of equipment simultaneously on one or more building sites is not covered under the noise ordinance. Therefore, the impacts of combined construction noise within San Francisco will be analyzed based on Federal Transit Administration (FTA) guidance. FTA's general construction noise assessment approach recommends assessing the two noisiest pieces of construction equipment operating concurrently at the center of the project site.[12]

The construction noise analysis will evaluate, using the FTA general construction assessment criterion (i.e., 90 dBA 1-hour L_{eq} at the nearest noise-sensitive receptor), the noise level resulting from simultaneous operation of the two loudest pieces of equipment and whether the noise level would be 10 dBA or greater above the ambient noise level at the locations of sensitive receptors.

FTA also has a 100 dBA general construction assessment criterion applicable to commercial and industrial land uses. Potential construction noise impacts will be assessed for two scenarios. The first scenario will evaluate the noise levels near proposed locations of pile driving (the Daly City yard for the project variant or jack and bore crossing pits). The second scenario will evaluate the noise levels of standard construction equipment assuming a worst-case distance of 15 feet. If the

[12] The FTA does not publish a software noise model; as such, the Federal Highway Administration's model will be used and impacts will be assessed using FTA's methodology for assessing impacts.

analysis indicates that any of the above quantitative criteria are exceeded at a 15-foot distance, then a table will be provided the presents the noise levels at various distances from work areas out to the distance where noise levels would be below the appropriate criteria. Consistent with FTA and the Federal Highway Administration (FHWA) methodology, combined construction noise will be assessed relative to an hourly L_{eq} and account for equipment percentage uses as inventoried by FHWA. If any of these quantitative standards are met or exceeded, the impact analysis will evaluate the frequency, duration, and intensity of that noise above the quantitative standards to determine whether a significant noise impact could occur.

Nighttime Construction

Night work may be required at Martin Substation to stay on schedule. Tasks such as outage switching, cable splicing, electrical connections, low voltage wiring, and relay modifications could be completed at night to help stay on schedule. These tasks would typically use hand tools, various electrical testing and metering devices, and task lighting. These tools and meters are not noise intensive. They are able to be completed at night without substantial disturbance to the public. Construction tasks using heavy machinery, pile driving, and other major construction work occur typically during normal day time hours. Therefore, a quantitative assessment of nighttime construction noise will not be included in the Noise Technical Study.

Operational Noise Thresholds to be used for the Project Analysis

The noise analysis will assess the proposed project's compliance with the noise ordinances of the cities of Brisbane, Daly City, and San Francisco for operation of stationary equipment. For traffic noise impact assessment, a semi-quantitative analysis will be used to assess the potential for noticeable (3 decibel [(dBA]) increases in roadside noise levels, assuming residential uses along the primary roadway used to access the OCC and service yard. While the southern portion of the Olympic Club is within unincorporated areas of San Mateo County where LDSS and system reinforcement work is proposed, no operational sources are proposed in this area. Therefore, operational noise restrictions of the County Code are not included in the discussion below.

City of Brisbane

The City of Brisbane regulates community noise levels through enforcement of Chapter 8.28 of the Brisbane Municipal Code. Noise standards are established by land use and are presented in **Table 3**. As indicated in the table, the generation of noise levels by any machine, animal, or device in excess of 30 dBA over the existing ambient noise level is prohibited. Such equipment may generate noise levels of up to 20 dBA above existing ambient noise levels provided that the noise is generated for no more than three minutes per given hour. Similarly, such equipment may generate noise levels of up to 10 dBA above existing ambient noise levels provided that the noise is generated for no more than 10 minutes per given hour.

TABLE 3
BRISBANE MUNICIPAL CODE CHAPTER 8.28 NOISE STANDARDS

Land Use Type	Duration of Noise in Minutes within an Hour	Noise Standard as Maximum Allowable dBA Above Ambient
Residential	At any time	30
	3 minutes	20
	10 minutes	10
Commercial/Industrial	Any time	30
	3 minutes	20
	10 minutes	10

SOURCE: City of Brisbane, 2023

City of Daly City

Section 9.22.030 of the Daly City Municipal Code establishes nuisance noise restrictions. Between the hours of 10 p.m. and 6 a.m. of the following day, no person shall cause, create or permit any noise, music, sound or other disturbance upon his property which may be heard by, or which noise disturbs or harasses, any other person beyond the confines of the property, quarters or apartment from which the noise, music, sound or disturbance emanates. The Code does not establish operational noise standards within the City. In lieu of any available quantitative operational standards, the analysis of operational noise impacts generated by operational activities within the City of Daly City will apply the City of San Francisco thresholds and methodology, discussed below.

City and County of San Francisco

San Francisco Noise Ordinance Section 2909 regulates fixed source noise. Specifically, on public property, Section 2909(c) generally prohibits noise produced by any machine or device, or any combination of the two on a public property, that exceeds the local ambient noise level more than 10 dBA at a distance of 25 feet or more unless the machine or device is being operated to serve or maintain the property.

The standards in Section 2909(d)—45 dBA between 10:00 p.m. and 7:00 a.m. and 55 dBA between 7:00 a.m. and 10:00 p.m.—are the absolute maximum allowable level of interior noise produced from any combination of mechanical device(s) and audio systems(s) under one ownership/use originating from outside the dwelling unit. The standards in this section may not apply to areas in which the ambient noise level exceeds the limits. This interior noise standard of 45 dBA will be applied to evaluate potential operational nighttime noise impacts to residential land uses and the potential for sleep disturbance.

Vibration Threshold Criteria

There are no quantitative vibration standards or criteria established in the General Plans or municipal codes of the City of Brisbane, Daly City or San Francisco. Therefore, the criterion used

for impacts from construction-related vibration levels from standard construction equipment will be the vibration damage criteria compiled and published by Caltrans for historic structures (0.25 inches per second PPV), non-historic structures (0.3 inches per second PPV for residential and 0.5 inches per second PPV for commercial/industrial), pipelines and optical-fiber cable as applicable (refer to following section, below). The programmatic analysis of potential impacts to vibration-sensitive equipment will apply the FTA criterion of 65 vibration decibels (VdB) to assess potential significance.

Proposed Noise and Vibration Impact Assessment Methodology

This section describes the proposed methodology for assessing construction noise, operational noise, and construction vibration. **Table 4** summarizes the proposed criteria for the noise and vibration analysis, discussed in greater detail below.

Construction Impact Assessment

Impacts from Construction Work Generated within the City of San Francisco and Affecting Receptors within San Francisco and Daly City:

Impacts from each of three potential construction activities under the project occurring within the City of San Francisco will be individually assessed: Construction activities associated with the distribution express feeders; construction activities associated with LDSS; and construction activities associated with system reinforcements work. The potential for construction for distribution express feeders, LDSS, and system reinforcements work to overlap for some receptor areas will be assessed qualitatively.

The analysis will assess construction-related noise levels generated within the City of San Francisco from non-impact equipment based on compliance with standards contained in Section 2907(a) of the San Francisco Police Code, as well as in terms of the overall increase in ambient noise levels based on operation of the two noisiest pieces of typical construction equipment expected by the project sponsor to be used in demolition, excavation, and construction. For impact and non-impact equipment, the analysis will also compare estimated construction noise levels against Federal Transportation Administration (FTA) daytime noise standards of 90 dBA for residential uses and 100 dBA for commercial and industrial land uses. Potential construction noise impacts to commercial uses will be assessed for two scenarios. The first scenario will evaluate the noise levels near proposed locations of pile driving (jack and bore crossing pits[13] within San Francisco). The second scenario will evaluate the noise levels of standard construction equipment for typical trenching assuming a worst-case distance of 15 feet. If the analysis indicates that noise levels will exceed the above criteria at a 15-foot distance, then a table will be provided that presents the noise levels at various distances from work areas out to the distance where noise would be below the appropriate criteria. The analysis will apply FTA's general assessment methodology, analyzing simultaneous operations of the two noisiest pieces of equipment.

[13] Sheet piles at entry and exit pits would be vibrated into place with a vibratory hammer.

TABLE 4
PROPOSED CRITERIA FOR THE NOISE AND VIBRATION ANALYSIS

Source Location[a]	Noise-Sensitive Receptor Location[b]		
	San Francisco	**Daly City**	**Brisbane**
Construction Noise			
San Francisco	>80 dBA at 100 feet from single equipment >90 dBA for residential uses, using FTA combined equipment approach >10 dBA above ambient, using FTA combined equipment approach If any of the above quantitative criteria are exceeded, the noise analysis will assess the frequency, duration, and intensity of that noise above the quantitative standards to determine whether a significant noise impact could occur.	In lieu of applicable quantitative thresholds within the City of Daly City General Plan or noise ordinance, the analysis will apply the same criteria as for receptors within the City of San Francisco	Not applicable since there are no noise-sensitive receptors within the City of Brisbane that would be within 900 feet of work occurring within the City of San Francisco
Daly City	Same as San Francisco	Same as San Francisco	Not applicable since there are no noise-sensitive receptors within the City of Brisbane that would be within 900 feet of work occurring within the City of Daly City.
Brisbane	>86 dBA outside the property plane, individual piece of equipment >83 dBA at 25 feet, and San Francisco criteria	>86 dBA outside the property plane, individual piece of equipment >83 dBA at 25 feet, and San Francisco criteria	>86 dBA outside the property plane, individual piece of equipment >83 dBA at 25 feet, and San Francisco criteria
San Mateo County	Time restriction only in the County Code for construction. In lieu of applicable quantitative thresholds, the analysis will apply the same criteria as for receptors within the City of San Francisco	In lieu of applicable quantitative thresholds within the County Code or City of Daly City General Plan or noise ordinance, the analysis will apply the same criteria as for receptors within the City of San Francisco.	In lieu of applicable quantitative thresholds within the County Code, the analysis will apply the same criteria as for receptors within the City of Brisbane.
Operational Noise			
San Francisco	>10 dBA increase in ambient at 25 feet from equipment >45 dBA at interior of nearest noise-sensitive receptor at night >55 dBA at interior of nearest noise-sensitive receptor during day	Not applicable since there are no noise-sensitive receptors within 900 feet of operational equipment in San Francisco	Not applicable since there are no noise-sensitive receptors within 900 feet of operational equipment in San Francisco

Source Location[a]	Noise-Sensitive Receptor Location[b]		
	San Francisco	**Daly City**	**Brisbane**
Daly City	Same as San Francisco	Apply San Francisco standards since Daly City has no quantitative operational noise standards	Not applicable since there are no noise-sensitive receptors in the City of Brisbane that are within 900 feet of operational equipment (Martin Substation or Daly City Yard)
Brisbane	Not applicable since no receptors within 900 feet of operational equipment (Martin Substation)	>10 dBA above local ambient to any receiver for more than 10 minutes in any hour; however, because noise source would be steady-state, will apply the San Francisco Police Code Section 2909 (c)[c]	
Construction Vibration			
San Francisco, Daly City, and Brisbane	>0.5 PPV[d] for modern industrial/commercial buildings >0.3 PPV for older residential structures >0.25 PPV for historic structures > 4.0 PPV for pipelines and optical-fiber cables > 65 VdB for vibration-sensitive equipment		

NOTES:
a Construction truck traffic and operational traffic noise approach and thresholds would be the same regardless of receptor or source location and are not shown.
b There are no sensitive receptors within areas of unincorporated San Mateo County within 900 feet of project components.
c Direct calculation of this metric would require a knowledge of the frequency at which the equipment cycles on and off. At present, this information is not available and this analysis will conservatively assume that equipment operates at a steady-state noise level throughout a given hour.
d PPV = peak particle velocity. This is the peak signal value of an oscillating vibration velocity waveform, usually expressed in inches/second.

SOURCE: ESA

In addition to FTA noise standards, construction noise levels will be assessed based on whether ambient noise levels at nearby receptors would increase by 10 dBA or more. If any of the above quantitative criteria are exceeded, the noise analysis will assess the frequency, duration, and intensity of that noise above the quantitative standards to determine whether a significant noise impact could occur.

Because the City of Daly City does not have quantitative construction noise standards, the analysis will apply the City of San Francisco's criteria as described above for assessing impacts to receptors within the City of Daly City.

Impacts from Construction Work Generated within the City of San Francisco and Affecting Receptors within Brisbane:

There are no existing noise-sensitive receptors within the City of Brisbane within 900 feet of any of the components of the proposed project inclusive of distribution express feeders, local distribution system separation, and system reinforcements that would occur within the City of San Francisco. Additionally, there are no commercial or industrial uses within the City of Brisbane that would be within 900 feet of construction work in the City of San Francisco. Therefore, construction noise impacts would be less than significant to these receptors and analysis in the Technical Noise Memorandum will state this succinctly.

Impacts from Construction Work Generated within the City of Daly City and Affecting Receptors within San Francisco and Daly City:

Impacts from each of five different construction activities under the project and variant within the City of Daly City will be individually assessed (i.e. construction-related staging activities occurring within the Daly City as part of the Martin Substation construction; construction activities associated with the distribution express feeders; construction activities associated with LDSS and system reinforcements work; and construction occurring within the Daly City Yard for the project variant. The potential for construction for Martin Substation, distribution express feeders, LDSS, and system reinforcements work to overlap for some receptor areas will be assessed qualitatively.

Because the City of Daly City does not have quantitative construction noise standards, the analysis will apply the City of San Francisco's criteria as described above for assessing impacts from construction noise generated within the City of Daly City and FTA's 90 dBA criteria for residential uses and 100 dBA for commercial and industrial land uses. Potential construction noise impacts to commercial uses will be assessed for two scenarios. The first scenario will evaluate the noise levels near proposed locations of pile driving (pile driving for construction of the project variant within Daly City). The second scenario will evaluate the noise levels of standard construction equipment assuming a worst-case distance of 15 feet. If the analysis indicates that any of the above quantitative criteria are exceeded at a 15-foot distance, then a table will be provided the presents the noise levels at various distances from work areas out to the distance where noise would be below the appropriate criteria.

Impacts from Construction Work Generated within the City of Brisbane and Affecting Receptors within San Francisco and Daly City:

Impacts from each of three construction activities under the project within the City of Brisbane will be assessed (construction-related activities occurring within the Martin Substation; construction activities associated with the LDSS; and construction activities associated with system reinforcements work).

The City of Brisbane has established two noise standards with respect to construction noise. The first standard prohibits operation of individual pieces of equipment from producing a noise level exceeding 83 dBA at a distance of 25 feet. This standard is equivalent to a noise level of 95 dBA at a distance of 100 feet. Because the City of San Francisco‘s individual equipment noise standard is 80 dBA at 100 feet, it is a more stringent standard and application of this standard will satisfy the restrictions of the City of Brisbane’s threshold for single equipment noise.

The second City of Brisbane standard with respect to construction noise prohibits the generation of a noise level at any point outside of the property plane of the project from exceeding 86 dBA. This will be an additional criterion that will be applied to construction noise analysis for the construction work at Martin Substation. Impacts related to this second criterion will be assessed at the property plane of the receptor.

In addition, the analysis will apply the City of San Francisco’s criteria, as described above, for assessing impacts from construction noise generated within the City of Brisbane.

Impacts from Construction Work Generated within the City of Brisbane and Affecting Receptors within Brisbane:

The only construction activity within the City of Brisbane for which there are receptors within the City of Brisbane located within 900 feet would be the system reinforcements. Analysis of these construction impacts will be conducted using the two City of Brisbane criteria discussed above and shown in Table 4.

Construction Truck Traffic Noise

Haul and vender truck trips would be generated by construction activities at the Martin Substation and by trenching activities for the distribution express feeders, the local distribution system separation, and system reinforcements. Hourly truck trip increments will be calculated based on the volumes contained in the air quality RFI response and the discussion of increased traffic noise will focus on existing alignment locations, existing roadway volumes on roadways (as available) and the potential for an increase in roadway noise that could lead to a 3 dBA increase. For construction truck trips into and out of Martin Substation, the analysis will focus on potential impacts along Geneva Avenue, Bayshore Boulevard, Alemany Boulevard, John Daly Boulevard, Lake Merced Boulevard, and Schwerin Street (potential staging area access). For truck trips generated by distribution express feeders, the local distribution system separation, and system reinforcements, the analysis will focus on the estimate of hourly truck trips generated and the degree to which their contribution would be equivalent to the existing monitored noise levels at locations representative of areas in each area in a tabular format. A quantitative analysis is recommended because the contribution would be entirely truck trips which generate more noise

than the existing roadway vehicle mix (which has only a small percentage of heavy-duty trucks). If the contribution of hourly construction trucks would be equivalent to the existing monitored daytime noise level, then the potential exists for a doubling of sound energy and an increase of 3 dBA.

Operational Noise Impact Assessment

Impacts from Stationary Equipment Generated within the City of San Francisco and Affecting Receptors within San Francisco:

Stationary equipment within the City of San Francisco would primarily result from a backup diesel generator for the OCC.

The potential operational noise impacts of new mechanical and stationary equipment will be assessed, to the extent equipment specifications are available and with consideration to the frequency of operation. Given that there would only be a single generator which would be operated up to 50 hours per year for maintenance purposes, the analysis will be qualitative in nature and will assume that maintenance operations will be restricted to daytime hours.

It is assumed that the existing building to be acquired for the OCC will have existing HVAC equipment. If this existing system would need to be replaced as part of the project it would be sized to serve the same square footage of interior space. However, the HVAC specifications are not known at this time and the potential exists for the replacement HVAC system to have increased cooling demand. Therefore, the analysis will assume a rooftop mounted HVAC package associated with industrial land use. If warranted, the analysis will identify a performance standard to ensure compliance with the noise ordinance, consistent with the approach for other development projects in San Francisco.

Operational Noise Impacts from Stationary Equipment Generated within the City of Daly City and Affecting Receptors within Daly City:

Operational noise generated within the City of Daly City would result from the project variant under which a new substation would be constructed in the Daly City Yard. All receptors within 900 feet of the Daly City Yard are located in the City of Daly City, so receptors in San Francisco are not anticipated to be affected. Because the City of Daly City does not have quantitative operational noise standards, the analysis will apply the City of San Francisco's thresholds, as described above, for assessing impacts from operational noise from stationary sources within the City of Daly City.

Operational Noise Impacts from Stationary Equipment Generated within the City of Brisbane and Affecting Receptors within Daly City:

Operational noise generated within the City of Brisbane would result from improvements proposed for the Martin Substation. All receptors within 900 feet of the Martin Substation are located in the City of Daly City. The City of Daly City does not have quantitative operational noise standards and, because the new or modified stationary sources would exist within the City of Brisbane, the analysis will apply the City of Brisbane standards. The most stringent restriction of the Brisbane municipal code prohibits noise produced by any machine, animal or device or any

combination of same, in any commercial or industrial zoning district from generating a noise level more than 10 dBA above the local ambient to any receiver for a cumulative period of more than 10 minutes in any hour (section 8.26.040). Such a restriction would be equivalent to the noise produced for 17 percent of an hour (L_{17} metric). Noise from substation operations includes transformers that would operate constantly, and fans that would operate approximately five hours a day (4-9 pm) during the hottest months (May through October). Noise generated by transformers is generally steady-state and would not have fluctuations in hourly operational duration. [14] Transformer operations may be characterized as having a pure tone character. Because there is no more stringent exterior noise standard in the City of Brisbane municipal code, the analysis in the noise study will apply this10 dBA increase over ambient as a significance standard which is similar to the standard contained in the City of San Francisco Police Code (Section 2909 (c)). Because the City of Daly City does not have quantitative operational noise standards, the analysis will apply the City of Brisbane and San Francisco's standards, as described above, for assessing impacts from operational noise in Brisbane. Appendix D to the state of California General Plan Guidelines[15] contains a table of recommended adjustments to standards for land use noise compatibility. For noisy urban residential communities near relatively busy roads or industrial areas, such as Geneva Avenue, a 5 dBA accommodation is recommended, while for sources with a "pure tone character", a 5 dBA penalty is recommended. Because these two conditions cancel out each adjustment, no adjustment is warranted for the significance criteria proposed above.

In addition to transformer noise, noise from cooling fans will also be separately evaluated. Although fans will only operate during the hottest months and for up to 5 hours per day, fan noise will be compared to the applicable daytime noise standard.

Operational Traffic Noise

Approximately 400 additional employees and additional maintenance would generate new traffic trips that could increase noise levels along roadways used to access work locations, inclusive of both the future OCC and the existing headquarters building. It is assumed that new employee trips would be based at SFPUC offices, service yard, and the OCC. However, no location has presently been identified for the OCC and service yard components. Therefore, a qualitative discussion of increased traffic noise is proposed with a focus on existing service yard locations, existing roadway volumes on roadways (as available) and the potential for a doubling in traffic volumes that could lead to a 3 dBA increase. For this analysis, it is assumed that up to 35 workers per day (or 24 worker trips per shift change) would commute to the OCC per day, and that the OCC would be located in an industrial, commercial or mixed-use district that potentially could be adjacent to residential uses. The service yard is anticipated to have 183 employees who are conservatively assumed to arrive and depart during the same peak hour which would translate to 183 peak hour one-way vehicle trips. Unless otherwise specified during the transportation

[14] It is acknowledged that operations would be approximately 5 hours a day (4:00 to 9:00 P.M.), 7 days a week, for the six hottest months of the year. The analysis will conservatively examine the worst-case hour when equipment is operating and will assume steady-state operation during that hour.

[15] Governor's Office of Planning and Research, *State of California 2017 General Plan Guidelines, Appendix D: Noise Element Guidelines, Page 375,* 2017. This document is available online at: http://opr.ca.gov/docs/OPR_Appendix_D_final.pdf.Accessed February 8, 2023.

demand estimate, this analysis will assume all trips are conducted by passenger vehicles or light duty trucks.

For traffic noise impact assessment, a semi-quantitative analysis will be used to assess the potential for noticeable (3 decibel [(dBA]) increases in roadside noise levels, assuming existing residential uses along the primary roadway used to access the OCC are outside of the clearly acceptable land use compatibility category of the General Plan. For commercial/industrial receptors, the analysis will apply a 5 dBA increase unless the existing noise level exceeds the 70 dBA clearly acceptable land use compatibility category for such uses in which case the criterion for commercial/industrial would be 3 dBA.

EP has proposed to provide modeled values and a zoning overlay to assess traffic noise impacts. ESA will use an overlay of commercial/industrial zoning on top of modeled traffic noise for 2020 from housing element to be provided by EP, to identify commercial/industrial zoned areas adjacent to relatively quiet streets, and evaluate the potential impacts using those streets as the baseline.

Construction Vibration

Construction activities that would occur within the project site include grading, excavation, compaction, and, in some locations, vibratory or impact pile driving which would have the potential to generate groundborne vibration. Groundborne vibration levels resulting from construction activities at the project site will be estimated using data published by Caltrans in its *Transportation and Construction Vibration Guidance Manual* (2020) document. The potential vibration levels at offsite vibration-sensitive uses will be analyzed against the vibration criteria for structural damage established in Caltrans' *Transportation and Construction Vibration Guidance Manual*. Because construction activities involving heavy equipment would occur during daytime hours, potential vibration impacts with respect to human annoyance are not expected or proposed to be analyzed.

Vibration impact criteria for structural damage depends on the type of structure potentially impacted. The vibration building damage criterion for modern industrial/commercial buildings is 0.5 PPV. The building damage criterion for older residential structures is 0.3 PPV and for historic structures the criterion is 0.25 PPV. Calculation of vibration attenuation with distance will apply the following formula for peak particle velocity (PPV):

$$PPV_{equipment} = PPV_{reference\ at\ 25\ feet} \times (25/distance)^{1.1}$$

Vibration may also impact underground structures and gas pipelines. The 2004 American Association of State Highway and Transportation Officials (AASHTO) guidelines include references for underground utility criteria, citing studies that indicate vibration under the ground surface is lower than that measured at the ground surface. One major utility has adopted a criterion of 4.0 in/sec (100 mm/sec) for underground optical-fiber cables (AASHTO 2004). Underground or restrained concrete structures can withstand vibration of 10.0 in/sec (254 mm/sec)

before the appearance of threshold cracks. Thus, these criteria will be applied to pipelines/cables and underground structures, respectively.

If the street-level physical reconnaissance of the project areas and alignments results in identification of potential land uses that typically operate vibration-sensitive equipment within 500 feet[16] of the project boundary, the analysis will assess potential impacts using the vibration attenuation with distance. This analysis will apply the following formula for vibration decibels (VdB):

VdB(distance) = Vdb(reference25 at feet) – 30log(distance/25)

The criterion for vibration-sensitive equipment is 65 VdB, as published by FTA and based on the root mean square velocity amplitude.

Cumulative Construction Noise

Construction activities under the proposed project could potentially coincide with construction activities associated with other cumulative projects which may include but are not limited to Baylands North, San Francisco State Master Plan, Park Merced and locations of routine infrastructure repair, maintenance, and improvement projects. Construction activities under the proposed project combined with construction of cumulative projects have the potential to result in a combined increase in construction noise. The potential for projects to overlap, resulting in combined or prolonged increases in ambient noise, will be assessed in consideration of a construction noise influence area generally defined as the area 900 feet from a construction site.

Construction of multiple projects consecutively could increase the duration of construction noise levels that would be 10 dBA above the ambient noise level or 90 dBA at sensitive receptors or above standards presented in Table 4. Depending on the intensity of construction noise levels, the frequency for which construction noise exceeds criteria, and the duration of activity, noise from cumulative construction activities could be significant. Because the locations of the OCC, service yard, LDSS and system reinforcements are not specified at present, the analysis of potential cumulative impacts for these elements will be addressed under the assumption that the potential exists for a cumulative impact within the limited construction noise influence area and the analysis will evaluate the project's contribution to construction noise.

Cumulative Operational Noise

Cumulative operational noise contributions of the proposed project and variant would primarily be the result of localized traffic increases generated by the OCC and service yard and stationary noise of the electrical transformers and cooling equipment and generator. Project contributions to cumulative stationary source noise impacts will be assessed qualitatively given that specifics of the contributions of other cumulative projects will not be known quantitatively. With respect to traffic noise, project traffic contributions will be added to the 2050 roadway volumes estimated

[16] At a distance of 500 feet, vibrations generated by an impact pile driver would be attenuated to below the threshold for impacts to vibration-sensitive equipment of 65 VdB.

for the San Francisco Housing Element 2022 Update EIR which identified significant and unavoidable cumulative traffic noise impacts. The analysis will either use modeled values and a zoning overlay to be provide by EP, or 2050 roadway volumes to determine if the proposed project would result in a cumulatively considerable contribution to predicted significant cumulative roadway noise impacts.

Attachment C

Supporting Materials for Noise Analysis

C.1 Construction Noise Modeling Output

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/11/2024
Case Description: Distribution Express Feeder Alignment - Microtunneling

**** Receptor #1 ****

Description	Baselines (dBA) Land Use	Daytime	Evening	Night
Sagamore Street Residences, San Francisco	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		15.0	0.0
Vibratory Pile Driver	No	20		100.8	15.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	94.5	90.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vibratory Pile Driver	111.3	104.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	111.3	104.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/22/2024
Case Description: Distribution Express Feeder Alignment - Trenching (Within the City of Daly City)

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Geneva Avenue Residences, Daly City	Residential	55.0	55.0	50.0

Equipment Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	15.0	0.0
Jackhammer	Yes	20		88.9	15.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Concrete Saw	100.0	93.0			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	99.3	92.4			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	100.0	95.7			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A N/A N/A N/A N/A N/A N/A N/A

**** Receptor #2 ****

Description	Baselines (dBA) Land Use	Daytime	Evening	Night
Geneva Avenue Residences, San Francisco	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20	89.6		15.0	0.0
Jackhammer	Yes	20	88.9		15.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)	Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	100.0	93.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	99.3	92.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	100.0	95.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 04/01/2024
Case Description: Distribution Express Feeder Alignment - Trenching (Within the City of Daly City)

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Avenue Residences, Daly City	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	15.0	0.0
Excavator	No	40		80.7	15.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	89.6	85.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	91.2	87.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	91.2	89.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Avenue Residences, San Francisco	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	15.0	0.0
Excavator	No	40		80.7	15.0	0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Front End Loader	94.5	90.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	91.2	87.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	100.0	93.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/21/2024
Case Description: Distribution Express Feeder Alignment - Trenching (Within the City of San Francisco)

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Geneva Avenue Residences, Daly City	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	15.0	0.0
Jackhammer	Yes	20		88.9	15.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Concrete Saw	100.0	93.0			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	99.3	92.4			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	100.0	95.7			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A N/A N/A N/A N/A N/A N/A N/A

**** Receptor #2 ****

Description	Baselines (dBA) Land Use	Daytime	Evening	Night
Geneva Avenue Residences, San Francisco	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20	89.6		15.0	0.0
Jackhammer	Yes	20	88.9		15.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)	Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	100.0	93.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	99.3	92.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	100.0	95.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/22/2024
Case Description: Local Distribution System Separation or System Reinforcement Work - Trenching (Within the City of Brisbane)

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Mission Blue Neighborhood, Brisbane	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	15.0	0.0
Jackhammer	Yes	20		88.9	15.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Concrete Saw	100.0	93.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	99.3	92.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	100.0	95.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night

Central Brisbane	Residential	55.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	30.0	0.0
Jackhammer	Yes	20		88.9	30.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Concrete Saw	94.0	87.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	93.3	86.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	94.0	89.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/21/2024
Case Description: Daly City Yard Staging

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Geneva Residences	Residential	69.0	66.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	350.0	0.0
Dump Truck	No	40		76.5	350.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Front End Loader	62.2	58.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	59.5	55.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	62.2	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	61.0	61.0	61.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Front End Loader	No	40		79.1	500.0	0.0
Dump Truck	No	40		76.5	500.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Front End Loader	59.1	55.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	56.5	52.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.1	57.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/21/2024
Case Description: Martin Substation - Site Excavation (Include Trenching)

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	51.0	51.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		460.0	0.0
Concrete Saw	No	20		89.6	460.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	64.7	60.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	70.3	63.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.3	65.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Geneva Residences	Residential	66.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Concrete Saw	No	20		89.6	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	77.5	72.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Schwerin Street Residences	Residential	72.0	65.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		820.0	0.0
Concrete Saw	No	20		89.6	820.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)				Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	65.3	58.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.3	60.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Main Street	Residential	63.0	57.0	57.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		850.0	0.0
Concrete Saw	No	20		89.6	850.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)				Day		Evening		Night	

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/22/2024
Case Description: Martin Substation - Concrte Foundations

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Midway Village	Residential	51.0	51.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		460.0	0.0
Generator	No	50		80.6	460.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	64.7	60.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	61.4	58.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.3	65.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Residences	Residential	66.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Generator	No	50		80.6	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	77.5	72.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Schwerin Street Residences	Residential	72.0	65.0	65.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		820.0	0.0
Generator	No	50		80.6	820.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	56.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.7	57.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Main Street	Residential	63.0	57.0	57.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		850.0	0.0
Generator	No	50		80.6	850.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Noise Limits (dBA) Day Leq	Noise Limits (dBA) Evening Lmax	Noise Limits (dBA) Evening Leq	Noise Limits (dBA) Night Lmax	Noise Limits (dBA) Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Tractor	59.4	55.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	56.0	53.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.0	59.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/22/2024
Case Description: Martin Substation - Concrte Foundations

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Midway Village	Residential	51.0	51.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		460.0	0.0
Generator	No	50		80.6	460.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	64.7	60.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	61.4	58.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	70.3	65.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Residences	Residential	66.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Generator	No	50		80.6	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	77.5	72.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Schwerin Street Residences	Residential	72.0	65.0	65.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		820.0	0.0
Generator	No	50		80.6	820.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	56.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.7	57.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Main Street	Residential	63.0	57.0	57.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		850.0	0.0
Generator	No	50		80.6	850.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Noise Limits (dBA) Day Leq	Noise Limits (dBA) Evening Lmax	Noise Limits (dBA) Evening Leq	Noise Limits (dBA) Night Lmax	Noise Limits (dBA) Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Tractor	59.4	55.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	56.0	53.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.0	59.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/22/2024
Case Description: Martin Substation - Placement of Facilities

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Midway Village	Residential	51.0	51.0	50.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Generator	No	50	80.6	460.0	0.0	
Jackhammer	Yes	20	88.9	460.0	0.0	

Results

	Calculated (dBA)		Noise Limits (dBA)				Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Generator	61.4	58.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	69.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.6	64.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Residences	Residential	66.0	64.0	64.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Generator	No	50	80.6	200.0	0.0	
Jackhammer	Yes	20	88.9	200.0	0.0	

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	76.8	69.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	76.8	71.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Schwerin Street Residences	Residential	72.0	65.0	65.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Generator	No	50	80.6		820.0	0.0
Jackhammer	Yes	20	88.9		820.0	0.0

Results

	Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Generator	56.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	64.6	57.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	64.6	59.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Main Street	Residential	63.0	57.0	57.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Generator	No	50	80.6		850.0	0.0
Jackhammer	Yes	20	88.9		850.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Noise Limits (dBA) Day Leq	Noise Limits (dBA) Evening Lmax	Noise Limits (dBA) Evening Leq	Noise Limits (dBA) Night Lmax	Noise Limits (dBA) Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Generator	56.0	53.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	64.3	57.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	64.3	58.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/22/2024
Case Description: Martin Substation - Equipment and Gate Installation

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Midway Village	Residential	51.0	51.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		460.0	0.0
Jackhammer	Yes	20		88.9	460.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Noise Limit Exceedance (dBA) Day Leq	Noise Limit Exceedance (dBA) Evening Lmax	Noise Limit Exceedance (dBA) Evening Leq	Noise Limit Exceedance (dBA) Night Lmax	Noise Limit Exceedance (dBA) Night Leq
Tractor	64.7	60.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	69.6	62.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	64.7	62.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Residences	Residential	66.0	64.0	64.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Jackhammer	Yes	20		88.9	200.0	0.0

Results

Equipment	Noise Limits (dBA) Calculated (dBA) Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	76.8	69.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	72.0	70.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Schwerin Street Residences	Residential	72.0	65.0	65.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		820.0	0.0
Jackhammer	Yes	20		88.9	820.0	0.0

Results

Equipment	Noise Limits (dBA) Calculated (dBA) Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Tractor	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	64.6	57.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	64.6	59.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #4 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Main Street	Residential	63.0	57.0	57.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Tractor	No	40	84.0		850.0	0.0
Jackhammer	Yes	20		88.9	850.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	59.4	55.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Jackhammer	64.3	57.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.4	57.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/18/2024
Case Description: New Substation (Variant) - Site Excavation & Preparation

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	51.0	51.0	51.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Impact Pile Driver	Yes	20		101.3	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Night	Day	Calculated (dBA) Evening	Night	Day	Evening	Night
Equipment	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq
Tractor	72.0 68.0			N/A N/A	N/A N/A	N/A N/A
Impact Pile Driver	89.2 82.2			N/A N/A	N/A N/A	N/A N/A
Total	89.2 82.4			N/A N/A	N/A N/A	N/A N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Bayshore Elementary	Residential	72.0	70.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		300.0	0.0
Impact Pile Driver	Yes	20		101.3	300.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Impact Pile Driver	85.7	78.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.7	78.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/18/2024
Case Description: New City Substation - Placement of Facilities

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	51.0	50.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	200.0	0.0
Generator	No	50		80.6	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA)				Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Jackhammer	76.8	69.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	76.8	71.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Bayshore Elementary	Residential	72.0	70.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Jackhammer	Yes	20		88.9	300.0	0.0
Generator	No	50		80.6	300.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Jackhammer	73.3	66.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	65.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	73.3	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/18/2024
Case Description: New City Substation - Equipment and Gate

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	51.0	50.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Generator	No	50		80.6	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	72.0	70.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Bayshore Elementary	Residential	72.0	70.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		300.0	0.0
Generator	No	50		80.6	300.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	65.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.4	66.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/18/2024
Case Description: New City Substation - Concrete Foundations

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	51.0	50.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Generator	No	50		80.6	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	72.0	70.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Bayshore Elementary	Residential	72.0	70.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		300.0	0.0
Generator	No	50		80.6	300.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	65.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.4	66.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 10/18/2024
Case Description: New City Substation - Backfill and Grading

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Midway Village	Residential	51.0	50.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Generator	No	50		80.6	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	68.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	72.0	70.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Bayshore Elementary	Residential	72.0	70.0	65.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		300.0	0.0
Generator	No	50		80.6	300.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Tractor	68.4	64.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	65.1	62.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.4	66.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/21/2024
Case Description: New Substation (Variant) - Trenching

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Geneva Residences	Residential	69.0	66.0	64.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Concrete Saw	No	20	89.6	80.0		0.0
All Other Equipment > 5 HP	No	50	85.0	80.0		0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Concrete Saw	85.5	78.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	80.9	77.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.5	81.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

C.2 Traffic Noise Modeling Output

Construction Traffic

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE %						VEHICLE SPEED						NOISE LEVEL (dBA)			CALCULATED NOISE LEVEL 15 meters from	Receptor Dist. from Roadway	Adjusted Noise Level	Distance from Roadway to 65 dBA	Distance from Roadway to 65 dBA
				Auto		MT		HT		Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT					
	from:	to:		%	Auto	%	MT	%	HT										roadway center)	Center (m.)	(dBA)	(m.)	(ft)
Bayshore Boulevard	Geneva Avenue	Guadalupe Canyon Parkway	11	39.3	4.4	40	4.533	20	2.267	45	72	45	72	45	72	43.9	52.3	55.3	57.3	40	53.0	2.5	8.3
Bayshore Boulevard	Geneva Avenue	Arleta Avenue	11	39.3	4.4	40	4.533	20	2.267	35	56	35	56	35	56	40.7	50.6	54.3	51.0	40	46.8	0.6	2.0
Bayshore Boulevard	Arleta Avenue	Blanken Avenue	11	39.3	4.4	40	4.533	20	2.267	35	56	35	56	35	56	40.7	50.6	54.3	51.0	40	46.8	0.6	2.0
Bayshore Boulevard	Blanken Avenue	Hester Avenue	11	39.3	4.4	40	4.533	20	2.267	35	56	35	56	35	56	40.7	50.6	54.3	51.0	40	46.8	0.6	2.0
Geneva Avenue	Bayshore Boulevard	Schwerin Street	11	39.3	4.4	40	4.533	20	2.267	35	56	35	56	35	56	40.7	50.6	54.3	51.0	40	46.8	0.6	2.0
Geneva Avenue	Schwerin Street	Cow Palace	11	39.3	4.4	40	4.533	20	2.267	35	56	35	56	35	56	40.7	50.6	54.3	51.0	40	46.8	0.6	2.0
Geneva Avenue	Cow Palace	Carter Street	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Geneva Avenue	Carter Street	Prague Street	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Geneva Avenue	Prague Street	Alemany Boulevard	9	37.8	3.4	41	3.733	21	1.867	25	40	25	40	25	40	35.4	47.5	52.1	47.7	40	43.5	0.3	0.9
Alemany Boulevard	Geneva Avenue	Ottawa Avenue	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Alemany Boulevard	Ottawa Avenue	Sickles Avenue	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Alemany Boulevard	Sickles Avenue	Sagamore Street	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Alemany Boulevard	Sagamore Street	St Charles Avenue	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Alemany Boulevard	St Charles Avenue	Junipero Serra Boulevard	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
John Muir Drive	Lakewood Apartments Drive	Lake Merced Boulevard	9	37.8	3.4	41	3.733	21	1.867	40	64	40	64	40	64	41.3	50.7	54.0	51.1	40	46.9	0.6	2.0
Lake Merced Boulevard	Brotherhood Way	Lake Merced Boulevard	9	37.8	3.4	41	3.733	21	1.867	40	64	40	64	40	64	41.3	50.7	54.0	51.1	40	46.9	0.6	2.0
Lake Merced Boulevard	John Muir Drive	John Daly Boulevard	9	37.8	3.4	41	3.733	21	1.867	30	48	30	48	30	48	37.7	48.7	52.8	49.0	40	44.8	0.4	1.2
John Daly Boulevard	Lake Merced Boulevard	Junipero Serra Freeway	9	37.8	3.4	41	3.733	21	1.867	35	56	35	56	35	56	39.6	49.8	53.5	50.2	40	45.9	0.5	1.6
Geneva Avenue	Alemany Boulevard	San Jose Avenue	9	37.8	3.4	41	3.733	21	1.867	25	40	25	40	25	40	35.4	47.5	52.1	47.7	40	43.5	0.3	0.9
Geneva Avenue	San Jose Avenue	Junipero Serra Freeway	9	37.8	3.4	41	3.733	21	1.867	25	40	25	40	25	40	35.4	47.5	52.1	47.7	40	43.5	0.3	0.9

Assumptions: Traffic data from Ramboll

Construction Traffic - Variant

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE %						VEHICLE SPEED						NOISE LEVEL (dBA)			CALCULATED NOISE LEVEL 15 meters from	Receptor Dist. from Roadway	Adjusted Noise Level	Distance from Roadway to 65 dBA	Distance from Roadway to 65 dBA
				Auto		MT		HT		Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT					
	from:	to:		%	Auto	%	MT	%	HT										roadway center)	Center (m.)	(dBA)	(m.)	(ft)
Bayshore Boulevard	Geneva Avenue	Guadalupe Canyon Parkway	15	28.6	4.4	48	7.333	24	3.667	45	72	45	72	45	72	43.9	54.4	57.4	59.3	40	55.0	4.0	13.2
Bayshore Boulevard	Geneva Avenue	Arleta Avenue	15	28.6	4.4	48	7.333	24	3.667	35	56	35	56	35	56	40.7	52.7	56.4	53.0	40	48.7	0.9	3.1
Bayshore Boulevard	Arleta Avenue	Blanken Avenue	15	28.6	4.4	48	7.333	24	3.667	35	56	35	56	35	56	40.7	52.7	56.4	53.0	40	48.7	0.9	3.1
Bayshore Boulevard	Blanken Avenue	Hester Avenue	15	28.6	4.4	48	7.333	24	3.667	35	56	35	56	35	56	40.7	52.7	56.4	53.0	40	48.7	0.9	3.1
Geneva Avenue	Bayshore Boulevard	Schwerin Street	15	28.6	4.4	48	7.333	24	3.667	35	56	35	56	35	56	40.7	52.7	56.4	53.0	40	48.7	0.9	3.1

Assumptions: Traffic data from Ramboll

Addition of Multiple Noise Sources - Traffic Noise

Martin Substation Seperation/Distribution Express Feeders/Local Distribution System Separation/System Reinforcement

Road Segment:	from:	to:
Bayshore Boulevard	**Geneva Avenue**	**Guadalupe Canyon Parkway**
	Exisitng Roadway	Project Trips
Noise Source	80	57.26967542
Remove LOG	100000000	533295.0369
Adding Noise Sources	80.02309917	
Change in noise level =	0.02	dBA

Road Segment:	from:	to:
Bayshore Boulevard	**Geneva Avenue**	**Arleta Avenue**
	Exisitng Roadway	Project Trips
Noise Source	80	51.02426712
Remove LOG	100000000	126597.9614
Adding Noise Sources	80.0054946	
Change in noise level =	0.01	dBA

Road Segment:	from:	to:
Bayshore Boulevard	**Arleta Avenue**	**Blanken Avenue**
	Exisitng Roadway	Project Trips
Noise Source	80	51.02426712
Remove LOG	100000000	126597.9614
Adding Noise Sources	80.0054946	
Change in noise level =	0.01	dBA

Road Segment:	from:	to:
Bayshore Boulevard	**Blanken Avenue**	**Hester Avenue**
	Exisitng Roadway	Project Trips
Noise Source	80	51.02426712
Remove LOG	100000000	126597.9614
Adding Noise Sources	80.0054946	
Change in noise level =	0.01	dBA

Road Segment:	from:	to:
Geneva Avenue	**Bayshore Boulevard**	**Schwerin Street**
	Exisitng Roadway	Project Trips
Noise Source	72	51.02426712
Remove LOG	15848931.92	126597.9614
Adding Noise Sources	72.03455272	
Change in noise level =	0.03	dBA

Addition of Multiple Noise Sources - Traffic Noise

New City Substation Seperation/Distribution Express Feeders/Local Distribution System Separation/System Reinforcement

Road Segment:	**from:**	**to:**
Bayshore Boulevard	**Geneva Avenue**	**Guadalupe Canyon Parkway**
	Exisitng Roadway	Project Trips
Noise Source	80	59.28174739
Remove LOG	100000000	847568.3654
Adding Noise Sources	80.03665431	
Change in noise level =	0.04	dBA

Road Segment:	**from:**	**to:**
Bayshore Boulevard	**Geneva Avenue**	**Arleta Avenue**
	Exisitng Roadway	Project Trips
Noise Source	80	52.95482352
Remove LOG	100000000	197461.4637
Adding Noise Sources	80.00856719	
Change in noise level =	0.01	dBA

Road Segment:	**from:**	**to:**
Bayshore Boulevard	**Arleta Avenue**	**Blanken Avenue**
	Exisitng Roadway	Project Trips
Noise Source	80	52.95482352
Remove LOG	100000000	197461.4637
Adding Noise Sources	80.00856719	
Change in noise level =	0.01	dBA

Road Segment:	**from:**	**to:**
Bayshore Boulevard	**Blanken Avenue**	**Hester Avenue**
	Exisitng Roadway	Project Trips
Noise Source	80	52.95482352
Remove LOG	100000000	197461.4637
Adding Noise Sources	80.00856719	
Change in noise level =	0.01	dBA

Road Segment:	**from:**	**to:**
Geneva Avenue	**Bayshore Boulevard**	**Schwerin Street**
	Exisitng Roadway	Project Trips
Noise Source	72	52.95482352
Remove LOG	15848931.92	197461.4637
Adding Noise Sources	72.05377435	
Change in noise level =	0.05	dBA

Addition of Multiple Noise Sources - Traffic Noise

Distribution Express Feeders/Local Distribution System Separation/System Reinforcement

Road Segment:	from:	to:
Geneva Avenue	Schwerin Street	Cow Palace
	Exisitng Roadway	Project Trips
Noise Source	72	51.02426712
Remove LOG	15848931.92	126597.9614
Adding Noise Sources	72.03455272	
Change in noise level =	0.03 dBA	

Road Segment:	from:	to:
Geneva Avenue	Cow Palace	Carter Street
	Exisitng Roadway	Project Trips
Noise Source	72	50.15587311
Remove LOG	15848931.92	103654.2972
Adding Noise Sources	72.02831101	
Change in noise level =	0.03 dBA	

Road Segment:	from:	to:
Geneva Avenue	Carter Street	Prague Street
	Exisitng Roadway	Project Trips
Noise Source	68	50.15587311
Remove LOG	6309573.445	103654.2972
Adding Noise Sources	68.07076663	
Change in noise level =	0.07 dBA	

Road Segment:	from:	to:
Geneva Avenue	Prague Street	Alemany Street
	Exisitng Roadway	Project Trips
Noise Source	70	47.73626125
Remove LOG	10000000	59378.07657
Adding Noise Sources	70.02571131	
Change in noise level =	0.03 dBA	

Road Segment:	from:	to:
Alemany Boulevard	Geneva Avenue	Ottawa Avenue
	Exisitng Roadway	Project Trips
Noise Source	63	50.15587311
Remove LOG	1995262.315	103654.2972
Adding Noise Sources	63.21995185	
Change in noise level =	0.22 dBA	

Road Segment:	from:	to:
Alemany Boulevard	Ottawa Avenue	Sickles Avenue
	Exisitng Roadway	Project Trips
Noise Source	71	50.15587311
Remove LOG	12589254.12	103654.2972
Adding Noise Sources	71.03561146	
Change in noise level =	0.04 dBA	

Road Segment:	from:	to:
Alemany Boulevard	Sickles Avenue	Sagamore Street
	Exisitng Roadway	Project Trips
Noise Source	71	50.15587311
Remove LOG	12589254.12	103654.2972
Adding Noise Sources	71.03561146	
Change in noise level =	0.04 dBA	

Road Segment:	from:	to:
Alemany Boulevard	Sagamore Street	St Charles Avenue
	Exisitng Roadway	Project Trips
Noise Source	72	50.15587311
Remove LOG	15848931.92	103654.2972
Adding Noise Sources	72.02831101	
Change in noise level =	0.03 dBA	

Road Segment:	from:	to:
Alemany Boulevard	St Charles Avenue	Junipero Serra Boulevard
	Exisitng Roadway	Project Trips
Noise Source	80	50.15587311
Remove LOG	100000000	103654.2972
Adding Noise Sources	80.00449932	
Change in noise level =	0.00	

Road Segment:	from:	to:
John Muir Drive	Lakewood Apartments Drive	Lake Merced Boulevard
	Exisitng Roadway	Project Trips
Noise Source	60	51.13397624
Remove LOG	1000000	129836.7463
Adding Noise Sources	60.53015695	
Change in noise level =	0.53	

Road Segment:	from:	to:
Lake Merced Boulevard	Brotherhood Way	Lake Merced Boulevard
	Exisitng Roadway	Project Trips
Noise Source	70	51.13397624
Remove LOG	10000000	129836.7463
Adding Noise Sources	70.05602446	
Change in noise level =	0.06	

Road Segment:	from:	to:
Lake Merced Boulevard	John Muir Drive	John Daly Boulevard
	Exisitng Roadway	Project Trips
Noise Source	70	49.04018619
Remove LOG	10000000	80171.24327
Adding Noise Sources	70.0346791	
Change in noise level =	0.03	

Road Segment:	from:	to:
John Daly Boulevard	Lake Merced Boulevard	Junipero Serra Freeway
	Exisitng Roadway	Project Trips
Noise Source	75	50.15587311
Remove LOG	31622776.6	103654.2972
Adding Noise Sources	75.01421218	
Change in noise level =	0.01	

Road Segment:	from:	to:
Geneva Avenue	Alemany Boulevard	San Jose Avenue
	Exisitng Roadway	Project Trips
Noise Source	70	47.73626125
Remove LOG	10000000	59378.07657
Adding Noise Sources	70.02571131	
Change in noise level =	0.03	

Road Segment:	from:	to:
Geneva Avenue	San Jose Avenue	Junipero Serra Freeway
	Exisitng Roadway	Project Trips
Noise Source	80	47.73626125
Remove LOG	100000000	59378.07657
Adding Noise Sources	80.00257799	
Change in noise level =	0.00	

Operation Control Center

LOCATION	ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto k/h		MT k/h		HT k/h		NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from	Receptor Dist. from Roadway	Adjusted Noise Level	Distance from Roadway to 65 dBA	Distance from Roadway to 65 dBA
		from:	to:		%	Auto	%	MT	%	HT										roadway center)	Center (m.)	(dBA)	(m.)	(ft)
301 Executive Park Boulevard, San Francisco	Executive Park Boulevard	Crescent Way	Thomas Mellon Circle	24	95	22.8	2	0.48	1	0.24	25	40	25	40	25	40	43.7	38.6	43.2	47.1	40	42.9	0.2	0.8
	Sandpiper Cove	Executive Park Boulevard	End of Sandpiper Cove	24	95	22.8	1	0.24	1	0.24	25	40	25	40	25	40	43.7	35.6	43.2	46.8	40	42.5	0.2	0.7

Assumptions: 24 workers per shift change

Service Yard

LOCATION	ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto k/h		MT k/h		HT k/h		NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from	Receptor Dist. from Roadway	Adjusted Noise Level	Distance from Roadway to 65 dBA	Distance from Roadway to 65 dBA
		from:	to:		%	Auto	%	MT	%	HT										roadway center)	Center (m.)	(dBA)	(m.)	(ft)
210 Jennings Street, San Francisco	Newhall Street	End of Newhall Street	Jennings Street	183	95	173.85	3	5.49	2	3.66	25	40	25	40	25	40	52.5	49.1	55.0	57.6	40	53.4	2.7	9.0
	Jennings Street	Newhall Street	Evans Avenue	183	95	173.85	3	5.49	2	3.66	25	40	25	40	25	40	52.5	49.1	55.0	57.6	40	53.4	2.7	9.0
990 Palou Avenue, San Francisco	Palou Avenue	End of Palou Stret	Griffin Street	183	95	173.85	3	5.49	2	3.66	25	40	25	40	25	40	52.5	49.1	55.0	57.6	40	53.4	2.7	9.0
1401 Griffith Street, San Francisco	Revere Avenue	Griffith Street	Fitch Street	183	95	173.85	3	5.49	2	3.66	25	40	25	40	25	40	52.5	49.1	55.0	57.6	40	53.4	2.7	9.0
	Shafter Street	Griffith Street	End of Shafter Street	183	95	173.85	3	5.49	2	3.66	25	40	25	40	25	40	52.5	49.1	55.0	57.6	40	53.4	2.7	9.0

Assumptions: 183 Peak hour trips

Addition of Multiple Noise Sources - Traffic Noise

Operation Control Center

Location: 301 Executive Park Boulevard, San Francisco		
Road Segment:	**from:**	**to:**
Executive Park Boulevard	**Crescent Way**	**Thomas Mellon Circle**
	Exisitng Roadway	Project Trips
Noise Source	60	47.1114744
Remove LOG	1000000	51421.81961
Adding Noise Sources	60.21776985	
Change in noise level =	0.22 dBA	

Location: 301 Executive Park Boulevard, San Francisco		
Road Segment:	**from:**	**to:**
Sandpiper Cove	**Executive Park Boulevard**	**End of Sandpiper Cove**
	Exisitng Roadway	Project Trips
Noise Source	60	46.7968524
Remove LOG	1000000	47828.33253
Adding Noise Sources	60.20290137	
Change in noise level =	0.20 dBA	

Addition of Multiple Noise Sources - Traffic Noise

Service Yard

Location: 210 Jennings Street, San Francisco		
Road Segment:	**from:**	**to:**
Newhall Street	**End of Newhall Street**	**Jennings Street**
	Exisitng Roadway	Project Trips
Noise Source	60	57.62583352
	1000000	578873.078
Adding Noise Sources	61.98347219	
Change in noise level =	1.98	dBA

Location: 210 Jennings Street, San Francisco		
Road Segment:	**from:**	**to:**
Jennings Street	**Newhall Street**	**Evans Avenue**
	Exisitng Roadway	Project Trips
Noise Source	60	57.62583352
	1000000	578873.078
Adding Noise Sources	61.98347219	
Change in noise level =	1.98	dBA

Location: 990 Palou Avenue, San Francisco		
Road Segment:	**from:**	**to:**
Newhall Street	**End of Newhall Street**	**Jennings Street**
	Exisitng Roadway	Project Trips
Noise Source	60	57.62583352
	1000000	578873.078
Adding Noise Sources	61.98347219	
Change in noise level =	1.98	dBA

Location: 1401 Griffith Street, San Francisco		
Road Segment:	**from:**	**to:**
Revere Avenue	**Griffin Street**	**Fitch Street**
	Exisitng Roadway	Project Trips
Noise Source	60	57.62583352
	1000000	578873.078
Adding Noise Sources	61.98347219	
Change in noise level =	1.98	dBA

Location: 1401 Griffith Street, San Francisco		
Road Segment:	**from:**	**to:**
Shafter Street	**Griffin Street**	**End of Shafter Street**
	Exisitng Roadway	Project Trips
Noise Source	60	57.62583352
	1000000	578873.078
Adding Noise Sources	61.98347219	
Change in noise level =	1.98	dBA

C.3 Noise Measurement Summaries and Output

Summary

File Name on Meter	LxT_Data.175.s
File Name on PC	LxT_0004437-20240226 100000-LxT_Data.175.ldbin
Serial Number	0004437
Model	SoundTrack LxT®
Firmware Version	2.404
User	Nick Reynoso
Location	LT-1: 3175 Geneva Avenue, on Talbert Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 10:00:00
Stop	2024-02-28 10:00:00
Duration	48:00:00.0
Run Time	48:00:00.0
Pause	00:00:00.0
Pre-Calibration	2024-02-26 06:03:06
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	Z Weighting			
Detector	Slow			
Preamplifier	PRMLxT2B			
Microphone Correction	Off			
Integration Method	Linear			
Overload	142.6 dB			
	A	**C**	**Z**	
Under Range Peak	98.8	95.8	**100.8**	dB
Under Range Limit	**37.2**	36.8	43.5	dB
Noise Floor	28.1	27.6	34.4	dB
	First	**Second**	**Third**	
Instrument Identification				

Results

LAeq	64.6		
LAE	117.0		
EA	55.060	mPa²h	
EA8	9.177	mPa²h	
EA40	45.884	mPa²h	
LZpeak (max)	2024-02-27 13:53:15	117.5	dB
LASmax	2024-02-26 15:57:14	92.7	dB
LASmin	2024-02-27 01:28:46	36.0	dB
SEA	-99.9	dB	

	Exceedance Counts	**Duration**	
LAS > 85.0 dB	23	69.0	s
LAS > 115.0 dB	0	0.0	s
LZpeak > 135.0 dB	0	0.0	s
LZpeak > 137.0 dB	0	0.0	s
LZpeak > 140.0 dB	0	0.0	s

LCeq	72.1	dB
LAeq	64.6	dB
LCeq - LAeq	7.5	dB
LAleq	66.8	dB
LAeq	64.6	dB
LAleq - LAeq	2.2	dB

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	64.6		72.1			
LS(max)	92.7	2024/02/26 15:57:14				
LS(min)	36.0	2024/02/27 1:28:46				
LPeak(max)					117.5	2024/02/27 13:53:15

Overload Count	0	
Overload Duration	0.0	s

Calculated Ldn from Long-Term Noise Monitoring Data

Meter 0004437 - PG&E Power Asset Acquisition

2/27/2024

Tuesday

	TIME	dBA	Numbers...	10 dBA More Numbers...	5 dBA
Midnight	0 / 24	59.0	790526	7905257	2499862
am 1:00	100	55.8	378880	3788803	1198125
2:00	200	55.9	390012	3900120	1233326
3:00	300	59.1	810610	8106101	2563374
4:00	400	58.7	735316	7353160	2325273
5:00	500	64.5	2790840	27908404	8825412
6:00	600	67.4	5438198	54381978	17197091
7:00	700	67.5	5681788	56817877	17967390
8:00	800	68.4	6853683	68536828	21673248
9:00	900	66.7	4709329	47093287	14892205
10:00	1000	66.7	4660258	46602584	14737031
11:00	1100	66.4	4334250	43342504	13706103
12:00	1200	65.8	3812852	38128525	12057298
pm 1:00	1300	66.4	4371233	43712334	13823054
2:00	1400	64.7	2962498	29624976	9368240
3:00	1500	64.7	2937115	29371153	9287974
4:00	1600	65.9	3889663	38896632	12300195
5:00	1700	66.2	4161223	41612231	13158943
6:00	1800	65.3	3402522	34025225	10759721
7:00	1900	63.8	2404247	24042465	7602895
8:00	2000	62.7	1868741	18687405	5909476
9:00	2100	61.9	1541995	15419951	4876217
10:00	2200	60.5	1129203	11292029	3570853
pm 11:00	2300	59.7	939925	9399246	2972302

Leq Nighttime 10:00 p.m.-7:00 a.m. (not penalized)

62 dBA

Leq Daytime 7:00 am-10:00 p.m.

67 dBA

Leq 24-Hour

65 dBA

Ldn: 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

69 dBA

CNEL: 5 dBA penalty for noise between 7:00p.m. and 10:00 p.m., and 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

69 dBA

CNEL - Ld	0.276004

Summary

File Name on Meter	LxT_Data.122.s
File Name on PC	LxT_0004337-20240226 100000-LxT_Data.122.ldbin
Serial Number	0004337
Model	SoundTrack LxT®
Firmware Version	2.404
User	Nick Reynoso
Location	LT-2: 2929 Geneva Avenue, on Schwerin Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 10:00:00
Stop	2024-02-28 10:00:00
Duration	48:00:00.0
Run Time	48:00:00.0
Pause	00:00:00.0
Pre-Calibration	2024-02-26 05:44:50
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRMLxT2B
Microphone Correction	Off
Integration Method	Linear
Overload	143.1 dB

	A	C	Z
Under Range Peak	99.4	96.4	**101.4** dB
Under Range Limit	**37.8**	37.3	44.1 dB
Noise Floor	28.6	28.2	35.0 dB

	First	Second	Third
Instrument Identification			

Results

LAeq	67.8	
LAE	120.1	
EA	114.888	mPa²h
EA8	19.148	mPa²h
EA40	95.740	mPa²h
LZpeak (max)	2024-02-26 11:30:11	119.0 dB
LASmax	2024-02-27 10:21:51	102.9 dB
LASmin	2024-02-27 01:27:17	32.5 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 85.0 dB	71	198.6 s
LAS > 115.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

LCeq	75.0	dB
LAeq	67.8	dB
LCeq - LAeq	7.2	dB
LAleq	70.3	dB
LAeq	67.8	dB
LAleq - LAeq	2.5	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	67.8		75.0			
LS(max)	102.9	2024/02/27 10:21:51				
LS(min)	32.5	2024/02/27 1:27:17				
LPeak(max)					119.0	2024/02/26 11:30:11

Overload Count	0	
Overload Duration	0.0	s

Calculated Ldn from Long-Term Noise Monitoring Data

Meter 0004337 - PG&E Power Asset Acquisition

2/27/2024

Tuesday

	TIME	dBA	Numbers...	10 dBA More Numbers...	5 dBA
Midnight	0 / 24	57.8	598536	5985356	1892736
am 1:00	100	52.9	194936	1949360	616442
2:00	200	53.2	211181	2111811	667813
3:00	300	54.3	269560	2695603	852425
4:00	400	56.7	465417	4654167	1471777
5:00	500	60.6	1159880	11598798	3667862
6:00	600	69.8	9634429	96344294	30466741
7:00	700	70.5	11284206	112842058	35683792
8:00	800	69.2	8315474	83154738	26295837
9:00	900	78.0	63650820	636508196	########
10:00	1000	73.1	20357151	203571511	64374964
11:00	1100	71.7	14715669	147156686	46535030
12:00	1200	70.1	10187650	101876496	32216177
pm 1:00	1300	70.0	10066465	100664653	31832958
2:00	1400	69.2	8324267	83242670	26323643
3:00	1500	66.5	4449375	44493749	14070159
4:00	1600	71.2	13038391	130383910	41231013
5:00	1700	70.0	9992772	99927725	31599921
6:00	1800	67.0	5019009	50190093	15871501
7:00	1900	63.9	2452268	24522684	7754754
8:00	2000	61.8	1509037	15090374	4771995
9:00	2100	60.8	1215606	12156065	3844085
10:00	2200	59.3	858250	8582504	2714026
pm 11:00	2300	59.7	939198	9391977	2970004

Leq Nighttime 10:00 p.m.-7:00 a.m. (not penalized)

62 dBA

Leq Daytime 7:00 am-10:00 p.m.

72 dBA

Leq 24-Hour

69 dBA

Ldn: 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

71 dBA

CNEL: 5 dBA penalty for noise between 7:00p.m. and 10:00 p.m.,

72 dBA **and 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.**

CNEL - Ld 0.1457894

Summary

File Name on Meter	LxT_Data.170.s
File Name on PC	LxT_0004435-20240226 100000-LxT_Data.170.ldbin
Serial Number	0004435
Model	SoundTrack LxT®
Firmware Version	2.404
User	Nick Reynoso
Location	LT-3: 792 Schwerin Street, on Otilia Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description		
Start	2024-02-26	10:00:00
Stop	2024-02-28	10:00:00
Duration		48:00:00.0
Run Time		48:00:00.0
Pause		00:00:00.0
Pre-Calibration	2024-02-26	05:33:17
Post-Calibration		None
Calibration Deviation		---

Overall Settings

RMS Weight	A Weighting				
Peak Weight	Z Weighting				
Detector	Slow				
Preamplifier	PRMLxT2B				
Microphone Correction	Off				
Integration Method	Exponential				
Overload	143.5	dB			
	A		**C**	**Z**	
Under Range Peak	99.8		96.8	**101.8**	dB
Under Range Limit	**38.1**		37.7	44.4	dB
Noise Floor	29.0		28.5	35.3	dB
	First		**Second**	**Third**	
Instrument Identification					

Results

LASeq	60.2			
LASE	112.6			
EAS	20.058	mPa²h		
EAS8	3.343	mPa²h		
EAS40	16.715	mPa²h		
LZpeak (max)	2024-02-26 19:21:26		117.4	dB
LASmax	2024-02-28 09:38:49		94.1	dB
LASmin	2024-02-27 01:27:19		36.5	dB
SEA	-99.9	dB		
	Exceedance Counts		**Duration**	
LAS > 85.0 dB	11		39.9	s
LAS > 115.0 dB	0		0.0	s
LZpeak > 135.0 dB	0		0.0	s
LZpeak > 137.0 dB	0		0.0	s
LZpeak > 140.0 dB	0		0.0	s
LCSeq	69.8	dB		
LASeq	60.2	dB		
LCSeq - LASeq	9.6	dB		
LAleq	62.9	dB		
LAeq	60.2	dB		
LAleq - LAeq	2.7	dB		

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	60.2					
LS(max)	94.1	2024/02/28 9:38:49				
LS(min)	36.5	2024/02/27 1:27:19				
LPeak(max)					117.4	2024/02/26 19:21:26

Overload Count	0	
Overload Duration	0.0	s

Calculated Ldn from Long-Term Noise Monitoring Data

Meter 0004337 - PG&E Power Asset Acquisition

2/27/2024

Tuesday

	TIME	dBA	Numbers...	10 dBA More Numbers...	5 dBA
Midnight	0 / 24	57.8	598536	5985356	1892736
am 1:00	100	52.9	194936	1949360	616442
2:00	200	53.2	211181	2111811	667813
3:00	300	54.3	269560	2695603	852425
4:00	400	56.7	465417	4654167	1471777
5:00	500	60.6	1159880	11598798	3667862
6:00	600	69.8	9634429	96344294	30466741
7:00	700	70.5	11284206	112842058	35683792
8:00	800	69.2	8315474	83154738	26295837
9:00	900	78.0	63650820	636508196	201281565
10:00	1000	73.1	20357151	203571511	64374964
11:00	1100	71.7	14715669	147156686	46535030
12:00	1200	70.1	10187650	101876496	32216177
pm 1:00	1300	70.0	10066465	100664653	31832958
2:00	1400	69.2	8324267	83242670	26323643
3:00	1500	66.5	4449375	44493749	14070159
4:00	1600	71.2	13038391	130383910	41231013
5:00	1700	70.0	9992772	99927725	31599921
6:00	1800	67.0	5019009	50190093	15871501
7:00	1900	63.9	2452268	24522684	7754754
8:00	2000	61.8	1509037	15090374	4771995
9:00	2100	60.8	1215606	12156065	3844085
10:00	2200	59.3	858250	8582504	2714026
pm 11:00	2300	59.7	939198	9391977	2970004

Leq Nighttime 10:00 p.m.-7:00 a.m. (not penalized)

62 dBA

Leq Daytime 7:00 am-10:00 p.m.

72 dBA

Leq 24-Hour

69 dBA

Ldn: 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

71 dBA

CNEL: 5 dBA penalty for noise between 7:00p.m. and 10:00 p.m., and 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

72 dBA

CNEL - Ld 0.1457894

Summary

File Name on Meter	LxT_Data.123.s
File Name on PC	LxT_0004337-20240228 120000-LxT_Data.123.ldbin
Serial Number	0004337
Model	SoundTrack LxT®
Firmware Version	2.404
User	Nick Reynoso
Location	LT-4: Across 100 Main Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 12:00:00
Stop	2024-03-01 12:00:00
Duration	48:00:00.0
Run Time	48:00:00.0
Pause	00:00:00.0
Pre-Calibration	2024-02-28 10:59:10
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting			
Peak Weight	Z Weighting			
Detector	Slow			
Preamplifier	PRMLxT2B			
Microphone Correction	Off			
Integration Method	Linear			
Overload	143.2 dB			
	A	**C**	**Z**	
Under Range Peak	99.4	96.4	**101.4**	dB
Under Range Limit	**37.8**	37.4	44.1	dB
Noise Floor	28.7	28.2	35.0	dB
	First	**Second**	**Third**	
Instrument Identification				

Results

LAeq	59.6		
LAE	112.0		
EA	17.664	mPa²h	
EA8	2.944	mPa²h	
EA40	14.720	mPa²h	
LZpeak (max)	2024-03-01 10:40:08	123.3	dB
LASmax	2024-02-29 13:33:57	91.2	dB
LASmin	2024-02-29 01:58:42	38.2	dB
SEA	140.4 dB		

	Exceedance Counts	**Duration**	
LAS > 85.0 dB	9	25.8	s
LAS > 115.0 dB	0	0.0	s
LZpeak > 135.0 dB	0	0.0	s
LZpeak > 137.0 dB	0	0.0	s
LZpeak > 140.0 dB	0	0.0	s

LCeq	70.4	dB
LAeq	59.6	dB
LCeq - LAeq	10.8	dB
LAleq	64.5	dB
LAeq	59.6	dB
LAleq - LAeq	4.9	dB

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	59.6		70.4			
LS(max)	91.2	2024/02/29 13:33:57				
LS(min)	38.2	2024/02/29 1:58:42				
LPeak(max)					123.3	2024/03/01 10:40:08

Overload Count	0	
Overload Duration	0.0	s

Calculated Ldn from Long-Term Noise Monitoring Data

Meter 0004337 - PG&E Power Asset Acquisition

2/29/2024

Thursday

	TIME	dBA	Numbers...	10 dBA More Numbers...	5 dBA
Midnight	0 / 24	52.4	173400	1733996	548338
am 1:00	100	49.6	92086	920861	291202
2:00	200	47.7	58258	582583	184229
3:00	300	49.1	82207	822074	259963
4:00	400	51.8	152341	1523411	481745
5:00	500	55.0	313308	3133077	990766
6:00	600	64.2	2657884	26578839	8404967
7:00	700	62.8	1893878	18938780	5988968
8:00	800	62.6	1839518	18395178	5817066
9:00	900	61.8	1508034	15080335	4768821
10:00	1000	60.1	1018650	10186500	3221254
11:00	1100	59.3	853587	8535874	2699280
12:00	1200	62.6	1837460	18374605	5810560
pm 1:00	1300	67.3	5337551	53375505	16878817
2:00	1400	63.4	2193310	21933099	6935855
3:00	1500	60.2	1042889	10428888	3297904
4:00	1600	63.7	2340831	23408307	7402357
5:00	1700	60.2	1054292	10542922	3333965
6:00	1800	58.4	684454	6844536	2164432
7:00	1900	57.6	574972	5749724	1818222
8:00	2000	59.2	830996	8309961	2627840
9:00	2100	56.6	459433	4594328	1452854
10:00	2200	57.4	543922	5439225	1720034
pm 11:00	2300	54.9	309741	3097405	979485

Leq Nighttime 10:00 p.m.-7:00 a.m. (not penalized)

57 dBA

Leq Daytime 7:00 am-10:00 p.m.

63 dBA

Leq 24-Hour

61 dBA

Ldn: 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

64 dBA

CNEL: 5 dBA penalty for noise between 7:00p.m. and 10:00 p.m., and 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.

65 dBA

CNEL - Ld 0.2527808

Summary

File Name on Meter	831_Data.091.s
File Name on PC	831_0002783-20240226 100919-831_Data.091.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	LT-5: Midway Village, adjacent to Daly City Yard
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 10:09:19
Stop	2024-02-26 10:24:20
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:03
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	50.9	
LAE	80.4	
EA	12.310	µPa²h
LZpeak (max)	2024-02-26 10:16:26	85.8 dB
LASmax	2024-02-26 10:16:26	67.5 dB
LASmin	2024-02-26 10:15:16	36.6 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	1	12.8 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	50.9	50.9	-99.9	50.9	50.9	-99.9	-99.9	dB

LCeq	58.8	dB
LAeq	50.9	dB
LCeq - LAeq	7.9	dB
LAleq	53.7	dB
LAeq	50.9	dB
LAleq - LAeq	2.8	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	50.9		58.8		61.1	
LS(max)	67.5	2024/02/26 10:16:26	71.3	2024/02/26 10:16:35	71.7	2024/02/26 10:16:35
LF(max)	71.3	2024/02/26 10:16:26	74.2	2024/02/26 10:16:26	74.3	2024/02/26 10:16:26
LI(max)	72.7	2024/02/26 10:16:26	75.4	2024/02/26 10:16:26	75.7	2024/02/26 10:13:36
LS(min)	36.6	2024/02/26 10:15:16	50.5	2024/02/26 10:15:15	54.5	2024/02/26 10:24:09
LF(min)	35.8	2024/02/26 10:15:00	48.7	2024/02/26 10:15:06	52.2	2024/02/26 10:24:06
LI(min)	36.1	2024/02/26 10:15:16	51.1	2024/02/26 10:15:06	56.0	2024/02/26 10:24:09
LPeak(max)	84.3	2024/02/26 10:16:26	86.2	2024/02/26 10:16:26	85.8	2024/02/26 10:16:26

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.092.s
File Name on PC	831_0002783-20240226 103942-831_Data.092.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-1: 2201 Geneva Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 10:39:42
Stop	2024-02-26 10:54:42
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	68.7		
LAE	98.2		
EA	736.928 µPa²h		
LZpeak (max)	2024-02-26 10:40:25	101.5	dB
LASmax	2024-02-26 10:48:19	79.1	dB
LASmin	2024-02-26 10:44:29	49.1	dB
SEA	-99.9 dB		

	Exceedance Counts	Duration
LAS > 65.0 dB	17	675.7 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	68.7	68.7	-99.9	68.7	68.7	-99.9	-99.9	dB

LCeq	74.6	dB
LAeq	68.7	dB
LCeq - LAeq	5.9	dB
LAleq	70.1	dB
LAeq	68.7	dB
LAleq - LAeq	1.4	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	68.7		74.6		78.3	
LS(max)	79.1	2024/02/26 10:48:19	83.2	2024/02/26 10:49:40	89.8	2024/02/26 10:44:57
LF(max)	82.4	2024/02/26 10:48:19	86.3	2024/02/26 10:40:47	93.1	2024/02/26 10:44:57
LI(max)	82.8	2024/02/26 10:48:19	89.5	2024/02/26 10:40:47	95.9	2024/02/26 10:44:56
LS(min)	49.1	2024/02/26 10:44:29	60.8	2024/02/26 10:44:30	65.9	2024/02/26 10:44:25
LF(min)	46.7	2024/02/26 10:44:28	59.1	2024/02/26 10:44:25	63.1	2024/02/26 10:44:25
LI(min)	48.5	2024/02/26 10:44:28	61.3	2024/02/26 10:44:29	65.8	2024/02/26 10:44:25
LPeak(max)	94.8	2024/02/26 10:49:20	95.7	2024/02/26 10:40:47	101.5	2024/02/26 10:40:25

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.093.s
File Name on PC	831_0002783-20240226 110048-831_Data.093.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-2: 103 Walbridge Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 11:00:48
Stop	2024-02-26 11:15:49
Duration	00:15:01.3
Run Time	00:15:01.3
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	72.3		
LAE	101.8		
EA	1.690	mPa²h	
LZpeak (max)	2024-02-26 11:15:12	110.3	dB
LASmax	2024-02-26 11:15:12	82.1	dB
LASmin	2024-02-26 11:09:50	57.3	dB
SEA	-99.9	dB	

	Exceedance Counts	Duration	
LAS > 65.0 dB	16	789.4	s
LAS > 85.0 dB	0	0.0	s
LZpeak > 135.0 dB	0	0.0	s
LZpeak > 137.0 dB	0	0.0	s
LZpeak > 140.0 dB	0	0.0	s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	72.3	72.3	-99.9	72.3	72.3	-99.9	-99.9	dB

LCeq	79.3	dB
LAeq	72.3	dB
LCeq - LAeq	7.1	dB
LAleq	73.3	dB
LAeq	72.3	dB
LAleq - LAeq	1.0	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	72.3		79.3		82.9	
LS(max)	82.1	2024/02/26 11:15:12	100.0	2024/02/26 11:15:13	100.8	2024/02/26 11:15:13
LF(max)	84.9	2024/02/26 11:15:12	103.4	2024/02/26 11:15:12	104.2	2024/02/26 11:15:12
LI(max)	85.7	2024/02/26 11:15:12	104.2	2024/02/26 11:15:12	105.0	2024/02/26 11:15:12
LS(min)	57.3	2024/02/26 11:09:50	65.1	2024/02/26 11:00:48	68.6	2024/02/26 11:03:24
LF(min)	56.1	2024/02/26 11:09:49	64.5	2024/02/26 11:03:24	66.4	2024/02/26 11:00:51
LI(min)	57.1	2024/02/26 11:09:50	66.1	2024/02/26 11:00:48	69.3	2024/02/26 11:03:22
LPeak(max)	96.3	2024/02/26 11:15:12	109.8	2024/02/26 11:15:12	110.3	2024/02/26 11:15:12

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	1	
OBA Overload Duration	2.1	s

Summary

File Name on Meter	831_Data.101.s
File Name on PC	831_0002783-20240228 111856-831_Data.101.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-3: 600 Prague Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 11:18:56
Stop	2024-02-28 11:33:57
Duration	00:15:00.6
Run Time	00:15:00.6
Pause	00:00:00.0
Pre-Calibration	2024-02-28 09:46:52
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	**C**	**Z**	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LAeq	68.4		
LAE	98.0		
EA	696.603	µPa²h	
LZpeak (max)	2024-02-28 11:32:49	113.7	dB
LASmax	2024-02-28 11:32:49	91.7	dB
LASmin	2024-02-28 11:25:24	48.4	dB
SEA	-99.9	dB	

	Exceedance Counts	**Duration**	
LAS > 65.0 dB	24	236.8	s
LAS > 85.0 dB	1	3.7	s
LZpeak > 135.0 dB	0	0.0	s
LZpeak > 137.0 dB	0	0.0	s
LZpeak > 140.0 dB	0	0.0	s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	68.4	68.4	-99.9	68.4	68.4	-99.9	-99.9	dB

LCeq	77.5	dB
LAeq	68.4	dB
LCeq - LAeq	9.0	dB
LAleq	71.3	dB
LAeq	68.4	dB
LAleq - LAeq	2.8	dB

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	68.4		77.5		78.5	
LS(max)	91.7	2024/02/28 11:32:49	99.2	2024/02/28 11:32:49	99.4	2024/02/28 11:32:49
LF(max)	94.9	2024/02/28 11:32:49	102.8	2024/02/28 11:32:49	103.0	2024/02/28 11:32:49
LI(max)	95.7	2024/02/28 11:32:49	103.5	2024/02/28 11:32:49	103.8	2024/02/28 11:32:49
LS(min)	48.4	2024/02/28 11:25:24	61.2	2024/02/28 11:33:10	63.3	2024/02/28 11:33:10
LF(min)	47.7	2024/02/28 11:25:24	59.1	2024/02/28 11:33:07	61.1	2024/02/28 11:33:10
LI(min)	48.1	2024/02/28 11:25:24	61.1	2024/02/28 11:33:07	64.2	2024/02/28 11:33:10
LPeak(max)	110.1	2024/02/28 11:32:49	113.0	2024/02/28 11:32:49	113.7	2024/02/28 11:32:49

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	2	
OBA Overload Duration	4.9	s

Summary

File Name on Meter	831_Data.102.s
File Name on PC	831_0002783-20240228 114317-831_Data.102.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-4: 820 Geneva Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 11:43:17
Stop	2024-02-28 11:58:18
Duration	00:15:00.7
Run Time	00:15:00.7
Pause	00:00:00.0
Pre-Calibration	2024-02-28 09:46:52
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	C	Z	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	69.6		
LAE	99.1		
EA	910.286 µPa²h		
LZpeak (max)	2024-02-28 11:52:46	102.9	dB
LASmax	2024-02-28 11:52:46	85.1	dB
LASmin	2024-02-28 11:56:10	51.2	dB
SEA	-99.9	dB	

	Exceedance Counts	Duration	
LAS > 65.0 dB	24	569.8	s
LAS > 85.0 dB	0	0.0	s
LZpeak > 135.0 dB	0	0.0	s
LZpeak > 137.0 dB	0	0.0	s
LZpeak > 140.0 dB	0	0.0	s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	69.6	69.6	-99.9	69.6	69.6	-99.9	-99.9	dB

LCeq	77.3	dB
LAeq	69.6	dB
LCeq - LAeq	7.7	dB
LAleq	71.9	dB
LAeq	69.6	dB
LAleq - LAeq	2.3	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	69.6		77.3		79.3	
LS(max)	85.1	2024/02/28 11:52:46	91.7	2024/02/28 11:52:47	91.8	2024/02/28 11:52:47
LF(max)	88.2	2024/02/28 11:52:46	94.4	2024/02/28 11:52:47	94.5	2024/02/28 11:52:47
LI(max)	89.1	2024/02/28 11:52:46	96.2	2024/02/28 11:52:47	96.2	2024/02/28 11:52:47
LS(min)	51.2	2024/02/28 11:56:10	65.8	2024/02/28 11:45:25	69.1	2024/02/28 11:45:26
LF(min)	50.6	2024/02/28 11:56:09	63.2	2024/02/28 11:45:24	66.1	2024/02/28 11:45:24
LI(min)	50.8	2024/02/28 11:56:09	67.5	2024/02/28 11:50:22	70.8	2024/02/28 11:50:51
LPeak(max)	99.2	2024/02/28 11:52:46	103.0	2024/02/28 11:52:46	102.9	2024/02/28 11:52:46

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.103.s
File Name on PC	831_0002783-20240228 120357-831_Data.103.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-5: 98 Ottawa Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 12:03:57
Stop	2024-02-28 12:18:57
Duration	00:15:00.9
Run Time	00:15:00.9
Pause	00:00:00.0
Pre-Calibration	2024-02-28 09:46:52
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	C	Z	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	62.5		
LAE	92.0		
EA	177.272 µPa²h		
LZpeak (max)	2024-02-28 12:04:06	96.8	dB
LASmax	2024-02-28 12:04:06	78.2	dB
LASmin	2024-02-28 12:17:46	44.0	dB
SEA	-99.9	dB	

	Exceedance Counts	Duration	
LAS > 65.0 dB	22	184.8	s
LAS > 85.0 dB	0	0.0	s
LZpeak > 135.0 dB	0	0.0	s
LZpeak > 137.0 dB	0	0.0	s
LZpeak > 140.0 dB	0	0.0	s

	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00	
Community Noise	62.5	62.5	-99.9	62.5	62.5	-99.9	-99.9	dB

LCeq	71.0	dB
LAeq	62.5	dB
LCeq - LAeq	8.5	dB
LAleq	63.5	dB
LAeq	62.5	dB
LAleq - LAeq	1.0	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	62.5		71.0		72.4	
LS(max)	78.2	2024/02/28 12:04:06	86.9	2024/02/28 12:18:33	88.5	2024/02/28 12:18:33
LF(max)	79.7	2024/02/28 12:04:06	89.1	2024/02/28 12:18:32	90.7	2024/02/28 12:18:32
LI(max)	80.3	2024/02/28 12:04:06	89.6	2024/02/28 12:18:32	91.3	2024/02/28 12:18:32
LS(min)	44.0	2024/02/28 12:17:46	56.8	2024/02/28 12:06:24	61.2	2024/02/28 12:17:39
LF(min)	43.5	2024/02/28 12:17:43	55.1	2024/02/28 12:17:45	58.6	2024/02/28 12:17:46
LI(min)	44.1	2024/02/28 12:17:45	57.7	2024/02/28 12:06:24	61.9	2024/02/28 12:17:39
LPeak(max)	92.6	2024/02/28 12:04:06	96.4	2024/02/28 12:04:06	96.8	2024/02/28 12:04:06

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.104.s
File Name on PC	831_0002783-20240228 122826-831_Data.104.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-6: 996 Huron Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 12:28:26
Stop	2024-02-28 12:43:27
Duration	00:15:00.9
Run Time	00:15:00.9
Pause	00:00:00.0
Pre-Calibration	2024-02-28 09:46:52
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	C	Z	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	65.2		
LAE	94.8		
EA	332.186 µPa²h		
LZpeak (max)	2024-02-28 12:41:02	103.0	dB
LASmax	2024-02-28 12:33:39	75.9	dB
LASmin	2024-02-28 12:35:19	50.9	dB
SEA	-99.9 dB		

	Exceedance Counts	Duration
LAS > 65.0 dB	38	364.9 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	65.2	65.2	-99.9	65.2	65.2	-99.9	-99.9	dB

LCeq	73.6	dB
LAeq	65.2	dB
LCeq - LAeq	8.4	dB
LAleq	66.7	dB
LAeq	65.2	dB
LAleq - LAeq	1.5	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	65.2		73.6		80.1	
LS(max)	75.9	2024/02/28 12:33:39	88.1	2024/02/28 12:39:36	92.7	2024/02/28 12:41:03
LF(max)	78.1	2024/02/28 12:28:46	90.6	2024/02/28 12:39:36	96.9	2024/02/28 12:41:03
LI(max)	81.4	2024/02/28 12:28:46	91.1	2024/02/28 12:39:36	100.1	2024/02/28 12:41:02
LS(min)	50.9	2024/02/28 12:35:19	65.6	2024/02/28 12:37:17	68.6	2024/02/28 12:29:54
LF(min)	49.9	2024/02/28 12:35:19	63.2	2024/02/28 12:41:55	67.1	2024/02/28 12:29:54
LI(min)	51.0	2024/02/28 12:42:36	65.9	2024/02/28 12:41:44	68.9	2024/02/28 12:29:54
LPeak(max)	92.0	2024/02/28 12:34:38	97.3	2024/02/28 12:33:38	103.0	2024/02/28 12:41:02

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.107.s
File Name on PC	831_0002783-20240301 092239-831_Data.107.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-7: 106 Sagamore Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 09:22:39
Stop	2024-03-01 09:38:12
Duration	00:15:33.7
Run Time	00:15:33.7
Pause	00:00:00.0
Pre-Calibration	2024-03-01 09:19:20
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	71.1	
LAE	100.8	
EA	1.335	mPa²h
LZpeak (max)	2024-03-01 09:34:30	110.4 dB
LASmax	2024-03-01 09:34:31	87.6 dB
LASmin	2024-03-01 09:31:19	63.9 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	1	933.6 s
LAS > 85.0 dB	1	2.3 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	71.1	71.1	-99.9	71.1	71.1	-99.9	-99.9	dB

LCeq	79.4	dB
LAeq	71.1	dB
LCeq - LAeq	8.3	dB
LAleq	72.7	dB
LAeq	71.1	dB
LAleq - LAeq	1.6	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	71.1		79.4		82.4	
LS(max)	87.6	2024/03/01 9:34:31	97.6	2024/03/01 9:34:30	98.0	2024/03/01 9:34:30
LF(max)	90.5	2024/03/01 9:34:30	100.6	2024/03/01 9:34:30	101.0	2024/03/01 9:34:30
LI(max)	92.3	2024/03/01 9:34:30	101.4	2024/03/01 9:34:30	101.7	2024/03/01 9:34:30
LS(min)	63.9	2024/03/01 9:31:19	69.5	2024/03/01 9:24:32	71.8	2024/03/01 9:29:02
LF(min)	63.2	2024/03/01 9:29:03	67.9	2024/03/01 9:24:32	69.9	2024/03/01 9:29:02
LI(min)	63.4	2024/03/01 9:29:03	69.5	2024/03/01 9:24:32	72.7	2024/03/01 9:29:02
LPeak(max)	105.8	2024/03/01 9:34:30	110.0	2024/03/01 9:34:30	110.4	2024/03/01 9:34:30

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	1	
OBA Overload Duration	2.1	s

Summary

File Name on Meter	831_Data.108.s
File Name on PC	831_0002783-20240301 094640-831_Data.108.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick reynoso
Location	ST-8: 106 Orizaba Avenue, on Sagamore Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 09:46:40
Stop	2024-03-01 10:01:41
Duration	00:15:00.6
Run Time	00:15:00.6
Pause	00:00:00.0
Pre-Calibration	2024-03-01 09:19:19
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	72.4	
LAE	101.9	
EA	1.725	mPa²h
LZpeak (max)	2024-03-01 09:47:08	108.7 dB
LASmax	2024-03-01 09:54:54	86.0 dB
LASmin	2024-03-01 09:52:47	64.1 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	1	900.5 s
LAS > 85.0 dB	1	1.2 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	72.4	72.4	-99.9	72.4	72.4	-99.9	-99.9	dB

LCeq	77.8	dB
LAeq	72.4	dB
LCeq - LAeq	5.5	dB
LAIeq	73.4	dB
LAeq	72.4	dB
LAIeq - LAeq	1.0	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	72.4		77.8		83.5	
LS(max)	86.0	2024/03/01 9:54:54	92.7	2024/03/01 9:54:54	98.2	2024/03/01 9:59:21
LF(max)	89.8	2024/03/01 9:54:54	96.0	2024/03/01 9:54:54	103.4	2024/03/01 9:47:08
LI(max)	90.9	2024/03/01 9:54:54	96.7	2024/03/01 9:54:54	106.4	2024/03/01 9:47:08
LS(min)	64.1	2024/03/01 9:52:47	69.0	2024/03/01 9:52:47	71.2	2024/03/01 9:48:00
LF(min)	63.4	2024/03/01 9:52:45	67.9	2024/03/01 9:48:00	69.3	2024/03/01 9:48:00
LI(min)	63.8	2024/03/01 9:52:46	68.8	2024/03/01 9:48:00	71.7	2024/03/01 9:48:00
LPeak(max)	102.7	2024/03/01 9:54:54	106.8	2024/03/01 9:54:54	108.7	2024/03/01 9:47:08

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.109.s
File Name on PC	831_0002783-20240301 101131-831_Data.109.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-9: 116 Arch Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 10:11:31
Stop	2024-03-01 10:26:31
Duration	00:15:00.8
Run Time	00:15:00.8
Pause	00:00:00.0
Pre-Calibration	2024-03-01 09:19:19
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	64.4	
LAE	93.9	
EA	275.181	µPa²h
LZpeak (max)	2024-03-01 10:12:18	107.7 dB
LASmax	2024-03-01 10:21:10	81.4 dB
LASmin	2024-03-01 10:23:16	58.4 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	19	255.2 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	64.4	64.4	-99.9	64.4	64.4	-99.9	-99.9	dB

LCeq	70.9	dB
LAeq	64.4	dB
LCeq - LAeq	6.5	dB
LAleq	66.9	dB
LAeq	64.4	dB
LAleq - LAeq	2.5	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	64.4		70.9		78.8	
LS(max)	81.4	2024/03/01 10:21:10	82.4	2024/03/01 10:12:19	95.0	2024/03/01 10:12:19
LF(max)	86.4	2024/03/01 10:21:09	86.3	2024/03/01 10:21:09	100.2	2024/03/01 10:12:18
LI(max)	89.1	2024/03/01 10:21:09	89.0	2024/03/01 10:21:09	103.4	2024/03/01 10:12:18
LS(min)	58.4	2024/03/01 10:23:16	62.7	2024/03/01 10:11:31	65.8	2024/03/01 10:24:38
LF(min)	57.8	2024/03/01 10:23:14	61.9	2024/03/01 10:23:18	64.4	2024/03/01 10:24:37
LI(min)	58.3	2024/03/01 10:23:14	63.0	2024/03/01 10:23:18	66.4	2024/03/01 10:24:34
LPeak(max)	101.3	2024/03/01 10:21:09	100.4	2024/03/01 10:21:09	107.7	2024/03/01 10:12:18

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.097.s
File Name on PC	831_0002783-20240226 124746-831_Data.097.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-10: 4010 Crescent Court, on Harney Way
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 12:47:46
Stop	2024-02-26 13:02:49
Duration	00:15:03.3
Run Time	00:15:03.3
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	59.9	
LAE	89.4	
EA	97.761	µPa²h
LZpeak (max)	2024-02-26 12:57:01	104.8 dB
LASmax	2024-02-26 13:00:32	74.4 dB
LASmin	2024-02-26 12:49:55	46.7 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	8	87.9 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	59.9	59.9	-99.9	59.9	59.9	-99.9	-99.9	dB

LCeq	68.3	dB
LAeq	59.9	dB
LCeq - LAeq	8.5	dB
LAIeq	61.7	dB
LAeq	59.9	dB
LAIeq - LAeq	1.8	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	59.9		68.3		81.4	
LS(max)	74.4	2024/02/26 13:00:32	84.2	2024/02/26 13:01:19	95.5	2024/02/26 12:56:26
LF(max)	76.2	2024/02/26 13:00:31	86.9	2024/02/26 13:01:19	100.7	2024/02/26 12:57:07
LI(max)	77.0	2024/02/26 13:00:31	87.8	2024/02/26 13:01:19	102.9	2024/02/26 12:57:07
LS(min)	46.7	2024/02/26 12:49:55	57.8	2024/02/26 12:49:55	62.3	2024/02/26 12:49:05
LF(min)	45.8	2024/02/26 12:49:54	55.7	2024/02/26 12:49:55	59.7	2024/02/26 12:50:00
LI(min)	46.4	2024/02/26 12:49:54	59.0	2024/02/26 12:49:55	63.5	2024/02/26 12:49:03
LPeak(max)	94.2	2024/02/26 12:57:46	94.6	2024/02/26 13:01:19	104.8	2024/02/26 12:57:01

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.096.s
File Name on PC	831_0002783-20240226 121923-831_Data.096.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-11: 465 Wheeler Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 12:19:23
Stop	2024-02-26 12:34:23
Duration	00:15:00.7
Run Time	00:15:00.7
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	65.4		
LAE	94.9		
EA	347.078 µPa²h		
LZpeak (max)	2024-02-26 12:27:21	102.0 dB	
LASmax	2024-02-26 12:27:21	84.0 dB	
LASmin	2024-02-26 12:29:19	47.7 dB	
SEA	-99.9 dB		

	Exceedance Counts	Duration
LAS > 65.0 dB	6	147.6 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	65.4	65.4	-99.9	65.4	65.4	-99.9	-99.9	dB

LCeq	74.0	dB
LAeq	65.4	dB
LCeq - LAeq	8.6	dB
LAleq	67.4	dB
LAeq	65.4	dB
LAleq - LAeq	2.0	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	65.4		74.0		76.1	
LS(max)	84.0	2024/02/26 12:27:21	90.5	2024/02/26 12:27:21	90.7	2024/02/26 12:27:21
LF(max)	85.3	2024/02/26 12:27:21	91.7	2024/02/26 12:27:21	91.9	2024/02/26 12:27:21
LI(max)	86.1	2024/02/26 12:20:28	92.3	2024/02/26 12:27:21	92.8	2024/02/26 12:27:09
LS(min)	47.7	2024/02/26 12:29:19	61.1	2024/02/26 12:29:24	65.2	2024/02/26 12:25:43
LF(min)	47.0	2024/02/26 12:29:19	58.7	2024/02/26 12:29:23	63.1	2024/02/26 12:32:05
LI(min)	47.2	2024/02/26 12:29:19	61.8	2024/02/26 12:25:51	65.6	2024/02/26 12:32:25
LPeak(max)	96.9	2024/02/26 12:20:28	102.4	2024/02/26 12:27:20	102.0	2024/02/26 12:27:21

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.095.s
File Name on PC	831_0002783-20240226 115209-831_Data.095.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-12: 353 Harkness Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 11:52:09
Stop	2024-02-26 12:07:10
Duration	00:15:01.4
Run Time	00:15:01.4
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	57.8	
LAE	87.4	
EA	60.486	µPa²h
LZpeak (max)	2024-02-26 11:55:55	100.3 dB
LASmax	2024-02-26 11:58:10	72.8 dB
LASmin	2024-02-26 11:54:26	41.7 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	6	52.7 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	57.8	57.8	-99.9	57.8	57.8	-99.9	-99.9	dB

LCeq	65.8	dB
LAeq	57.8	dB
LCeq - LAeq	8.0	dB
LAleq	60.6	dB
LAeq	57.8	dB
LAleq - LAeq	2.8	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	57.8		65.8		74.2	
LS(max)	72.8	2024/02/26 11:58:10	80.2	2024/02/26 12:06:59	85.3	2024/02/26 11:58:48
LF(max)	76.2	2024/02/26 11:58:04	85.1	2024/02/26 11:55:56	91.0	2024/02/26 11:58:48
LI(max)	77.1	2024/02/26 11:58:04	88.9	2024/02/26 11:55:56	94.7	2024/02/26 11:55:55
LS(min)	41.7	2024/02/26 11:54:26	53.6	2024/02/26 12:06:03	58.2	2024/02/26 12:06:10
LF(min)	41.0	2024/02/26 11:54:26	51.8	2024/02/26 12:06:03	55.9	2024/02/26 12:06:08
LI(min)	41.2	2024/02/26 11:54:26	53.8	2024/02/26 12:06:03	59.5	2024/02/26 12:06:10
LPeak(max)	88.6	2024/02/26 11:58:09	97.4	2024/02/26 11:56:21	100.3	2024/02/26 11:55:55

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.094.s
File Name on PC	831_0002783-20240226 112959-831_Data.094.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-13: 241 Leland Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 11:29:59
Stop	2024-02-26 11:45:00
Duration	00:15:00.8
Run Time	00:15:00.8
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	58.4	
LAE	87.9	
EA	68.593	µPa²h
LZpeak (max)	2024-02-26 11:36:29	98.6 dB
LASmax	2024-02-26 11:41:15	70.4 dB
LASmin	2024-02-26 11:33:43	40.6 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	7	84.6 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	58.4	58.4	-99.9	58.4	58.4	-99.9	-99.9	dB

LCeq	67.8	dB
LAeq	58.4	dB
LCeq - LAeq	9.4	dB
LAIeq	60.6	dB
LAeq	58.4	dB
LAIeq - LAeq	2.3	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	58.4		67.8		75.6	
LS(max)	70.4	2024/02/26 11:41:15	78.9	2024/02/26 11:38:54	90.7	2024/02/26 11:36:29
LF(max)	73.2	2024/02/26 11:41:15	80.9	2024/02/26 11:38:53	94.5	2024/02/26 11:36:29
LI(max)	74.8	2024/02/26 11:41:15	81.5	2024/02/26 11:36:33	97.0	2024/02/26 11:36:29
LS(min)	40.6	2024/02/26 11:33:43	52.4	2024/02/26 11:33:35	59.3	2024/02/26 11:30:54
LF(min)	39.7	2024/02/26 11:33:37	50.5	2024/02/26 11:33:30	57.7	2024/02/26 11:30:51
LI(min)	40.7	2024/02/26 11:33:43	53.2	2024/02/26 11:33:32	60.8	2024/02/26 11:30:54
LPeak(max)	84.1	2024/02/26 11:41:15	90.7	2024/02/26 11:41:22	98.6	2024/02/26 11:36:29

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.098.s
File Name on PC	831_0002783-20240226 132336-831_Data.098.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-14: 163 Cliff Swallow Court
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 13:23:36
Stop	2024-02-26 13:38:37
Duration	00:15:00.6
Run Time	00:15:00.6
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	59.8	
LAE	89.4	
EA	95.799	µPa²h
LZpeak (max)	2024-02-26 13:32:57	95.9 dB
LASmax	2024-02-26 13:32:57	76.0 dB
LASmin	2024-02-26 13:24:01	47.1 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	14	75.1 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	59.8	59.8	-99.9	59.8	59.8	-99.9	-99.9	dB

LCeq	67.9	dB
LAeq	59.8	dB
LCeq - LAeq	8.1	dB
LAleq	61.9	dB
LAeq	59.8	dB
LAleq - LAeq	2.1	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	59.8		67.9		71.2	
LS(max)	76.0	2024/02/26 13:32:57	83.9	2024/02/26 13:32:57	84.2	2024/02/26 13:32:57
LF(max)	78.4	2024/02/26 13:32:57	86.5	2024/02/26 13:32:57	87.9	2024/02/26 13:33:26
LI(max)	78.9	2024/02/26 13:32:57	87.4	2024/02/26 13:32:56	90.0	2024/02/26 13:33:26
LS(min)	47.1	2024/02/26 13:24:01	59.4	2024/02/26 13:24:03	63.3	2024/02/26 13:24:04
LF(min)	46.5	2024/02/26 13:24:01	57.8	2024/02/26 13:23:56	61.3	2024/02/26 13:24:04
LI(min)	46.8	2024/02/26 13:24:01	59.8	2024/02/26 13:23:56	64.7	2024/02/26 13:24:04
LPeak(max)	89.3	2024/02/26 13:32:56	95.7	2024/02/26 13:32:56	95.9	2024/02/26 13:32:57

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.099.s
File Name on PC	831_0002783-20240226 134844-831_Data.099.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-15: 30 Mariposa Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-26 13:48:44
Stop	2024-02-26 14:03:44
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-02-26 10:06:02
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	56.4	
LAE	85.9	
EA	43.431	µPa²h
LZpeak (max)	2024-02-26 13:55:15	92.9 dB
LASmax	2024-02-26 13:54:34	69.0 dB
LASmin	2024-02-26 13:53:16	47.0 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	5	25.3 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	56.4	56.4	-99.9	56.4	56.4	-99.9	-99.9	dB

LCeq	67.7	dB
LAeq	56.4	dB
LCeq - LAeq	11.4	dB
LAIeq	58.1	dB
LAeq	56.4	dB
LAIeq - LAeq	1.8	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	56.4		67.7		71.4	
LS(max)	69.0	2024/02/26 13:54:34	81.5	2024/02/26 13:55:16	82.0	2024/02/26 13:55:16
LF(max)	72.2	2024/02/26 13:54:34	84.0	2024/02/26 13:55:15	87.2	2024/02/26 13:59:29
LI(max)	73.4	2024/02/26 13:54:34	85.1	2024/02/26 13:55:15	89.3	2024/02/26 13:59:29
LS(min)	47.0	2024/02/26 13:53:16	58.8	2024/02/26 13:52:46	62.8	2024/02/26 13:52:49
LF(min)	46.6	2024/02/26 13:53:12	57.4	2024/02/26 13:52:46	60.7	2024/02/26 13:52:48
LI(min)	46.9	2024/02/26 13:53:11	59.6	2024/02/26 13:52:43	64.2	2024/02/26 13:52:49
LPeak(max)	86.6	2024/02/26 13:55:16	92.3	2024/02/26 13:55:15	92.9	2024/02/26 13:55:15

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.106.s
File Name on PC	831_0002783-20240228 131551-831_Data.106.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	464 S Hill Boulevard
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 13:15:51
Stop	2024-02-28 13:31:52
Duration	00:16:00.7
Run Time	00:15:24.7
Pause	00:00:36.0
Pre-Calibration	2024-02-28 09:46:52
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	C	Z	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	60.6	
LAE	90.3	
EA	119.287	µPa²h
LZpeak (max)	2024-02-28 13:27:59	96.5 dB
LASmax	2024-02-28 13:18:34	78.3 dB
LASmin	2024-02-28 13:31:47	38.1 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	12	92.8 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	60.6	60.6	-99.9	60.6	60.6	-99.9	-99.9	dB

LCeq	69.3	dB
LAeq	60.6	dB
LCeq - LAeq	8.7	dB
LAIeq	62.5	dB
LAeq	60.6	dB
LAIeq - LAeq	1.9	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	60.6		69.3		70.5	
LS(max)	78.3	2024/02/28 13:18:34	85.4	2024/02/28 13:28:00	86.1	2024/02/28 13:28:00
LF(max)	79.3	2024/02/28 13:18:34	87.9	2024/02/28 13:29:26	88.7	2024/02/28 13:29:26
LI(max)	80.5	2024/02/28 13:18:35	89.6	2024/02/28 13:29:26	90.4	2024/02/28 13:29:26
LS(min)	38.1	2024/02/28 13:31:47	48.1	2024/02/28 13:17:05	53.3	2024/02/28 13:31:47
LF(min)	37.2	2024/02/28 13:31:47	47.0	2024/02/28 13:17:04	50.9	2024/02/28 13:31:51
LI(min)	38.2	2024/02/28 13:31:47	48.5	2024/02/28 13:17:05	54.3	2024/02/28 13:31:31
LPeak(max)	93.6	2024/02/28 13:25:48	94.9	2024/02/28 13:27:59	96.5	2024/02/28 13:27:59

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.105.s
File Name on PC	831_0002783-20240228 125228-831_Data.105.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-17: 500 Bellevue Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 12:52:28
Stop	2024-02-28 13:07:28
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-02-28 09:46:52
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	C	Z	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	59.5	
LAE	89.1	
EA	89.925	µPa²h
LZpeak (max)	2024-02-28 12:57:17	98.3 dB
LASmax	2024-02-28 12:57:19	80.9 dB
LASmin	2024-02-28 13:00:54	43.0 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	7	25.7 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	59.5	59.5	-99.9	59.5	59.5	-99.9	-99.9	dB

LCeq	68.4	dB
LAeq	59.5	dB
LCeq - LAeq	8.9	dB
LAIeq	61.7	dB
LAeq	59.5	dB
LAIeq - LAeq	2.1	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	59.5		68.4		72.2	
LS(max)	80.9	2024/02/28 12:57:19	85.6	2024/02/28 12:57:18	86.0	2024/02/28 12:57:18
LF(max)	82.0	2024/02/28 12:57:17	88.4	2024/02/28 12:57:17	90.4	2024/02/28 12:52:28
LI(max)	82.7	2024/02/28 12:57:17	89.1	2024/02/28 12:57:17	92.9	2024/02/28 12:52:28
LS(min)	43.0	2024/02/28 13:00:54	54.1	2024/02/28 13:00:56	56.6	2024/02/28 13:01:03
LF(min)	42.3	2024/02/28 13:00:52	52.3	2024/02/28 13:00:56	55.1	2024/02/28 13:01:00
LI(min)	43.0	2024/02/28 13:00:53	54.5	2024/02/28 13:00:56	57.4	2024/02/28 13:01:00
LPeak(max)	93.9	2024/02/28 12:57:17	98.1	2024/02/28 12:57:17	98.3	2024/02/28 12:57:17

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Summary

File Name on Meter	831_Data.113.s
File Name on PC	831_0002783-20240301 130657-831_Data.113.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-18: 66 Alp Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 13:06:57
Stop	2024-03-01 13:22:45
Duration	00:15:48.1
Run Time	00:15:48.1
Pause	00:00:00.0
Pre-Calibration	2024-03-01 09:19:19
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LAeq	63.3	
LAE	93.0	
EA	223.773	µPa²h
LZpeak (max)	2024-03-01 13:14:49	115.8 dB
LASmax	2024-03-01 13:08:50	74.4 dB
LASmin	2024-03-01 13:12:12	53.0 dB
SEA	-99.9	dB

	Exceedance Counts	**Duration**
LAS > 65.0 dB	36	246.6 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	63.3	63.3	-99.9	63.3	63.3	-99.9	-99.9	dB

LCeq	73.8	dB
LAeq	63.3	dB
LCeq - LAeq	10.6	dB
LAIeq	64.8	dB
LAeq	63.3	dB
LAIeq - LAeq	1.5	dB

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	63.3		73.8		86.8	
LS(max)	74.4	2024/03/01 13:08:50	88.7	2024/03/01 13:14:50	104.2	2024/03/01 13:14:43
LF(max)	77.5	2024/03/01 13:21:14	94.5	2024/03/01 13:14:50	110.7	2024/03/01 13:14:42
LI(max)	81.6	2024/03/01 13:21:14	96.7	2024/03/01 13:14:49	113.3	2024/03/01 13:14:42
LS(min)	53.0	2024/03/01 13:12:12	62.5	2024/03/01 13:07:48	67.2	2024/03/01 13:21:36
LF(min)	52.5	2024/03/01 13:12:10	61.0	2024/03/01 13:10:46	64.6	2024/03/01 13:07:49
LI(min)	52.8	2024/03/01 13:12:12	63.0	2024/03/01 13:07:49	67.4	2024/03/01 13:21:36
LPeak(max)	97.1	2024/03/01 13:21:14	101.2	2024/03/01 13:14:42	115.8	2024/03/01 13:14:49

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	2	
OBA Overload Duration	5.0	s

Summary

File Name on Meter	831_Data.112.s
File Name on PC	831_0002783-20240301 115738-831_Data.112.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-19: 66 Cliffside Drive, on Westlawn Avenue
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 11:57:38
Stop	2024-03-01 12:12:39
Duration	00:15:00.9
Run Time	00:15:00.9
Pause	00:00:00.0
Pre-Calibration	2024-03-01 09:19:19
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LAeq	54.7		
LAE	84.3		
EA	29.594 µPa²h		
LZpeak (max)	2024-03-01 12:09:10	110.2	dB
LASmax	2024-03-01 12:03:51	69.4	dB
LASmin	2024-03-01 11:59:34	46.4	dB
SEA	-99.9 dB		

	Exceedance Counts	**Duration**
LAS > 65.0 dB	9	25.0 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	54.7	54.7	-99.9	54.7	54.7	-99.9	-99.9	dB

LCeq	68.2	dB
LAeq	54.7	dB
LCeq - LAeq	13.5	dB
LAIeq	57.3	dB
LAeq	54.7	dB
LAIeq - LAeq	2.6	dB

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	54.7		68.2		82.9	
LS(max)	69.4	2024/03/01 12:03:51	84.2	2024/03/01 12:09:10	98.6	2024/03/01 12:09:10
LF(max)	72.4	2024/03/01 12:03:51	89.0	2024/03/01 12:09:10	104.2	2024/03/01 12:09:10
LI(max)	74.6	2024/03/01 12:03:51	91.5	2024/03/01 12:09:10	107.3	2024/03/01 12:09:10
LS(min)	46.4	2024/03/01 11:59:34	56.1	2024/03/01 12:11:29	61.1	2024/03/01 11:59:08
LF(min)	45.8	2024/03/01 11:59:36	54.6	2024/03/01 12:10:03	58.7	2024/03/01 11:58:55
LI(min)	46.1	2024/03/01 11:59:36	56.5	2024/03/01 11:59:02	62.2	2024/03/01 11:59:07
LPeak(max)	88.4	2024/03/01 12:00:52	96.5	2024/03/01 12:09:10	110.2	2024/03/01 12:09:10

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	1	
OBA Overload Duration	2.0	s

Summary

File Name on Meter	831_Data.111.s
File Name on PC	831_0002783-20240301 112238-831_Data.111.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-20: 615D John Muir Drive
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 11:22:38
Stop	2024-03-01 11:37:40
Duration	00:15:02.9
Run Time	00:15:02.9
Pause	00:00:00.0
Pre-Calibration	2024-03-01 09:19:19
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	60.1	
LAE	89.7	
EA	102.522 µPa²h	
LZpeak (max)	2024-03-01 11:36:10	100.0 dB
LASmax	2024-03-01 11:24:16	72.6 dB
LASmin	2024-03-01 11:32:53	46.0 dB
SEA	-99.9 dB	

	Exceedance Counts	Duration
LAS > 65.0 dB	15	92.9 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	60.1	60.1	-99.9	60.1	60.1	-99.9	-99.9	dB

LCeq	67.7 dB	
LAeq	60.1 dB	
LCeq - LAeq	7.6 dB	
LAIeq	62.3 dB	
LAeq	60.1 dB	
LAIeq - LAeq	2.2 dB	

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	60.1		67.7		75.5	
LS(max)	72.6	2024/03/01 11:24:16	83.3	2024/03/01 11:27:36	90.7	2024/03/01 11:35:19
LF(max)	78.1	2024/03/01 11:24:16	86.7	2024/03/01 11:27:36	96.0	2024/03/01 11:30:58
LI(max)	80.3	2024/03/01 11:24:16	87.6	2024/03/01 11:27:36	98.2	2024/03/01 11:30:58
LS(min)	46.0	2024/03/01 11:32:53	55.7	2024/03/01 11:28:31	59.5	2024/03/01 11:28:33
LF(min)	45.1	2024/03/01 11:32:51	54.1	2024/03/01 11:28:27	57.7	2024/03/01 11:28:31
LI(min)	45.3	2024/03/01 11:32:51	56.5	2024/03/01 11:28:30	61.0	2024/03/01 11:28:33
LPeak(max)	91.2	2024/03/01 11:30:59	94.2	2024/03/01 11:27:36	100.0	2024/03/01 11:36:10

Overload Count	0
Overload Duration	0.0 s
OBA Overload Count	0
OBA Overload Duration	0.0 s

Summary

File Name on Meter	831_Data.110.s
File Name on PC	831_0002783-20240301 104206-831_Data.110.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-21: 701 Urbano Drive, on De Soto Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-03-01 10:42:06
Stop	2024-03-01 10:58:36
Duration	00:16:30.8
Run Time	00:15:19.6
Pause	00:01:11.2
Pre-Calibration	2024-03-01 09:19:19
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	C	Z	
Under Range Peak	75.6	72.6	**77.6**	dB
Under Range Limit	**26.1**	26.3	31.6	dB
Noise Floor	16.9	17.2	22.3	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	52.1	
LAE	81.7	
EA	16.568 µPa²h	
LZpeak (max)	2024-03-01 10:44:09	109.0 dB
LASmax	2024-03-01 10:44:00	66.9 dB
LASmin	2024-03-01 10:47:33	44.7 dB
SEA	-99.9 dB	

	Exceedance Counts	Duration
LAS > 65.0 dB	1	2.6 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	52.1	52.1	-99.9	52.1	52.1	-99.9	-99.9	dB

LCeq	66.4 dB
LAeq	52.1 dB
LCeq - LAeq	14.3 dB
LAIeq	53.9 dB
LAeq	52.1 dB
LAIeq - LAeq	1.8 dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	52.1		66.4		82.8	
LS(max)	66.9	2024/03/01 10:44:00	83.3	2024/03/01 10:44:10	97.9	2024/03/01 10:44:10
LF(max)	68.8	2024/03/01 10:44:00	89.1	2024/03/01 10:44:09	104.0	2024/03/01 10:56:01
LI(max)	69.7	2024/03/01 10:44:00	92.5	2024/03/01 10:44:09	106.2	2024/03/01 10:56:01
LS(min)	44.7	2024/03/01 10:47:33	52.8	2024/03/01 10:47:48	58.6	2024/03/01 10:47:52
LF(min)	44.0	2024/03/01 10:47:32	51.4	2024/03/01 10:47:48	55.8	2024/03/01 10:47:46
LI(min)	44.4	2024/03/01 10:47:53	53.2	2024/03/01 10:47:56	60.7	2024/03/01 10:48:06
LPeak(max)	85.3	2024/03/01 10:44:04	99.3	2024/03/01 10:44:09	109.0	2024/03/01 10:44:09

Overload Count	0
Overload Duration	0.0 s
OBA Overload Count	0
OBA Overload Duration	0.0 s

Summary

File Name on Meter	831_Data.100.s
File Name on PC	831_0002783-20240228 095030-831_Data.100.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-22: 1750 Silliman Street
Job Description	PG&E Power Asset Acquisition
Note	

Measurement

Description	
Start	2024-02-28 09:50:30
Stop	2024-02-28 10:05:30
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-02-28 09:46:54
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.1 dB

	A	C	Z	
Under Range Peak	75.5	72.5	**77.5**	dB
Under Range Limit	**26.0**	26.2	31.5	dB
Noise Floor	16.9	17.1	22.2	dB

	First	Second	Third
Instrument Identification			

Results

LAeq	55.8	
LAE	85.3	
EA	37.813	µPa²h
LZpeak (max)	2024-02-28 10:00:15	94.1 dB
LASmax	2024-02-28 09:57:15	67.9 dB
LASmin	2024-02-28 10:05:00	45.8 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	5	31.2 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	55.8	55.8	-99.9	55.8	55.8	-99.9	-99.9	dB

LCeq	66.6	dB
LAeq	55.8	dB
LCeq - LAeq	10.8	dB
LAleq	57.2	dB
LAeq	55.8	dB
LAleq - LAeq	1.4	dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	55.8		66.6		72.2	
LS(max)	67.9	2024/02/28 9:57:15	77.8	2024/02/28 10:04:27	84.3	2024/02/28 10:00:15
LF(max)	70.3	2024/02/28 9:57:15	83.2	2024/02/28 10:04:26	88.7	2024/02/28 10:00:15
LI(max)	71.9	2024/02/28 9:57:15	86.0	2024/02/28 10:04:26	91.4	2024/02/28 10:00:15
LS(min)	45.8	2024/02/28 10:05:00	57.1	2024/02/28 9:59:30	60.3	2024/02/28 9:59:36
LF(min)	45.3	2024/02/28 10:05:04	55.3	2024/02/28 9:59:29	57.5	2024/02/28 9:59:29
LI(min)	45.7	2024/02/28 10:04:56	57.8	2024/02/28 9:59:30	60.4	2024/02/28 9:59:30
LPeak(max)	80.5	2024/02/28 9:57:15	93.7	2024/02/28 10:04:26	94.1	2024/02/28 10:00:15

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Addition of Multiple Noise Sources - Transformers Daly City Yard New Substation

Noise Source	Tranformer 1	Transformer 2	Transformer 3	Transformer 4	Transformer 5	Transformer 6
Noise Level @ 6 feet	55	55	55	55	55	55

Source: National Electrical Manufacturers Association. 2019. Page 4
NEMA Standards Publication TR 1-2013 (R2019) Transformers, Step Voltage Regulators and Reactors

Summed noise = 10*LOG(NL1+NL2+...) Where NL = Noise level with LOG removed

Remove LOG	316227.766	316227.8	316227.8	316227.8	316227.8	316227.8

Adding Noise Sources 62.8

Attenuation of noise with distance - Point source (Transformers)

Attenuation Equation Ni = No - 20(log Di/Do)

where:

Ni= attenuated noise level of interest
No= reference noise level
Di= distance to receptor
Do= reference distance

No=	62.8	dBA	
Di=	260	ft	Distance from footprint to property line as measured in Google Earth
Do=	6	ft	
Ni=	30.0	dBA	

Addition of Multiple Noise Sources - Transformers Martin Substation

Noise Source	Tranformer 1	Transformer 2		
Noise Level @ 6 feet	55	55	Source:	National Electrical Manufacturers Association. 2019. Page 4 NEMA Standards Publication TR 1-2013 (R2019) Transformers, Step Voltage Regulators and Reactors

Summed noise = 10*LOG(NL1+NL2) Where NL = Noise level with LOG removed

Remove LOG	316227.766	316227.8
Adding Noise Sources	58.0	dBA

Attenuation of noise with distance - Point source (Transformers)

Attenuation Equation Ni = No - 20(log Di/Do)

where:

Ni=	attenuated noise level of interest
No=	reference noise level
Di=	distance to receptor
Do=	reference distance

No=	58.0	dBA
Di=	25	ft
Do=	6	ft
Ni=	45.6	dBA

Vibration propogation from Construction Equipment

Distribution Express Feeders

Formula from Caltrans, 2020 = PPVequip = PPVref x (25/D)^1.1
where

Receptor 1: Residences alongs streets in Daly City and San Francisco

PPV refs @ 25 ft =		PPV@25ft
	pile driver (impact)	0.65
	Vibratory Roller	0.21
	Bulldozer (large)	0.089
	Truck(loaded)	0.076
	Jackhammer	0.035
	Dozer (Small)	0.003

Enter distance = 15

Resultant PPV =		
	pile driver (impact)	1.140111
	Vibratory Roller	0.368343
	Bulldozer (large)	0.156107
	Truck(loaded)	0.133305
	Jackhammer	0.061391

		Lv@25 ft
	pile driver (impact)	104
	Vibratory Roller	94
	Bulldozer (large)	87
	Truck(loaded)	86
	Jackhammer	79
	Dozer (Small)	53

Formula from FTA 2018= Lv(D) = Lv(25 ft) – 30log(D/25)

Resultant Lv =		
	pile driver (impact)	110.6555
	Vibratory Roller	100.6555
	Bulldozer (large)	93.65546
	Truck(loaded)	92.65546
	Jackhammer	85.65546
	Dozer (Small)	59.65546

Receptor 2: Sagamore Street Residences

PPV refs @ 25 ft =		PPV@25ft
	pile driver (impact)	0.644
	pile driver (sonic)	0.17
	Bulldozer (large)	0.089
	Truck(loaded)	0.076
	Jackhammer	0.035

Enter distance = 15

Resultant PPV =		
	pile driver (impact)	1.129586496
	pile driver (sonic)	0.298182771
	Bulldozer (large)	0.156107451
	Truck(loaded)	0.133305239
	Jackhammer	0.06139057

		Lv@25 ft
	pile driver (impact)	104
	pile driver (sonic)	93
	Bulldozer (large)	87
	Truck(loaded)	86
	Jackhammer	79

Resultant Lv =		
	pile driver (impact)	110.6555
	pile driver (sonic)	99.65546
	Bulldozer (large)	93.65546
	Truck(loaded)	92.65546
	Jackhammer	85.65546

Vibration propogation from Construction Equipment

Local Distribution System Separation

Formula fromCaltrans, 2020 = PPVequip = PPVref x (25/D)^1.1
where

Receptor 1: Residences in Brisbane, Daly City and San Francisco

PPV refs @ 25 ft =

	PPV@25ft
pile driver (impact)	0.65
Vibratory Roller	0.21
Bulldozer (large)	0.089
Truck(loaded)	0.076
Jackhammer	0.035
Dozer (Small)	0.003

Enter distance = 15

Resultant PPV =

pile driver (impact)	1.140111
Vibratory Roller	0.368343
Bulldozer (large)	0.156107
Truck(loaded)	0.133305
Jackhammer	0.061391

	Lv@25 ft
pile driver (impact)	104
Vibratory Roller	94
Bulldozer (large)	87
Truck(loaded)	86
Jackhammer	79
Dozer (Small)	53

Formula from FTA 2018 = Lv(D) = Lv(25 ft) – 30log(D/25)

Resultant Lv =

pile driver (impact)	110.6555
Vibratory Roller	100.6555
Bulldozer (large)	93.65546
Truck(loaded)	92.65546
Jackhammer	85.65546
Dozer (Small)	59.65546

Vibration propogation from Construction Equipment

Martin Substation

Formula from Caltans, 2020 = PPVequip = PPVref x (25/D)^1.1
where

Receptor 1: Midway Village on 800 block of Schwerin Street, Daly City

PPV refs @ 25 ft =		PPV@25ft
	pile driver (impact)	0.65
	Vibratory Roller	0.21
	Bulldozer (large)	0.089
	Truck(loaded)	0.076
	Jackhammer	0.035
	Dozer (Small)	0.003

Enter distance = 40

Resultant PPV =		
	pile driver (impact)	0.387598
	Vibratory Roller	0.125224
	Bulldozer (large)	0.053071
	Truck(loaded)	0.045319
	Jackhammer	0.020871

	Lv@25 ft
pile driver (impact)	104
Vibratory Roller	94
Bulldozer (large)	87
Truck(loaded)	86
Jackhammer	79
Dozer (Small)	53

Formula from FTA 2018 = Lv(D) = Lv(25 ft) – 30log(D/25)

Resultant Lv =		
	pile driver (impact)	97.8764
	Vibratory Roller	87.8764
	Bulldozer (large)	80.8764
	Truck(loaded)	79.8764
	Jackhammer	72.8764
	Dozer (Small)	46.8764

Vibration propogation from Construction Equipment

New City Substation

Formula from Caltrans, 2020 = PPVequip = PPVref x (25/D)^1.1
where

Receptor 1: Midway Village on 800 block of Schwerin Street, Daly City

PPV refs @ 25 ft =		PPV@25ft
	pile driver (impact)	0.65
	Vibratory Roller	0.21
	Bulldozer (large)	0.089
	Truck(loaded)	0.076
	Jackhammer	0.035
	Dozer (Small)	0.003

Enter distance = 350

Resultant PPV =		
	pile driver (impact)	0.035659
	Vibratory Roller	0.011521
	Bulldozer (large)	0.004883
	Truck(loaded)	0.004169
	Jackhammer	0.00192

	Lv@25 ft
pile driver (impact)	104
Vibratory Roller	94
Bulldozer (large)	87
Truck(loaded)	86
Jackhammer	79
Dozer (Small)	53

Formula from FTA 2018 = Lv(D) = Lv(25 ft) – 30log(D/25)

Resultant Lv =		
	pile driver (impact)	69.61616
	Vibratory Roller	59.61616
	Bulldozer (large)	52.61616
	Truck(loaded)	51.61616
	Jackhammer	44.61616
	Dozer (Small)	18.61616

Calculation of peak particle velocity using a 12-ton Roller

Source Document 1: **Alternative Approaches to Measurement of Ground Vibrations Due to the Vibratory Roller: A Pilot Study**

Alternative Approaches to Measurement of Ground Vibrations Due to the Vibratory Roller: A Pilot Study - PMC

This study uses a Hammtronic HAMM H 11i Roller

Spec sheet is here: https://www.wirtgen-group.com/binary/full/o16176v83_H_11i_H266_enUS.pdf

Weight is : 10880 kilograms

From Figure 6 of the source document, the PPV at the closest measured point would, conservatively, be 11 millimeters per second. This is from the highest (first stage) of compaction.

PPV1 = 11 mm/sec

From Figure 4 of the source document, the closest measured point is 1.4 meters

D1= 1.4 meters

Step 1: Convert PPV1 from millimeters per second to inches per second

1 millimeter = 0.03937 inches

PPV1 = 0.4330711 inches/second

Step 2: Convert D1 from meters to feet

1 meter = 3.28084 feet

D1 = 4.593176 feet

So our reference peak particle velocity from the study is : 0.433071 inches/sec at 4.6 feet

Formula from Caltrans, 2020 = PPVequip = PPVref x (25/D)^1.1 ,where the reference distance is 25 feet

Adjust formula for reference distance PPVequip = PPVref x (4.6/D)^1.1

Calculate PPV at distances

Distance (feet)		
4.6	0.433071	
10	0.184329	
15	0.118003	
20	0.085992	
25	0.067276	
32	0.051278	
7.6	0.249286	Distance below 0.25 in/sec = 7.6 feet
50	0.031385	
60	0.025682	
200	0.006831	
500	0.002493	

This page intentionally left blank

APPENDIX F
AIR QUALITY TECHNICAL MEMORANDUM AND HEALTH RISK ASSESSMENT

PAGE INTENTIONALLY BLANK

Prepared for
San Francisco Planning Department
San Francisco, California

Prepared by
Ramboll Americas Engineering Solutions, Inc.
San Francisco, California

Project Number
1690031841

Date
November 27, 2024

AIR QUALITY AND HEALTH RISK ASSESSMENT RESULTS

PG&E POWER ASSET ACQUISITION PROJECT SAN FRANCISCO, CALIFORNIA

CASE NO. 2023-005370ENV

CONTENTS

1. INTRODUCTION 5
1.1 Project Description 5
1.1.1 Variant 7

2. METHODOLOGY 8

3. EMISSIONS OF CRITERIA AIR POLLUTANTS 9
3.1 Construction Emissions 9
3.1.1 Construction Emissions by Source Category 9
3.1.2 Summary of Construction Emissions 10
3.2 Operational Emissions 10

4. HEALTH RISK ASSESSMENT 11
4.1 Project-Level Health Risk Impacts by Project Component 11
4.1.1 Martin Substation and the Variant 11
4.1.2 Linear Components 12
4.1.3 Rail Emissions 12
4.1.4 Emergency Generator 12
4.1.5 Other TAC Sources 12
4.2 Existing Plus Project Health Risk Assessment 13
4.3 Cumulative Health Risk Assessment 14
4.3.1 Martin Substation and the Variant 14
4.3.2 Linear Components and Operations Control Center 16

5. UNCERTAINTIES 18
5.1 Emission Estimates 18
5.2 Modeling Approach 19
5.3 Health Risk Assessments 19

6. REFERENCES 22

TABLES

Table 1a: Construction Phasing Schedule for Martin Substation
Table 1b: Construction Equipment for Martin Substation
Table 1c: Construction Trips for Martin Substation
Table 2a: Construction Phasing Schedule for Linear Components
Table 2b: Construction Equipment for Linear Components
Table 2c: Construction Trips for Linear Components
Table 3a: Construction Phasing Schedule for Other Components
Table 3b: Construction Equipment for Other Components
Table 3c: Construction Trips for Other Components
Table 4a: Construction Phasing Schedule for the Variant
Table 4b: Construction Equipment for the Variant
Table 4c: Construction Trips for the Variant
Table 5: Estimated Emissions from Construction Paving Off-Gassing
Table 6a: Calculation Assumptions for Off-Highway Trucks (Variant)
Table 6b: Off-Highway Trucks Emission Factors (Variant)
Table 6c: Criteria Air Pollutants Emissions from Off-Highway Trucks (Variant)
Table 7: Emission Factors for Entrained Roadway Dust
Table 8: Emissions Calculations for Entrained Road Dust for Martin Substation within Modeling Extent
Table 9: Emissions Calculations for Entrained Road Dust for Linear Components within Modeling Extent
Table 10: Emissions Calculations for Entrained Road Dust for the Variant within Modeling Extent
Table 11a: Rail Emissions Input Assumptions
Table 11b: Rail Off-Site Line-Haul Emission Factors
Table 11c: Rail Line-Haul Fuel Consumption
Table 11d: Rail Emissions Summary
Table 12a: Uncontrolled Criteria Air Pollutants Emissions - Project (Assume Rail Haul)
Table 12b: Uncontrolled Criteria Air Pollutants Emissions - Project (Assume Truck Haul)
Table 13a: Controlled Criteria Air Pollutants Emissions - Project (Assume Rail Haul)
Table 13b: Controlled Criteria Air Pollutants Emissions - Project (Assume Truck Haul)
Table 14a: Uncontrolled Criteria Air Pollutants Emissions - Variant (Assume Rail Haul)
Table 14b: Uncontrolled Criteria Air Pollutants Emissions - Variant (Assume Truck Haul)
Table 15a: Controlled Criteria Air Pollutants Emissions - Variant (Assume Rail Haul)
Table 15b: Controlled Criteria Air Pollutants Emissions - Variant (Assume Truck Haul)
Table 16: Estimated Emissions from Emergency Generator Operations
Table 17: Criteria Air Pollutants Emissions from Operation
Table 18: Construction and Operational Exposure Parameters
Table 19: Toxicity Values
Table 20a: Martin Substation/Variant - Uncontrolled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$ for Receptors outside of San Francisco

Table 20b: Martin Substation/Variant - Uncontrolled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$ for Receptors in San Francisco
Table 21a: Martin Substation/Variant - Controlled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$ for Receptors outside of San Francisco
Table 21b: Martin Substation/Variant - Controlled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and $PM_{2.5}$ for Receptors in San Francisco
Table 22: Maximum Project Excess Lifetime Cancer Risk, Chronic HI, and $PM_{2.5}$ from Hypothetical Health Risk Assessments (Linear Components, Rail, and Operations Control Center)
Table 23: Existing Plus Project Health Risks Impacts for MEIs Located in San Francisco (Martin Substation)
Table 24: Existing Plus Project Health Risks Impacts for MEIs Located Outside of San Francisco (Martin Substation)
Table 25: Existing Plus Project Health Risks Impacts for MEIs Located in San Francisco (Variant)
Table 26: Existing Plus Project Health Risks Impacts for MEIs Located Outside of San Francisco (Variant)
Table 27: Foreseeable Future Projects Overlapping with Linear Components and Operations Control Center

FIGURES

Figure 1: Modeled Sources for the Martin Substation and Variant Components
Figure 2: Modeled Receptors for the Martin Substation and Variant Components
Figure 3: Maximally Exposed Individual (MEI) Locations for the Martin Substation and Variant Components
Figure 4a: Cancer Risks at Possible Receptor Locations for the Linear Components and Operational Control Center
Figure 4b: Annual Average $PM_{2.5}$ Concentration at Possible Receptor Locations for the Linear Components and Operational Control Center

APPENDICES

Appendix A: CEQA Air Quality and Health Risk Assessment Methodology
Appendix B: Relevant Pages of CalEEMod2022 Outputs for Operational Mobile Sources
Appendix C: AERMOD Outputs (Submitted Electronically)
Appendix D: BAAQMD's Confirmed Stationary Sources

ACRONYMS AND ABBREVIATIONS

AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Air Dispersion Model
APEZ	Air Pollution Exposure Zone
ARB	(California) Air Resources Board
BAAQMD	Bay Area Air Quality Management District
CalEPA	California Environmental Protection Agency
CalEEMod	California Emissions Estimator Model
CAP	criteria air pollutant
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CPF	cancer potency factor
Citywide HRA	San Francisco Citywide Health Risk Analysis database
DPM	diesel particulate matter
DTSC	California Department of Toxic Substances Control
DTX	Transbay Downtown Rail Extension
EIR	Environmental Impact Report
EMFAC	EMission FACtors model
ESA	Environmental Sciences Associates
HHDT	Heavy Heavy-Duty Trucks
HI	Hazard Index
HRA	health risk assessment
LMF	Light Maintenance Facility
MEI	maximally exposed individual
OEHHA	Office of Environmental Health Hazard Assessment
OFFROAD	(ARB) In-Use Off-Road Equipment model
PG&E	Pacific Gas and Electric
Planning Department	San Francisco Planning Department Environmental Planning Division
PM_{10}	fine particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	fine particulate matter less than 2.5 micrometers in aerodynamic diameter
Ramboll	Ramboll Americas Engineering Solutions, Inc.
ROG	Reactive organic gases
SFPUC	San Francisco Public Utilities Commission
TAC	toxic air contaminant
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

At the request of Environmental Sciences Associates (ESA), Ramboll Americas Engineering Solutions, Inc. (Ramboll) conducted an analysis of criteria air pollutant (CAP) emissions and air quality health risk impacts associated with the implementation of the Pacific Gas and Electric (PG&E) Power Asset Acquisition Project (referred to hereafter as "Project").

Details on the methodology and assumptions are described in the "CEQA Air Quality and Health Risk Assessment Methodology" (Ramboll, May 2024, referred to hereafter as "Methodology Document"), attached in **Appendix A**. This technical report presents a brief summary of the methodology and provides the results for air quality and health risk impact analysis of the construction and operation of the Project. This analysis has been performed to support the CEQA documentation at the request of the San Francisco Planning Department's Environmental Planning Division (Planning Department).

1.1 Project Description

San Francisco Public Utilities Commission (SFPUC) proposes to purchase PG&E-owned electrical transmission and distribution assets within and near San Francisco that are needed to provide electricity service to customers in San Francisco. In addition to the change in ownership of the power assets, the Project would include physical separation of PG&E's existing electric system into two separate systems, to allow both systems to be operated independently by SFPUC and PG&E.

In order to physically separate the acquired power assets from PG&E's remaining electricity grid outside of the City, SFPUC would modify portions of the existing distribution infrastructure, construct new underground distribution feeders, and modify the existing Martin Substation or construct a new substation, referred to as the New City Substation Variant (the Variant), discussed in more detail in **Section 1.1.1**). As outlined in the Figure 2-1 of Chapter 2, Project Description, construction of the Project would occur primarily along the border areas between the City and County of San Francisco and San Mateo County, and in the City of Daly City, City of Brisbane, and Unincorporated San Mateo County. Construction would take 3 to 5 years after the purchase and transfer of the power assets. The Project components that would involve physical changes to the environment include:

- **Martin Substation Separation:** Martin Substation is an existing outdoor, air-insulated[1] substation located on the borderline of Daly City and the City of Brisbane, where PG&E's high-voltage transmission lines are reduced to lower voltage distribution lines to supply electricity to San Francisco. Construction occurring at this Project component would reconfigure and partition the Martin Substation into two interconnected utility systems. Construction activities are anticipated to include installation of new and relocation of existing transformers, demolition of existing structures, installation of new foundation pads, excavation to access existing duct banks[2] for reconnection, construction of new underground duct banks and vaults, and installation of a galvanized fence. The Martin Substation separation would require construction within areas subject to California Department of Toxic Substances Control (DTSC) restrictions due to hazardous substances in soil and groundwater, and thus would require obtaining DTSC approval of a soil management plan and a health and safety plan prior to any excavation. A land use covenant currently restricts operations and maintenance activities at the entire Martin Substation property and prohibits certain types of land uses (e.g., residential, hospital, school, daycare center). The

[1] Air-insulated substations have all equipment installed outdoors and utilize air as an insulator.
[2] A duct bank is an underground concrete trench designed to protect a series of conduits (polyvinyl chloride [PVC], high-density polyethylene [HDPE] or equivalent) housing electrical cables.

anticipated excavation associated with the Martin Substation separation is approximately 7,930 cubic yards. Construction of this Project component is anticipated to take approximately 33 months.

- **Linear Components:** Linear components are defined in the Methodology Document and collectively refer to the following components: distribution express feeders, local distribution system separation, and system reinforcements, described below. Soil excavated for construction of these components is not anticipated to require disposal at a Class I hazardous materials facility.
  - **Distribution Express Feeders:** Approximately 3.8 miles of new underground distribution express feeders from Martin Substation would be constructed to connect Martin Substation and the existing distribution system in San Francisco. The proposed express feeders would be installed in duct banks. Underground construction would be completed using a cut-and-cover method (i.e., trenching) along roadway lanes. Approximately 0.3 miles of the duct bank alignment would be located in Brisbane, approximately 0.5 miles would be in Daly City, and approximately 3 miles would be in San Francisco. The proposed alignment would include segments of Geneva Avenue, Alemany Boulevard/Huron Avenue, Sickles Avenue, Sagamore Street, and Brotherhood Way. Every 400 feet along the trench, the installation of below-grade concrete vaults will require larger excavations, approximately 11 feet wide and 15 feet deep. A detailed construction schedule for the alignment was not determined at the time of preparation of the Methodology Document and this technical report. The linear trenching work would proceed at a rate of approximately 40 feet per day with a maximum open trench length of 100 to 400 feet occurring on each city block at a time. Construction of this Project component is anticipated to take approximately 12 months in total.
  - **Local Distribution System Separation:** Construction of this Project component would reconfigure and separate overhead and below-ground distribution lines around the San Francisco-San Mateo County Border, requiring both overhead and underground construction with trenching activities. Along the San Francisco and San Mateo County border, there would be three major construction areas: Southwest, Central, and Southeast border areas. Construction activities for this Project component would include disconnecting existing line segments, adding or replacing telecommunications and electrical equipment, modifying existing line voltages, and reconnecting line segments to the appropriate utility. The speed of work and maximum open trench length will be the same as the distribution express feeders, as discussed above. Exact locations where construction activities would occur were not determined at the time of preparation of the Methodology Document and this technical report. Construction of this Project component is anticipated to take approximately 24 months.
  - **System Reinforcements:** This Project component would be implemented to maintain system reliability and the ability to restore power in the event of outages for utilities on either side of the San Francisco-San Mateo County Border. Underground construction activities as well as the speed of work and maximum open trench length for system reinforcements would be similar to those for the distribution express feeders and local distribution system separation, as discussed above. At the time of preparing the Methodology Document and this technical report, the exact locations of daily construction activities have not been determined. Construction of this Project component is anticipated to take approximately 28 months.
- **Other separation components:** Other separation components include 1) modifications to retain PG&E access to non-electrical facilities, 2) operations control center, 3) operations and

maintenance service yards; materials and equipment storage, and 4) telecommunications equipment. An existing building in the southeastern part of the City would be modified to house the proposed operations control center. Interior modifications for the operations control center, which are expected to take 14 months, would not require any heavy construction equipment. Except for the telecommunications equipment, which would be installed and subsumed under other excavation work (or in certain locations that would not require excavation), miscellaneous construction activities involving diesel construction equipment for these project components are not anticipated to last more than two months each.

Operations and maintenance activities subsequent to the completion of Project construction would involve routine inspections, meter readings, periodic testing, and as-needed repairs and replacement, which are similar types of activities that currently occur to maintain the existing PG&E power system. In addition, the operations control center, whose exact location is not known at the time of this analysis, would operate a 300-kilowatt emergency diesel generator to serve as emergency backup power for the building. Up to 400 employees may be hired by SFPUC for Project operations and would be based at SFPUC offices, service yards, and the operations control center.

1.1.1 Variant

The Variant of the Project would construct a new, gas-insulated[3] substation instead of reconfiguring the existing Martin Substation. The new substation proposed by the Variant would be at 731 Schwerin Street in the City of Daly City, adjacent to the existing Martin Substation. Construction of the new substation would use the similar equipment as the Martin Substation separation, with the addition of pile drivers for substation building construction. The anticipated excavation associated with the Variant is approximately 34,980 cubic yards.

Construction and operation of the new substation at this location would require construction within areas subject to DTSC restrictions due to hazardous substances in soil and groundwater, and thus would require obtaining DTSC approval of a soil management plan and a health and safety plan prior to any excavation.

New incoming transmission and distribution lines from Martin Substation to the new substation and outgoing transmission and distribution lines from the new substation to the existing system would be constructed. All other Project components would be the same for the Variant. Construction of this Project component is anticipated to take approximately 26 months.

[3] In a gas insulated substation, the equipment uses sulfur hexafluoride (SF_6) gas to insulate the high voltage equipment. SF6 gas is an inert, non-toxic, and non-combustible gas that is denser than air and used as an insulating medium for electric equipment.

2. METHODOLOGY

The purpose of this analysis is to assess potential CAP and health risks and hazards that would result from the implementation of the Proposed Project, consistent with the City's Air Quality and Greenhouse Gas Analysis Guidelines (Planning Department, 2024), as well as the guidelines and methodologies from air quality agencies, specifically, the Bay Area Air Quality Management District (BAAQMD), the California Air Resources Board (ARB), the California Office of Environmental Health Hazard Assessment (OEHHA), and the US Environmental Protection Agency (USEPA).

The steps conducted in performing this air quality analysis are as follows:

1) Quantify CAP and toxic air contaminants (TAC) emissions from Project construction and operation.
2) Perform air dispersion modeling for pollutant concentrations for the Project components that may result in local health risk impacts.
3) Calculate resulting health risk endpoints (cancer risk, hazard index [HI] and annual average fine particulate [$PM_{2.5}$] concentrations) resulting from TAC sources of the Project.
4) Evaluate the cumulative health risk impacts of the Project and the Project's contributions in the context of other TAC sources in the Project areas.

As described in the Project Description, the Project consists of both project- and program-level components. As a result, the level of details for various Project components may differ. Not all construction locations and details for each Project components were known at the time of the analysis. To capture maximum possible impacts from the Project, Ramboll evaluated the construction activities using the same approaches and conservative assumptions described in the Methodology Document.

3. EMISSIONS OF CRITERIA AIR POLLUTANTS

3.1 Construction Emissions

Construction of all Project components is assumed to start in 2026, with the construction durations of the Project components varying between 1 to 33 months, as summarized above and described in more details in the Project Description. For the Martin Substation, construction phasing schedule, off-road equipment activities, and on-road construction vehicles trips are shown in **Tables 1a**, **1b**, and **1c**, respectively. For the linear components, trenching activities are assumed for the entire durations of these three Project components, listed in **Table 2a**. Daily off-road equipment and activities assumed for trenching for the linear components are summarized in **Table 2b**, and on-road construction trip information is provided in **Table 2c**. Similarly, construction schedule, equipment activities, and trip information for the other Project components are provided in **Tables 3a**, **3b**, and **3c**, respectively. Construction details of the new substation under the Variant are provided in **Tables 4a, 4b** and **4c**, while all other Project components remain the same under the Variant, as discussed in **Section 1.1.1**. Construction information was provided in the Project Description and by SFPUC. Inputs from **Tables 1-4** were used to estimate construction emissions of CAP and TAC.

3.1.1 Construction Emissions by Source Category

Construction emissions were calculated for off-road equipment, on-road vehicles, rail, and off-gassing from asphalt paving. Construction schedules and activities in **Tables 1-4** above were used to estimate off-road construction emissions and on-road vehicle emissions using the California Emissions Estimator Model version 2022.1 (CalEEMod)-equivalent methodologies. One of the two disposal options described in the Methodology Document for the excavated hazardous waste is transporting by truck to Kern County; CAP and TAC emissions for the transport of contaminated soil by trucks were calculated using CalEEMod-equivalent methodologies based on the trip length input described in the Methodology Document. The other disposal option using trucks and rail is described below.

Paving releases reactive organic gases (ROGs). ROG emissions from paving off-gassing were also estimated using CalEEMod methodologies based on maximum possible disturbed area and summarized in **Table 5** by construction year and Project component.

Emissions from water trucks for the Variant were estimated based on CARB's EMission FACtors model (EMFAC2021) emission factors, assuming the water trucks are HHDTs. Operational duration of water trucks was provided by SFPUC and listed in **Table 6a** with other travel assumptions. HHDT emission factors from EMFAC are summarized in **Table 6b**. Daily water trucks' CAP emissions per subphase were calculated based on these inputs are summarized in **Table 6c** and combined with emissions from other construction sources of the Variant.

PM emissions can occur from resuspended road surfacing that is entrained by vehicular travel on paved roads. Construction road dust $PM_{2.5}$ emissions are only included for evaluating local health risk impacts, and are excluded from the estimated CAP emissions per BAAQMD guidance (BAAQMD, 2022). **Table 7** shows the calculation of entrained roadway dust emission factor based on the silt loading factor recommended by the BAAQMD. The entrained roadway dust emission factor was adjusted following CARB's 2021 Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust, and CalEEMod defaults for San Francisco County. **Tables 8-10** show the calculation of roadway dust emissions for the Martin Substation, the linear components, and the Variant, respectively, based on the modeled distances within the zone of influence for the Project components. These road dust $PM_{2.5}$ emissions were included in estimating annual average $PM_{2.5}$ concentrations in the health risk assessment (HRA), described in **Section 4**.

One of the disposal options described in the Methodology Document for the excavated hazardous waste is transporting by truck to Pier 94, from which the soil would be conveyed by rail to a landfill in Utah. Because CalEEMod-default methodologies do not apply to rail emissions, assumptions for rail activity and emissions were developed separately in **Tables 11a-11d** and combined with emissions from other construction sources for the applicable emission scenarios described in **Section 3.1.2**.

3.1.2 Summary of Construction Emissions

CAP emissions summary from all Project components and by construction year are presented in Tables **12a-15b** in the order of the following emission scenarios:

- Project vs. Variant;
- Uncontrolled vs. controlled;
- Off-haul of hazardous waste using rail and trucks to Utah vs. only trucks to Kern County.

Tables 12a and **12b** summarize the uncontrolled CAP emissions from the Project assuming off-haul of hazardous waste using rail and trucks to Utah and only trucks to Kern County, respectively, whereas **Tables 13a** and **13b** summarize the controlled emissions from the Project under the hazardous waste off-haul scenarios above. Similarly, **Tables 14a, 14b, 15a and 15b** summarize the uncontrolled and controlled CAP emissions from the Variant. The Project and Variant scenarios assuming off-haul of hazardous waste using rail and trucks to Utah would result in slightly higher criteria air pollutant emissions than the scenario assuming off-haul using trucks traveling to Kern County.

3.2 Operational Emissions

When the Project is operational, net increase in operational CAP emissions would result from the proposed emergency diesel generator and additional employee trips. Other operational emission sources would remain the same as the existing conditions. Assumptions and emissions from the proposed emergency diesel generator are presented in **Table 16**. CAP emissions from additional employee trips were calculated using CalEEMod, with results attached as **Appendix B**. Annual total and daily average CAP emissions are reported in **Table 17**.

4. HEALTH RISK ASSESSMENT

The purpose of the HRA is to analyze potential health impacts that would result from construction and operation of the Project. This HRA evaluated the estimated cancer risk, chronic HI, and $PM_{2.5}$ concentration associated with construction and operation of the Project components, discussed in **Sections 4.1.1** through **4.1.4**. A discussion of TAC emissions sources that do not require dispersion modeling in the HRA is also included in **Section 4.1.5**.

As discussed in the Methodology Document, two different HRA approaches were applied for different Project components, depending on whether a given Project component has a known location(s) and/or whether detailed construction schedules are available by work area. For example, according to the Project Description, excavation for distribution express feeders have known locations along the streets from Geneva Avenue to Brotherhood Way and would proceed at approximately 40 feet per day; however, the specific location of construction work on a given date is unknown. In addition, the exact locations of the local distribution system separation, system reinforcements, the emergency generator for the operations control center, and receptor types and locations along the entire rail hauling routes are not currently known. For these components, a hypothetical screening-level HRA approach was applied. In comparison, a detailed HRA was applied to components such as Martin Substation and Variant with known construction schedules and locations. However, for both screening-level and detailed HRA approaches, Ramboll performed air dispersion modeling using the American Meteorological Society/USEPA Regulatory Model (AERMOD) to determine TAC concentrations for potentially exposed individuals. AERMOD model outputs are provided in **Appendix C**. Diesel particulate matter (DPM) emission rates were conservatively assumed to equal to PM_{10} emission rates from all diesel equipment and vehicles. Construction and operational DPM and $PM_{2.5}$ emission rates were calculated using the emissions inventory described for construction in **Section 3**. Both screening-level and detailed HRA approaches also used the same exposure parameters, summarized in **Table 18**, and the toxicity value for DPM listed in **Table 19**.

Section 4.1, below, summarizes the project-level health risk impacts from construction of the Project components and operations of the Project. **Section 4.2** includes an existing plus Project HRA for the identified maximally exposed individuals (MEIs) both in and outside of the City of San Francisco. **Section 4.3** expands on the existing plus Project HRA from **Section 4.2** to include potential health risk impacts from reasonably foreseeable future projects in a cumulative HRA.

4.1 Project-Level Health Risk Impacts by Project Component

4.1.1 Martin Substation and the New City Substation Variant

Martin Substation (and the Variant) has known construction locations and schedules, as discussed in **Section 3**. Modeled DPM emission sources are shown in **Figure 1**, and the modeling extent and modeled receptors within 1,000 meters of the Martin Substation boundary are shown in **Figure 2**. The MEI locations identified for the Martin Substation and the Variant components are shown in **Figure 3**.

Table 20a and **Table 20b** summarize the cancer risks, chronic HI and annual average $PM_{2.5}$ concentrations at MEI locations in and outside of San Francisco, respectively, for the uncontrolled construction emissions. Because the Martin Substation and the Variant's construction areas are located south of the San Francisco border, health risk impacts for the MEIs located outside of San Francisco are greater than those for MEIs located in San Francisco. Similarly, **Table 21a** and **Table 21b** summarize the health risk impacts of controlled emissions construction of Martin Substation and the Variant. All MEIs in San Francisco are located in the Air Pollution Exposure Zone (APEZ). The

maximum cancer risk occurs at a residential receptor outside San Francisco and the maximum chronic HI and $PM_{2.5}$ concentration occurs at an offsite worker receptor outside of San Francisco for both the Project and the Variant.

4.1.2 Linear Components

The linear components, unlike Martin Substation and the Variant, do not have known locations with detailed construction schedules. Consistent with the Methodology Document, all three linear components (distribution express feeders, local distribution system separation, and system reinforcements) were modeled as moving area sources along a straight line at 40 feet a day, perpendicular to the predominant wind direction, in a zone of influence with a 2,000-foot diameter. This 2,000-foot diameter distance was determined by extending 1,000 feet in either direction, based on the recommended zone of influence with the 1,000-foot radius, as specified by BAAQMD for risk assessments. DPM emissions from on-road diesel vehicles were modeled along the same line as volume sources. As expected, the MEI location for this hypothetical HRA configuration is the nearest receptor downwind of the midpoint of the 2,000-foot straight line; however, this does not represent a specific, physical receptor location but rather a hypothetical MEI that assumes the presence of a specific receptor at that location. The HRA setup provides the maximum possible health risk impacts from the most intense construction scenario for the linear components. **Table 22** summarizes the cancer risks, chronic HI and annual average $PM_{2.5}$ concentrations at the hypothetical MEI location for the uncontrolled and controlled construction emissions of the linear components. In reality, health risk impacts from the linear components may be less than what was modeled, depending on the exact locations of these Project components (which are yet to be determined), the surrounding receptor types, and their relative orientations with regards to local wind directions. In any case, the health risk impacts from the linear components are not expected to be greater than shown in **Table 22**.

4.1.3 Rail Emissions

Similar to the linear components, because rail haul transporting hazardous waste from construction of the Project would travel for 145 miles within the San Francisco Bay Area Air Basin, rail emissions were modeled as a hypothetical straight line in a zone of influence with a 2,000-foot diameter. Since the Variant is expected to involve a larger volume of excavated materials compared to the Martin Substation, the rail hauling associated with the Variant's construction, assuming 8 trains in 2026 and 4 trains in 2027, represents the most conservative scenario, as shown in **Table 11a**. Maximum possible health risk impacts from rail haul emissions associated with the Variant are presented in **Table 22**. Both the Project and the Variant are conservatively assumed to result in the health risk impacts summarized in **Table 22**, whereas in reality, the Project's impacts from rail emissions would be lower than those of the Variant.

4.1.4 Emergency Generator

Similar to the linear components, because the location of the operations control center that would include an emergency diesel generator was not determined at the time of preparation of this HRA, the proposed emergency generator was modeled as a point source at the center of a receptor grid of 2,000-foot in diameter. Other parameters and assumptions for the emergency generator are presented in the Methodology Document. Maximum possible health risk impacts from the proposed emergency diesel generator are presented in **Table 22**.

4.1.5 Other TAC Sources

As discussed in the Methodology Document, a quantitative HRA was not performed for the following Project components: 1) modifications to retain PG&E access to non-electrical facilities, 2) operations

control center construction, 3) operations and maintenance service yards; materials and equipment storage, and 4) telecommunications equipment. Except for telecommunications equipment incorporated into other excavation work (or in certain locations that would not require excavation), other Project components listed are not expected to use heavy construction equipment for more than two months. A quantitative HRA was not performed in accordance with OEHHA's guidelines.

Any TAC emissions from light-duty vehicles, such as construction worker vehicles and new operational vehicle trips from additional employees, were not included in the quantitative HRA. Based on the Project Description, two crews, each consisting of 3-6 workers, are anticipated to work concurrently on each of the major components (Martin Substation, distribution express feeder, local distribution system separation, and system reinforcements). Therefore, additional health risks from daily construction worker trips would be negligible and would not add substantial additional TAC emissions that would increase the health risks in **Table 22**. However, the additional operational vehicle trips resulting from 400 new employees for a total of 800 new vehicle one-way trips per day were estimated based on a health risk screening method to determine health risk from on-road vehicle volumes according to the City's Air Quality and Greenhouse Gas Analysis Guidelines, Appendix C Technical Support Documentation for Development of a Health Risk Screening Method for On-Road Vehicular Emissions in City and County of San Francisco (Planning Department, 2024). Based on a worst-case 95 percentile regression analysis for the correlation between vehicle volumes and health risks specific to San Francisco, the employee vehicle trips were estimated to result in a maximum excess cancer risk of 0.37 in a million and $PM_{2.5}$ concentrations of 0.021 $\mu g/m^3$. The calculation equations and health risk impacts due to employee vehicle trips are presented in **Table 22**.

4.2 Existing Plus Project Health Risk Assessment

Health risk impacts at the MEIs from all Project components that could overlap geographically were combined to estimate the worst-case project-level impacts and were added to the background risks. For the receptors in San Francisco, the background risks are available through San Francisco's 2020 Citywide HRA; for the receptors outside of San Francisco, the background risks were based on the BAAQMD's HRA screening tools. The stationary source screening tool from the BAAQMD provides generalized estimates of risk and $PM_{2.5}$ concentrations for the existing stationary sources, which represents a screening-level analysis based on the size and type of activity. The BAAQMD's Distance Multiplier Tool was used to refine the screening health risk values from the tool. In addition, health risk impacts from mobile sources were obtained from the BAAQMD's Roadway and Rail Screening Data Layers. For San Francisco only, this summation of risks at the MEI includes the proposed emergency generator at the operations control center, since this Project component would only be located in southeast San Francisco.

For the identified MEIs resulting from the construction of Martin Substation, existing plus uncontrolled and controlled health risk impacts from the Project components are summarized in **Table 23** (in San Francisco) and **Table 24** (outside San Francisco). As discussed above, existing health risk impacts on the MEIs located in San Francisco were obtained from the 2020 Citywide HRA and added to the Project's risks in **Table 23**. Existing plus Project health risk impacts for MEIs located outside of San Francisco are summarized in **Table 24**. The list of existing permitted stationary sources within 1,000 feet of the MEIs outside of San Francisco was confirmed by BAAQMD and included in **Appendix D**.

Similarly, existing plus Variant health risk impacts are summarized in **Table 25** and **Table 26** for MEIs located in and outside of San Francisco, respectively.

As discussed in **Section 1** and **Project Description**, construction and operations for Project components that are not at or near the Martin Substation would occur in several areas in and outside of San Francisco. These Project components include distribution express feeders, local distribution system separation, system reinforcements, and operations control center. Existing cancer risks in these areas were obtained from the 2020 Citywide HRA database and are shown in the top panel of **Figure 4a**.

The hypothetical Project-level HRA results in **Table 22** do not identify the physical locations of the MEIs for these Project components. Therefore, existing plus Project health risk impacts were analyzed for these Project components by conservatively assuming all locations within the potential work areas are equally exposed to the maximum risks identified in **Table 22**. In areas where more than one Project component could occur, cancer risks impacts identified for all the applicable Project components at these locations were summed. This approach is conservative because the actual cancer risk impacts from the Project component would likely be much less than those identified in **Table 22**, depending on a receptor's location. As described in the Methodology Report, the hypothetical MEI locations, situated directly downwind and in close proximity to the sources, do not consider whether actual receptors are present at these locations. In reality, receptors may be further away and not directly downwind of the sources. Also, the summation of the maximum risks is an overestimation of the actual combined impacts from the Project components, since this approach assumes that maximum risks would occur at the same location, whereas in reality, the location where the maximum risks would occur for one Project component is likely different from that of another Project component. Existing plus controlled Project cancer risks for these Project components' areas are also shown in the lower panel of **Figure 4a** to compared with the existing cancer risks. The lower panel of **Figure 4a** represents the maximum possible health risk impacts at these locations which are likely substantially overestimated compared to the actual health risk impacts.

Similarly, both existing $PM_{2.5}$ concentrations from the 2020 Citywide HRA database and existing plus controlled Project $PM_{2.5}$ concentrations were calculated and are presented in **Figure 4b**, in the top and lower panels, respectively.

4.3 Cumulative Health Risk Assessment

The cumulative analysis includes Project impacts added to background risk (**Section 4.2**) and reasonably foreseeable future projects. The 2020 Citywide HRA database does not include construction nor non-mobile operational emissions from individual projects that have been or will be proposed. Therefore, the need to quantitatively evaluate nearby projects was reviewed. A list of foreseeable future projects was identified in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures of the Draft Environmental Impact Report (EIR), and used in this analysis.

4.3.1 Martin Substation and the Variant

The following projects[4] were identified for the MEIs for Martin Substation and the Variant, because they could be near (*i.e.*, within 1,000 feet) or overlap geographically with these Project components and/or the MEI locations:

- (4) Brisbane Baylands Specific Plan

[4] The project numbers correspond to those listed in Table 3.1-3 Projects Considered in Cumulative Impact Analysis, Chapter 3 of the Draft EIR.

Brisbane Baylands Specific Plan (4) is a mixed-use development on approximately an approximately 540-acre site, to the east of Martin Substation. The Project's Draft EIR identified the location of existing MEI to be north-northeast of this project's site, near Little Hollywood Park, at least 2,500 feet from the nearest Project MEI in San Francisco and more for Project MEIs outside of San Francisco. Cancer risk identified for this location for a resident child was approximately 2.1 in a million. The Draft EIR does not identify health risk impacts for receptors closer to this proposed Project's MEIs. Because this cumulative project is downwind of the Project's MEIs and the health risk impacts identified in the Draft EIR are likely to attenuate and become negligible at the Project's MEI locations, health risk impacts from this cumulative project are not included quantitatively in the cumulative HRA.

- (5) Baylands North, formally Visitacion Valley Redevelopment Area

  Baylands North, formally Visitacion Valley Redevelopment Area, is a mixed-use development on an approximately 46-acre site to the north of Martin Substation. This cumulative project's area is less than 1,000 feet east of the nearest Project MEI. Building heights for some of the proposed buildings are more than 75 feet tall and could include emergency diesel generators in compliance with building codes, which are stationary sources of TAC emissions. Construction and operation of this cumulative project could potentially contribute to the cumulative health risk impacts at the identified Project's MEIs. However, no HRA for this cumulative project was available in the 2008 Draft EIR or the subsequent phase applications. Therefore, health risk impacts from this cumulative project are not included quantitatively in the cumulative HRA.

- (6) Transbay Downtown Rail Extension (DTX) Project

  The DTX project would extend Caltrain commuter rail to the new Transit Center and deliver the California High-Speed Rail Authority's future highspeed rail service. This proposed project would install light maintenance facilities (LMFs) along the rail line in Brisbane, which is mostly more than 1,000 feet away from the Martin Substation and the Variant. Only the Chronic HI MEI of the Project and the Variant and the Project's $PM_{2.5}$ MEI are less than 1,000 feet away from the rail line. However, no substantial construction activities are expected along this segment of the rail line because the existing rail line located would be used for the LMFs and other associated construction activities. Therefore, health risk impacts from this cumulative project are not included quantitatively in the cumulative HRA.

- (7) PG&E Egbert Switching Station Project

  PG&E Egbert Switching Station Project would construct, operate and maintain a new 230-kilovolt switching station, which would be more than a mile from the Project's Martin Substation area. The cumulative project would also construct new transmission lines, one of which would connect to Martin Substation. Construction of the new transmission line and other components that are adjacent or near Martin Substation could potentially contribute to the cumulative health risk impacts at the identified Project's MEIs. The Draft EIR of the cumulative project identified the maximum health risk impact to occur at a residence 50 feet away from the proposed switching station. The cancer risk at this location resulting from approximately two years of construction was estimated to be 8.5 in a million. However, health risk impacts identified at this location near the proposed switching station would not combine to Martin Substation's area, which is more than one mile away. Furthermore, the Draft EIR does not identify health risk impacts for receptors closer to the Martin Substation's area. Therefore, health risk impacts from this cumulative project are not included quantitatively in the cumulative HRA.

- (11) Pacific Place Retail Conversion

  Pacific Place Retail Conversion Project would construct seven condominiums on a 1-acre lot approximately 800 feet from the Variant's area. The scale of this cumulative project is relatively small, and no HRA was conducted in its 2017 Initial Study. Therefore, this cumulative project health risk impact could not be quantitatively evaluated.

- (12) Cormorant Battery Storage Facility

  Cormorant Battery Storage Facility would construct a 250-megawatt battery energy storage system at a 12-acre site approximately 2,000 feet and 2,800 feet northwest of the Variant and Martin Substation, respectively. The proposed facility would connect to Martin Substation via an underground transmission line. Construction of the portion of the cumulative project on the 12-acre parcel would be more than at least 2,800 feet away from any of the identified MEIs of the Project/Variant. Construction of the proposed underground transmission line may occur simultaneously with construction at the Martin Substation or the Variant and could be less than 1,000 feet away from the identified MEIs. However, the scale of construction of the proposed transmission line is relatively small and shorter in duration compared to the proposed battery storage facility, and would not contribute substantially to the cumulative health risks of the Project/Variant. Therefore, health risk impacts from this cumulative project are not included quantitatively in the cumulative HRA.

In summary, no cumulative projects were quantitatively analyzed for the cumulative health risks at the identified MEIs in **Tables 23-26** but were qualitatively analyzed above. The cumulative health risk impacts are equivalent to the existing plus Project/Variant health risk impacts summarized in these tables.

4.3.2 Linear Components and Operations Control Center

Project areas associated with distribution express feeders, local distribution system separation, system reinforcements, and operations control center are shown in Figure 3.1-1 in the Project Description, which also represent areas where receptors that would be potentially impacted by the project components would be located. A list of cumulative projects that could occur in the same geographical areas as these Project components is presented in **Table 27**.

The cumulative projects noted in **Table 27** include residential and/or commercial mixed-use development and infrastructure improvements projects. In terms of short-term TAC sources, these projects would likely result in construction emissions from demolition, site preparation, grading, excavation, construction, architectural coating, and a variety of other construction activities. Construction emissions would include exhaust from diesel-fueled off-road equipment and on-road trips made by workers, vendors, and haul trucks as well as off-gassing from paving and the application of architectural coating. Construction emissions from the cumulative projects would occur at various locations, shown in Figure 3.1-1. Whether construction emissions from a cumulative project would contribute to cumulative health risks impacts for the Project's receptors depend on several factors, such as timing, relative locations of the construction areas, and type and magnitude of the construction activities. The potential cumulative impacts from these projects cannot be determined quantitatively at this time, but it remains possible that TAC concentrations would increase at certain receptor locations because of the overlap between construction of the cumulative projects and the Project's construction.

In addition to the construction impacts from the projects in **Table 27**, these projects could also result in increased operational TAC emissions, including those from vehicle traffic and stationary equipment. Specially, Brisbane Baylands Specific Plan Project, Baylands North (formally Visitacion Valley Redevelopment Area), Sunnydale-Velasco Hope SF Master Plan Project and Pacific Place Retail Conversion Project will increase vehicle trips within the project areas, thereby increasing operational TAC emissions. Furthermore, Sunnydale Hope SF Master Plan plans to install an emergency generator on site, which could result in increased operational TAC emissions if it is powered by diesel. According to the latest project documentation, Baylands North and PG&E Egbert Switching Station Project could potentially install emergency generators on site, thereby leading to further increase in operational TAC emissions. Health risk impacts from these projects could combine with the construction and/or operational impacts from the Project and increase the severity of the cumulative health risk impacts.

Several other cumulative projects would likely result in beneficial air quality impacts because they would reduce vehicular traffic in the project areas. Such projects include Harney-101 Transit Crossing Project and Midway Village Redevelopment Project. These projects could reduce TAC concentrations in the project areas relative to the existing conditions and result in improved health outcomes.

Operation of other cumulative projects, namely, those that address infrastructure repair, maintenance, and improvements in **Table 27**, are unlikely to have an appreciable effect on air quality from an operational standpoint, except for the Transbay Downtown Rail Extension (DTX) Project, which will install an emergency generator to operate critical terminal functions and cause operational TAC emissions. Thus, the infrastructure-related projects would not result in substantial operational emissions that would combine with the Project's impacts.

In summary, some of the cumulative projects shown in **Table 27** could contribute to cumulative health risk impacts of the Project's linear components and the operations control center.

5. UNCERTAINTIES

While Ramboll used appropriate engineering and scientific methods in the emissions calculations and HRA presented in these analyses, there is uncertainty associated with the process of emissions estimation and risk assessment. In this context, uncertainty may be defined as what is not known and may be reduced with further scientific studies. Lack of data in many areas necessitates the use of assumptions, thus increasing the uncertainty. This section qualitatively describes some of the uncertainties that may influence the risk estimates produced in these analyses, including emissions estimation, the modeling approach, and risk estimation.

5.1 Emission Estimates

There are uncertainties associated with the estimation of emissions from each of the source categories considered that may affect the subsequent estimation of exposure concentrations and risk characterization.

Default emission factors under the uncontrolled emission scenario were used to estimate emissions of all off-road equipment for the construction of the project components. This assumes that emissions from all equipment will be equal to the fleet wide average emissions when some emissions may vary from this rate. Under the controlled emission scenario, engine emission standards are defined by the USEPA. Emission factors for engines of a specific tier may be lower than the limits set by the EPA, but they cannot be higher. Furthermore, a load factor is included in the calculation of both uncontrolled and controlled emissions. This load factor was obtained from CARB's OFFROAD model and is a fleet wide average. This load factor may not be representative of the exact piece of equipment in use but was the most reasonable estimate. In addition, construction emissions are based on activity assumptions provided by the Project Sponsor, which are conservative projections, especially for the Project components whose detailed construction schedules and exact locations of work have not been determined at the time of preparation of this study. It is likely that overhead construction, underground construction with trenching activities, or both would occur for the linear components. However, since trenching for underground construction generates higher emissions than overhead work, all construction of the linear components was conservatively assumed to use trenching equipment to estimate the highest possible average daily emissions.

EMFAC2021 was used to estimate on-road emission factors for light-duty passenger vehicles and heavy-duty trucks in San Francisco and San Mateo County. As with any emissions model, there are also uncertainties associated with EMFAC2021 methodologies. Mobile fleet emissions for construction and operations were calculated with emission factors assuming construction begins in 2026. In the event of any delays, and with each subsequent year, fleets become lower emitting as technology improves and the proportion of hybrid or zero emission cars increases.

Generator operation hours for routine maintenance and testing was conservatively assumed to be 50 hours per year, the maximum allowable by the Air Toxics Control Measure for Stationary Compression Ignition Engines. In reality, the generators would likely be run much less frequently for maintenance and testing, and this assumption on operational hours is likely conservative enough to account for emergency use. Further, emission factors for the Project generator are manufacturer guaranteed emission factors (i.e., never to be exceeded values); therefore, actual emissions are likely lower than estimated in this analysis.

5.2 Modeling Approach

In addition to uncertainty associated with emission estimates, there is also uncertainty associated with the estimated exposure concentrations. The limitations of the air dispersion model provide a source of uncertainty in the estimation of exposure concentrations. According to USEPA, errors in the highest estimated concentrations of +/- 10 percent to 40 percent are typical, due to the limitations of the algorithms implemented in the air dispersion model (USEPA, 2005).

The source parameters used to model emission sources are also a source of uncertainty. Construction is modeled as area sources over the associated construction area to account for the movement of equipment throughout construction. However, the location of the equipment may not be uniform across the site and over the modeled construction period, which adds uncertainty.

In urban areas, the many multi-story and high-rise buildings result in urban flow patterns, which are influenced by recirculation and channeling in urban canyons. The building downwash option in AERMOD accounts for the build-up of air pollution in the building cavity due to recirculating winds created by nearby buildings and is applicable to point sources such as exhaust stacks. The effects are governed by the building geometry and the wind direction. To take advantage of this option in the model, information on all the building heights and stacks within the modelled area is usually required. Typically, building downwash effects often lead to higher concentrations downwind of a stack release (e.g., emergency generators), which can be modeled in AERMOD. However, in the absence of information regarding the location of the proposed emergency diesel generator for the operations control center, building downwash was not modeled. Furthermore, the point source parameters of the proposed generator were not known, such as the stack height and exhaust characteristics; therefore, default parameters were used in the dispersion modeling which may not align exactly with the future generator. These factors further lead to uncertainties with regards to the air dispersion model for the proposed generator.

There are uncertainties with regards to the elevations of the proposed TAC sources and receptors. For receptors near the Martin Substation and the new City Substation (Variant) where terrain heights are known, a flagpole receptor height of 1.5 meters above the surface terrain was used. This option is recommended by the BAAQMD to conservatively model exposures within an individual's breathing zone at ground level. Using flagpole receptors may not always capture the highest predicted concentration in cases where both the source and the residential receptors are elevated above the surface terrain. Furthermore, for the air dispersion models for the Project components where hypothetical assumptions must be made, a terrain height of zero meters was assigned to all receptors and sources, because the exact, physical locations of these emission sources were not known. In reality, the relative vertical distance between a source and the receptors could be different than zero, which was assumed in the hypothetical HRAs. Similarly, the hypothetical HRAs assume that the nearest receptors are immediately downwind of the modeled sources. In reality, the relative horizontal distance between a source and a receptor is determined by the actual location of the source. The horizontal distance could be substantially more than what was modeled, depending on the types of surrounding land uses and the size of the actual work area. This introduces further uncertainties for the hypothetical dispersion models.

5.3 Health Risk Assessments

Numerous assumptions must be made in order to estimate human exposure to chemicals. These assumptions include parameters such as breathing rates, exposure time and frequency, exposure duration, and human activity patterns. While a mean value derived from scientifically defensible

studies is a reasonable estimate of central tendency, the exposure variables used in this assessment are only estimates. In any risk evaluation, a number of assumptions are made in order to estimate human exposure and to calculate potential risks. These assumptions may, however, introduce uncertainty in risk calculations. Regulatory guidance requires that conservative assumptions be used to provide an upper-bound estimate of the risk and to avoid underestimating the potential exposures and associated health risks.

Several conservative assumptions on receptors' exposure were built into the analysis. For example, exposure duration was assumed to be the entire construction period for the Martin Substation and the Variant, half a year for construction of the linear components, and 30 years (only for residential receptors) for operational TAC emissions from the proposed diesel generator. In reality, the construction duration of a linear component within the zone of influence for any given receptor is expected to be approximately two months at most. Additionally, it is conservatively assumed that the hypothetical MEIs from all linear components, rail, and the operations control center would be at the same locations as MEIs for Martin Substation (**Table 23** and **Table 24**) and the Variant (**Table 25** and **Table 26)**. However, in reality, it is unlikely that all the MEIs from different Project components would be co-located. Furthermore, residential receptors were assumed to reside in fixed locations, for the entirety of the construction duration and for up to 30 years of operational exposure. The USEPA has estimated that 50% of the population lives in the same residence for only eight years, while only 10% remain in the same house for 32 years (USEPA, 2011). Additionally, this analysis assumes that the residents below the age of 16 years are exposed for 24 hours per day, 350 days per year at the same location. However, young residents usually leave their houses for school, shopping, vacation, etc. After age 16, this analysis assumes the residents spend 73% of their time at home, although older residents also usually leave their houses for large fractions of most days. In addition, there is a natural range or variability in the human population in such properties as height, weight, and susceptibility to air toxics.

Another example of the conservatism is that these residential receptors, who were assumed to reside in fixed locations for extended periods of time, would start their infancy at the same time as TAC emissions from the Project components start to occur. In reality, age, exposure duration and frequency, and susceptibility of the actual receptors exposed to the Project's TAC emissions are highly variable, and the HRA assumptions are designed to account for the most vulnerable of the human population.

The primary uncertainties associated with the toxicity assessment are related to derivation of toxicity values. Standard cancer potency factors (CPFs) established by OEHHA were used to estimate potential carcinogenic effects from exposures to compounds emitted from the construction and operational activities. These values are derived by OEHHA by applying conservative assumptions and are intended to protect the most sensitive individuals in the potentially exposed populations, as discussed above. For instance, CPFs are typically derived using animal studies that rely on higher doses, and the dose-response correlation is typically extrapolated to much lower doses typical of human exposure. Very little experimental data are available on the nature of the dose-response relationship at low doses, such as whether a threshold exists or if the dose-response curve passes through the origin. Because of this uncertainty, a conservative model is used to estimate the low-dose relationship and uses an upper bound estimate (the 95 percent upper confidence limit of the slope predicted by the extrapolation model) as the CPF. With this factor, an upper-bound estimate of potential cancer risks is obtained.

In conclusion, emissions and HRA results presented in this analysis rely on engineering and scientific methods that are inherent of uncertainties. In addition, where information is lacking, conservative

assumptions and methodologies were selected to provide upper-bound estimates. Although it is difficult to quantify the uncertainties associated with all the assumptions made in this risk assessment, the use of conservative assumptions is likely to result in substantial overestimates of exposure, and hence, risk.

6. REFERENCES

Bay Area Air Quality Management District. 2022. California Environmental Quality Act Air Quality Guidelines. April.

San Francisco Planning Department. 2024. Air Quality and Greenhouse Gas Analysis Guidelines. July. Available at: https://sfplanning.org/air-quality

USEPA. 2005. Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule. 40 CFR Part 51, Appendix W (Federal Register) 70216.

USEPA. 2011. Exposure Factors Handbook: 2011 Edition, Office of Research and Development, Washington, D.C. September. Available at: https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236252

TABLES

Table 1a
Construction Phasing Schedule for Martin Substation
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Phase[1]	Year	Weeks
Site Excavation (Including Trenching)	2026	13
	2027	15
	2028	3
Concrete Foundations	2026	10
	2027	9
	2028	9
Backfill and Grading	2026	3
	2027	4
	2028	1
Placement of Facilities	2026	1
Equipment and Gate Installation[2]	2026	25
	2027	30
	2028	16

Notes:

1. Construction schedule by weeks provided by Project Sponsor.
2. Construction activities during the Equipment and Gate Installation phase in 2027 could overlap with other activities, reducing the total duration from 30 weeks to 24. However, this analysis assumes a 30-week duration to provide a conservative estimate of emissions.

Table 1b
Construction Equipment for Martin Substation
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Phase	Equipment[1]	CalEEMod® Equipment[2]	Fuel[1]	Number[1]	Horsepower[1]	Daily Usage[3,4] (hours/day)	Uncontrolled Tier[5]	Controlled Tier
Site Excavation (Including Trenching)	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	No Specific Tier	Tier 4 Final
	Excavators	Excavators	Diesel	2	36	8	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	--	--
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	33	8	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	1	14	24	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	--	--
	Paver	Pavers	Diesel	1	81	8	No Specific Tier	Tier 4 Final
	Water Buffalo with Pump	Pumps	Diesel	2	4	8	No Specific Tier	Tier 4 Final
	Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	No Specific Tier	Tier 4 Final
	Roller	Rollers	Diesel	1	36	8	No Specific Tier	Tier 4 Final
	Cable Pulling equipment	Other Material Handling Equipment	Diesel	2	200	8	No Specific Tier	Tier 4 Final
Concrete Foundations	Cranes	Cranes	Diesel	1	367	8	No Specific Tier	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	24	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	--	--
Backfill and Grading	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	No Specific Tier	Tier 4 Final
	Water Buffalo with Pump	Pumps	Diesel	2	4	8	No Specific Tier	Tier 4 Final
	Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	8	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	--	--
Placement of Facilities	Cranes	Cranes	Diesel	1	367	8	No Specific Tier	Tier 4 Final
	Lift/bucket trucks	Aerial Lifts	Diesel	1	46	8	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	--	--
	Air Compressors	Air Compressors	Electric	2	37	8	--	--
	Generator Sets	Generator Sets	Diesel	2	14	8	No Specific Tier	Tier 4 Final
Equipment and Gate Installation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	--	--
	Cranes	Cranes	Diesel	1	367	8	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	1	14	8	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	1	37	8	--	--

Notes:

1. Equipment list was provided by the Project Sponsor.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.
3. Construction activities are conservatively assumed to occur between 7AM and 8PM each weekday, with the exception of generator sets in Site Excavation and Concrete Foundations subphases, which can operate up to 24 hours a day when dewatering work needs to be conducted.
4. Utilization was assumed to be at full capacity (100%).
5. The statewide fleet-average tier diesel engines from CalEEMod® 2022.1 are assumed, as project-specific equipment tier data is unavailable.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 1c
Construction Trips for Martin Substation
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Phase	Year	Construction Days	Worker Trip Rates[1] (one-way trips/day)	Vendor Trip Rates[1] (one-way trips/day)	Hauling Trip Number[1] (one-way trips/phase)	Trip Lengths (miles/one way trip)			Vehicle Miles Traveled (VMT) (miles)		
						Worker[2]	Vendor[2]	Hauling[3]	Worker	Vendor	Hauling
Site Excavation (Including Trenching)	2026	66	20	24	465	11.7	8.4	21	15,444	13,138	9,832
	2027	76	20	0	536	11.7	8.4	21	17,784	0	11,322
	2028	15	20	0	106	11.7	8.4	21	3,510	0	2,235
Concrete Foundations	2026	51	20	0	0	11.7	8.4	21	11,934	0	0
	2027	45	20	0	0	11.7	8.4	21	10,530	0	0
	2028	45	20	0	0	11.7	8.4	21	10,530	0	0
Backfill and Grading	2026	15	20	0	106	11.7	8.4	21	3,510	0	2,235
	2027	20	20	0	141	11.7	8.4	21	4,680	0	2,979
	2028	6	20	0	42	11.7	8.4	21	1,404	0	894
Placement of Facilities	2026	5	20	0	0	11.7	8.4	21	1,170	0	0
Electrical Equipment/Gate Install	2026	126	20	0	0	11.7	8.4	21	29,484	0	0
	2027	151	20	0	0	11.7	8.4	21	35,334	0	0
	2028	81	20	0	0	11.7	8.4	21	18,954	0	0

Trip Rates and Trip Length[1,2,3]

Project Component	Parameter	Hauling Trips (Export)	Hauling Trips (Import)	Vendor Trips (Concrete)	Vendor Trips (Vault, Cable and Others)	Worker Trips
Martin Substation	Total Round Trips	440	258	732	50	--
	Daily Average Round Trips	--	--	--	--	10
	Trip length (miles/one-way trips)	80 (Option A: By truck) and 4.2 (Option B: By truck and rail)	50	8.4 (CalEEMod default)		11.7 (CalEEMod default)
	Weighted Average Trip Length (miles/one-way trips)	69 (Option A) and 21 (Option B)				

EMFAC Data[4]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Mateo County Calendar Years 2026-2028 Annual Season Aggregated Model Year EMFAC2021	25% LDA, 50% LDT1, 25% LDT2	Gasoline
Vendor		50% MHDT, 50% HHDT	Diesel
Hauling		100% HHDT	Diesel

Notes:

1. Daily worker trip rates and total vendor and hauling trips are provided by the Project Sponsor. The daily vendor trip rates are estimated by dividing the total one-way trips by construction days, assuming all vendor trips occur in 2026 according to the Project Sponsor. Hauling trips are assumed to occur in Site Excavation and Preparation, and Backfill and Grading phases. The hauling trips per year per phase are estimated by weighing the total one-way trips proportional to the construction days for each year and each phase.
2. Worker and vendor trip lengths are based on CalEEMod® Appendix G Table G-16 defaults for San Francisco Bay Area.
3. Two hauling assumptions are included for the excavated contaminated soil: Option A involves trucking to Kern County, and Option B involves trucking to the Port of San Francisco transfer facility on Cargo Way at Pier 94, followed by rail to the East Carbon Development Corporation Landfill in Utah. For both assumptions, the average trip length was calculated by taking the weighted average of the trip lengths for both import and export hauling trips. The weighted average hauling trip length reported here is for Option B. For Option A, the weighted average hauling trip length is estimated to be 69 miles per trip, and VMT is adjusted accordingly. All trip lengths included in this analysis fall within the boundaries of the San Francisco Bay Area Air Basin (SFBAAB).
4. Fleet mixes calculated based on EMFAC2021 vehicle miles traveled projections for San Mateo County. Region selected for EMFAC2021 is based on the general physical location of this/these project component(s). EMFAC2021 was run in Emission Rates mode for calendar year 2026-2028 in the annual season. The passenger fleet mix is assumed to have an EMFAC default vehicle type distribution and all vehicles are assumed to be gasoline. The vendor and ha are assumed to have an EMFAC default vehicle type distribution and all vehicles are assumed to be diesel.

Abbreviations:

ARB - [California] Air Resources Board
HHDT - heavy-heavy duty trucks

Table 1c
Construction Trips for Martin Substation
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
LDA - light-duty automobiles
LDT - light-duty trucks
MHDT - medium-heavy duty trucks
SFBAAB - San Francisco Bay Area Air Basin
VMT - vehicle miles traveled

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/
California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 2a
Construction Phasing Schedule for Linear Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component[1]	Year	Months	Number of Work Days	Days per Week
Distribution Express Feeders	2026	12	261	5
Local Distribution System Separation	2026	12	261	5
	2027	12	261	5
System Reinforcements	2026	12	261	5
	2027	12	261	5
	2028	4	85	5

Notes:

1. Construction schedule for the linear component was provided by the Project Sponsor.

Table 2b
Construction Equipment for Linear Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Equipment[1]	CalEEMod® Equipment[2]	Fuel[3]	Number[1]	Horsepower[1]	Daily Usage[4] (hours/day)	Utilization[5]	Uncontrolled Tier[6]	Controlled Tier
Distribution Express Feeders	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	84	8	50%	No Specific Tier	Tier 4 Final
	Excavators	Excavators	Diesel	2	36	8	50%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	2	8	8	50%	No Specific Tier	Tier 4 Final
	Water Buffalo with pump on trailer	Pumps	Diesel	2	4	8	100%	No Specific Tier	Tier 4 Final
	Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	100%	No Specific Tier	Tier 4 Final
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	2	33	8	10%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	24	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
	Roller	Rollers	Diesel	2	36	8	25%	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	2	83	8	100%	--	--
	Paver	Pavers	Diesel	2	81	8	25%	No Specific Tier	Tier 4 Final
	Cable Pulling equipment	Other Material Handling Equipment	Diesel	2	200	8	25%	No Specific Tier	Tier 4 Final
Local Distribution System Separation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	84	8	50%	No Specific Tier	Tier 4 Final
	Excavators	Excavators	Diesel	2	36	8	50%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	2	8	8	50%	No Specific Tier	Tier 4 Final
	Water Buffalo with pump on trailer	Pumps	Diesel	2	4	8	100%	No Specific Tier	Tier 4 Final
	Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	100%	No Specific Tier	Tier 4 Final
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	2	33	8	10%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	24	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
	Roller	Rollers	Diesel	2	36	8	25%	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	2	83	8	100%	--	--
	Paver	Pavers	Diesel	2	81	8	25%	No Specific Tier	Tier 4 Final
	Cable Pulling equipment	Other Material Handling Equipment	Diesel	2	200	8	25%	No Specific Tier	Tier 4 Final
System Reinforcements	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	84	8	50%	No Specific Tier	Tier 4 Final
	Excavators	Excavators	Diesel	2	36	8	50%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	2	8	8	50%	No Specific Tier	Tier 4 Final
	Water Buffalo with pump on trailer	Pumps	Diesel	2	4	8	100%	No Specific Tier	Tier 4 Final
	Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	100%	No Specific Tier	Tier 4 Final
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	2	33	8	10%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	24	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
	Roller	Rollers	Diesel	2	36	8	25%	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	2	83	8	100%	--	--
	Paver	Pavers	Diesel	2	81	8	25%	No Specific Tier	Tier 4 Final
	Cable Pulling equipment	Other Material Handling Equipment	Diesel	2	200	8	25%	No Specific Tier	Tier 4 Final

Notes:

1. Equipment list was provided by the Project Sponsor. Some overhead construction is needed for local distribution system separation and reinforcement, and generally emits less than underground work. However, all linear component construction is assumed to use the equipment required for underground construction for conservative estimation.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.
3. All equipment is conservatively assumed to be diesel-fueled except for air compressor and jack hammer.
4. Construction activities are assumed to occur between 7AM to and 8PM each weekday, with the exception of generator sets that can operate up to 24 hours a day when dewatering work needs to be conducted.
5. Utilization was provided by the Project Sponsor; otherwise, it was assumed to be at full capacity (100%).
6. The statewide fleet-average tier diesel engines from CalEEMod® 2022.1 are assumed, as project-specific equipment tier data is unavailable.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 2c
Construction Trips for Linear Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Year	Construction Days	Worker Trip Rates[1] (one-way trips/day)	Vendor Trip Rates[1] (one-way trips/day)	Hauling Trip Number[1] (one-way trips/phase)	Trip Lengths (miles/one way trip)			Vehicle Miles Traveled (VMT) (miles)		
						Worker[2]	Vendor[2]	Hauling[3]	Worker	Vendor	Hauling
Distribution Express Feeders	2026	261	24	17	6,066	11.7	8.4	50	73,289	36,758	303,300
Local Distribution System Separation	2026	261	24	1.1	483	11.7	8.4	50	73,289	2,478	24,150
	2027	261	24	1.1	483	11.7	8.4	50	73,289	2,478	24,150
System Reinforcements	2026	261	20	5.8	1,309	11.7	8.4	50	61,074	12,802	65,459
	2027	261	20	5.8	1,309	11.7	8.4	50	61,074	12,802	65,459
	2028	85	20	5.8	426	11.7	8.4	50	19,890	4,169	21,318

Total Trip Rates[1]

Project Component	Parameter	Hauling Trips (Export)	Hauling Trips (Import)	Vendor Trips (Concrete)	Vendor Trips (Vault, Cable and Others)	Worker Trips
Distribution Express Feeders	Total Round Trips	1,576	1,457	2,090	98	--
	Daily Average Round Trips	--	--	--	--	12
Local Distribution System Separation	Total Round Trips	236	247	285	10	--
	Daily Average Round Trips	--	--	--	--	12
System Reinforcements	Total Round Trips	974	548	1,644	128	--
	Daily Average Round Trips	--	--	--	--	10

EMFAC Data[4]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Fancisco County Calendar Years 2026-2028 Annual Season Aggregated Model Year EMFAC2021	25% LDA, 50% LDT1, 25% LDT2	Gasoline
Vendor		50% MHDT, 50% HHDT	Diesel
Hauling		100% HHDT	Diesel

Notes:

1. Daily worker trip rates and total vendor and hauling trips are provided by the Project Sponsor. The daily vendor trip rates are estimated by dividing the total one-way trips by construction days. The hauling trips per year for each component are estimated by weighing the total one-way trips proportional to the construction days for each year.
2. Worker and vendor trip lengths are based on CalEEMod® Appendix G Table G-16 defaults for San Francisco Bay Area.
3. All the soil excavated from linear components are assumed non-hazardous and will be transported by truck to the Altamont Landfill in Livermore, California. Both the hauling trip lengths for import and export are 50 miles, as provided by the Project Sponsor.
4. Fleet mixes calculated based on EMFAC2021 vehicle miles traveled projections for San Francisco County. Region selected for EMFAC2021 is based on the general physical location of this/these project component(s).

Abbreviations:

ARB - [California] Air Resources Board
CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
LDA - light-duty automobiles
LDT - light-duty trucks
HHDT - heavy-heavy duty trucks
MHDT - medium-heavy duty trucks
VMT - vehicle miles traveled

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/
California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 3a
Construction Phasing Schedule for Other Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component[1]	Year	Start Date	Months	Number of Work Days	Days per Week
Operations Control Center (Exterior Work Only)	2026	1/1/2026	2	42	5
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	1/1/2026	1	22	5
Operations and Maintenance Service Yards	2026	1/1/2026	2	42	5

Notes:

1. Construction schedule provided by the Project Sponsor.

Table 3b
Construction Equipment for Other Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Equipment[1]	CalEEMod® Equipment[2]	Fuel[3]	Number[1]	Horsepower[1]	Daily Usage[4,5] (hours/day)	Uncontrolled Tier	Controlled Tier
Operations Control Center	Excavator	Excavators	Diesel	1	36	8	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	No Specific Tier	Tier 4 Final
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	33	8	No Specific Tier	Tier 4 Final
	Water Buffalo with pump on trailer	Pumps	Diesel	2	4	8	No Specific Tier	Tier 4 Final
	Street Sweeper	Sweepers/Scrubbers	Diesel	2	24	8	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	2	83	8	--	--
Modifications to Retain PGE Access to Non-Electrical Facilities	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	--	--
	Cranes	Cranes	Diesel	1	367	8	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	1	14	8	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Diesel	1	37	8	No Specific Tier	Tier 4 Final
Operations and Maintenance Service Yards	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	2	84	8	No Specific Tier	Tier 4 Final
	Cranes	Cranes	Diesel	2	367	8	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	8	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Diesel	2	37	8	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	2	83	8	--	--

Notes:

1. Equipment list was provided by the Project Sponsor.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.
3. All equipment is conservatively assumed to be diesel-fueled except for Jack Hammer.
4. Construction activities are assumed to occur between 7AM and 8PM each weekday.
5. Utilization was provided by the Project Sponsor; otherwise, it was assumed to be at full capacity (100%).
6. The statewide fleet-average tier diesel engines from CalEEMod® 2022.1 are assumed, as project-specific equipment tier data is unavailable.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 3c
Construction Trips for Other Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Year	Construction Days	Worker Trip Rates[1] (one-way trips/day)	Vendor Trip Rates[1] (one-way trips/day)	Hauling Trip Number[1] (one-way trips/phase)	Trip Lengths (miles/one way trip)			Vehicle Miles Traveled (VMT) (miles)		
						Worker[2]	Vendor[2]	Hauling[3]	Worker	Vendor	Hauling
Operations Control Center	2026	42	40	4.7	334	11.7	8.4	50	19,656	1,663	16,700
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	22	12	4.7	10	11.7	8.4	50	3,089	874	500
Operations and Maintenance Service Yards	2026	42	12	3.5	10	11.7	8.4	50	5,897	1,243	500

Total Trip Rates[1]

Project Component	Parameter	Hauling Trips (Export)	Hauling Trips (Import)	Vendor Trips (Concrete)	Vendor Trips (Vault, Cable and Others)	Worker Trips
Operations Control Center	Total Round Trips	51	116	58	41	--
	Daily Average Round Trips	--	--	--	--	20
Modifications to Retain PGE Access to Non-Electrical Facilities	Total Round Trips	5	--	22	30	--
	Daily Average Round Trips	--	--	--	--	6
Operations and Maintenance Service Yards	Total Round Trips	5	--	44	30	--
	Daily Average Round Trips	--	--	--	--	6

EMFAC Data[4]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Francisco County Calendar Years 2026-2028 Annual Season Aggregated Model Year EMFAC2021	25% LDA, 50% LDT1, 25% LDT2	Gasoline
Vendor		50% MHDT, 50% HHDT	Diesel
Hauling		100% HHDT	Diesel

Notes:

1. Daily worker trip rates and total vendor and hauling trips are provided by the Project Sponsor. The daily vendor trip rates are estimated by dividing the total one-way trips by construction days.
2. Worker and vendor trip lengths are based on CalEEMod® Appendix G Table G-16 defaults for San Francisco Bay Area.
3. Hauling trip lengths of 50 miles for both import and export were provided by the Project Sponsor.
4. Fleet mixes calculated based on EMFAC2021 vehicle miles traveled projections for San Francisco County. Region selected for EMFAC2021 is based on the general physical location of this/these project component(s). EMFAC2021 was run in Emission Rates mode for calendar year 2026-2028 in the annual season. The passenger fleet mix is assumed to have an EMFAC default vehicle type distribution and all vehicles are assumed to be gasoline. The vendor and hauling fleet mixes are assumed to have an EMFAC default vehicle type distribution and all vehicles are assumed to be diesel.

Abbreviations:

ARB - [California] Air Resources Board
CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
LDA - light-duty automobiles
LDT - light-duty trucks
HHDT - heavy-heavy duty trucks
MHDT - medium-heavy duty trucks
VMT - vehicle miles traveled

Table 3c
Construction Trips for Other Components
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 4a
Construction Phasing Schedule for the Variant
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Phase[1]	Subphase	Number of Weeks
Project Variant	Site Excavation and Preparation (Including Trenching)	24
	Trenching	45
	Concrete Foundations	28
	Backfill and Grading	12
	Placement of Facilities	24
	Electrical Equipment/Gate Install	16

Notes:
1. Construction schedule for the Project Variant provided by the Project Sponsor.

Table 4b
Construction Equipment for the Variant
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Phase	Equipment[1]	CalEEMod® Equipment[2]	Fuel[1]	Number[1]	Horsepower[1]	Daily Usage[3] (hours/day)	Utilization[4]	Uncontrolled Tier[5]	Controlled Tier
Site Excavation and Preparation (Including Trenching)	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final
	Excavators	Excavators	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final
	Off-Highway Trucks	--	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
	Pile Driver	Bore/Drill Rigs	Diesel	1	83	8	100%	No Specific Tier	Tier 4 Final
Trenching	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final
	Concrete/Industrial Saws	Concrete/Industrial Saws	Diesel	1	33	8	100%	No Specific Tier	Tier 4 Final
	Excavators	Excavators	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	1	14	24	100%	No Specific Tier	Tier 4 Final
	Off-Highway Trucks	--	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	1	37	8	100%	--	--
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	100%	--	--
	Paver	Pavers	Diesel	1	81	8	100%	No Specific Tier	Tier 4 Final
	Roller	Rollers	Diesel	1	36	8	100%	No Specific Tier	Tier 4 Final
	Cable Pulling equipment	Other Material Handling Equipment	Diesel	2	200	8	100%	No Specific Tier	Tier 4 Final
Concrete Foundations	Cranes	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final
	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	24	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
	Off-Highway Trucks	--	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final
Backfill and Grading	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final
	Off-Highway Trucks	--	Diesel	1	--	8	50%	No Specific Tier	Tier 4 Final
	Plate Compactors	Plate Compactors	Diesel	1	8	8	100%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
Placement of Facilities	Cranes	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final
	Lift/bucket trucks	Aerial Lifts	Diesel	1	46	8	100%	No Specific Tier	Tier 4 Final
	Jack Hammer	Bore/Drill Rigs	Electric	1	83	8	100%	--	--
	Air Compressors	Air Compressors	Electric	2	37	8	100%	--	--
	Generator Sets	Generator Sets	Diesel	2	14	8	100%	No Specific Tier	Tier 4 Final
Equipment and Gate Installation	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	Diesel	1	84	8	100%	No Specific Tier	Tier 4 Final
	Cranes	Cranes	Diesel	1	367	8	100%	No Specific Tier	Tier 4 Final
	Generator Sets	Generator Sets	Diesel	1	14	8	100%	No Specific Tier	Tier 4 Final
	Air Compressors	Air Compressors	Electric	1	37	8	100%	--	--

Notes:

1. Equipment list was provided by the Project Sponsor. Off-Highway Trucks emissions are calculated separately in Table 6c using emission factors for heavy-heavy duty trucks (HHDT) from EMFAC 2021 for San Mateo County.
2. CalEEMod® equipment types are assigned using CalEEMod® User's Guide Appendix G.
3. Utilization was provided by the Project Sponsor; otherwise, it was assumed to be at full capacity (100%).
4. Construction activities are conservatively assumed to occur between 7AM to 8PM each weekday, with the exception of generator sets in Trenching and Concrete Foundations subphases, which can operate up to 24 hours a day when dewatering work needs to be conducted.
5. The statewide fleet-average tier diesel engines from CalEEMod® 2022.1 are assumed, as project-specific equipment tier data is unavailable.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 4c
Construction Trips for the Variant
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Phase	Year	Construction Days	Worker Trip Rates[1] (one-way trips/day)	Vendor Trip Rates[1] (one-way trips/day)	Hauling Trip Number[1] (one-way trips/phase)	Trip Lengths (miles/one way trip)			Vehicle Miles Traveled (VMT) (miles)		
						Worker[2]	Vendor[2]	Hauling[3]	Worker	Vendor	Hauling
Site Excavation and Preparation (Including Trenching)	2026	121	20	15	3,887	11.7	8.4	16	28,314	15,124	61,255
Trenching	2026	225	0	0	0	11.7	8.4	16	0	0	0
Concrete Foundations	2026	140	20	15	0	11.7	8.4	16	32,760	17,498	0
	2027	1	20	15	0	11.7	8.4	16	234	125	0
Backfill and Grading	2027	60	20	15	1,312	11.7	8.4	16	14,040	7,499	20,679
Placement of Facilities	2027	120	20	15	0	11.7	8.4	16	28,080	14,999	0
Electrical Equipment/Gate Install	2027	80	20	15	0	11.7	8.4	16	18,720	9,999	0
	2028	1	20	15	0	11.7	8.4	16	234	125	0

Total Trip Rates[1,2,3]

Project Component	Parameter	Hauling Trips (Export)	Hauling Trips (Import)	Vendor Trips (Concrete)	Vendor Trips (Vault, Cable and Others)	Worker Trips
Variant	Total Round Trips	1,943	656	3,717	175	--
	Daily Average Round Trips	--	--	--	--	10
	Trip length (miles/one-way trips)	80 (Option A: By truck) and 4.2 (Option B: By truck and rail)	50	8.4 (CalEEMod default)		11.7 (CalEEMod default)
	Weighted Average Trip Length (miles/one-way trips)	72 (Option A) and 16 (Option B)				

EMFAC Data[4]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	San Mateo County Calendar Years 2026-2028 Annual Season Aggregated Model Year EMFAC2021	25% LDA, 50% LDT1, 25% LDT2	Gasoline
Vendor		50% MHDT, 50% HHDT	Diesel
Hauling		100% HHDT	Diesel

Notes:

1. Worker, vendor, and hauling trip rates are provided by the Project Sponsor. For the trenching subphase, 1 crew working on trenches and the other crew is working elsewhere on the substation. The daily vendor trip rates are estimated by dividing the total one-way trips by construction days. All export hauling trips are assumed to occur during Site Excavation and Preparation, and all import hauling trips are assumed to occur during Backfill and Grading.
2. Worker and vendor trip lengths are based on CalEEMod® Appendix G Table G-16 defaults for San Francisco Bay Area.
3. Two hauling assumptions are included for the excavated contaminated soil: Option A involves trucking to Kern County, and Option B involves trucking to the Port of San Francisco transfer facility on Cargo Way at Pier 94, followed by rail to the East Carbon Development Corporation Landfill in Utah. For both assumptions, the average trip length was calculated by taking the weighted average of the trip lengths for both import and export hauling trips. The weighted average hauling trip length reported here is for Option B. For Option A, the weighted average hauling trip length is estimated to be 72 miles per trip, and VMT is adjusted accordingly.
4. Fleet mixes calculated based on EMFAC2021 vehicle miles traveled projections for San Mateo County. Region selected for EMFAC2021 is based on the general physical location of this/these project component(s). EMFAC2021 was run in Emission Rates mode for calendar year 2026-2028 in the annual season. The passenger fleet mix is assumed to have an EMFAC default vehicle type distribution and all vehicles are assumed to be gasoline. The vendor and hauling fleet mixes are assumed to have an EMFAC default vehicle type distribution and all vehicles are assumed to be diesel.

Abbreviations:

ARB - [California] Air Resources Board
CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
LDA - light-duty automobiles
LDT - light-duty trucks
HHDT - heavy-heavy duty trucks
MHDT - medium-heavy duty trucks
VMT - vehicle miles traveled

Table 4c
Construction Trips for the Variant
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 5
Estimated Emissions from Construction Paving Off-Gassing
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Year	Asphalt-Paved Area (sqft)	Asphalt-Paved Area (acre)	Asphalt Paving Off-Gassing ROG Emission Factor (lb/acre)[1]	Asphalt Paving Off-Gassing ROG Emissions (lb)
Martin Substation[2]	2026	249,519	5.7	2.62	15
	2027	287,907	6.6		17
	2028	57,581	1.3		3.5
Distribution Express Feeders[3]	2026	220,704	5.1		13
Local Distribution System Separation[3]	2026	112,750	2.6		6.8
	2027	112,750	2.6		6.8
System Reinforcements[3]	2026	104,035	2.4		6.3
	2027	104,035	2.4		6.3
	2028	34,678	0.80		2.1

Project Component	Year	Asphalt-Paved Area (sqft)	Asphalt-Paved Area (acre)	Asphalt Paving Off-Gassing ROG Emission Factor (lb/acre)[1]	Asphalt Paving Off-Gassing ROG Emissions (lb)
Variant[2]	2026	1,070,873	24.6	2.62	64

Notes:

1. Emission factor from CalEEMod® User's Guide, Appendix A.
2. Asphalt-paved area for Martin Substation and Variant were conservatively assumed to be all areas where construction could occur. These areas are represented by the modeled area polygons, as shown in Figure 1.
3. Asphalt-paved area for each of these Project components is assumed to be the alignment length multiplied by width of excavation, which is 11 feet according to Project Description.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
lb - pound
ROG - reactive organic gas
sqft - square foot

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 6a
Calculation Assumptions for Off-Highway Trucks (Variant)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Equipment[1]	Fleet Type[1]	Daily Usage[2]	Trip Length[3]	Idling Time[4]	Vehicle Speed[4]	Total Hour per Trip[5]	Daily Trip Rate[5]	Daily Trip VMT
		hours/day	mi/trip	min/trip	mi/hr	hr/trip	trips/day	mi/day
Off-Highway Trucks	HHDT	4.0	1.1	5.0	5.0	0.30	14	15

Notes:

1. According to the information provided by the Project Sponsor, off-highway trucks are used as water trucks during construction of the Variant. Water trucks are conservatively assumed to be heavy heavy-duty diesel trucks (HHDT), whose emission factors were obtained from EMFAC2021, the ARB Emission Factors model for on-road emissions.
2. According to the information provided by the Project Sponsor, the equipment would be used at a 50% utilization rate during an 8-hour work period.
3. Each watering trip is assumed to travel the circumference of the Variant's construction area, approximately 1.1 miles.
4. Water trucks are assumed to travel repeatedly the greater length of the construction site at the lowest vehicle speed of 5 miles per hour from EMFAC2021. The idling time is assumed five minutes at the end of each trip according to Title 13, CCR, Section 2485.
5. The total hour per trip is estimated based on the onroad time spent per trip. This is calculated dividing the trip length by vehicle speed, then added to idling time in the unit of hour per trip.

Abbreviations:

HHDT - heavy heavy-duty diesel trucks
VMT - vehicle miles traveled

References:

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 6b
Off-Highway Trucks Emission Factors (Variant)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Vehicle Type	Fuel	Year	Fleet Category	Emission Factor Units	Mobile Emission Factors[1]			
					ROG	NOx	PM_{10}	$PM_{2.5}$
Off-Highway Trucks	Diesel	2026	HHDT	g/mile	0.0033	0.33	0.019	0.0083
			HHDT	g/trip	4.6E-04	0.056	4.3E-06	4.1E-06
		2027	HHDT	g/mile	0.0032	0.32	0.019	0.0083
			HHDT	g/trip	4.6E-04	0.056	4.1E-06	3.9E-06
		2028	HHDT	g/mile	0.0030	0.30	0.019	0.0082
			HHDT	g/trip	4.6E-04	0.057	3.8E-06	3.7E-06

Notes:

1. Emission factors were estimated using EMFAC2021 for San Francisco County. EMFAC2021 was run in Emission Rates mode for calendar years 2026-2028 in the annual season. The following processes have units of g/trip: DIRUN, HOTSOAK, RESTLOSS, STREX, and IDLEX. The following processes have units of g/mile: PMBW, PMTW, RUNEX, and RUNLOSS. Processes with units of g/vehicle/day were converted to g/trip using the population and trip rate values given in the EMFAC2021 run.

Abbreviations:

CAP - Criteria Air Pollutant
DIURN - diurnal evaporative hydrocarbon emissions
EMFAC2021 - California Air Resources Board EMission FACtor model
g - grams
HOTSOAK - hot soak evaporative hydrocarbon emissions
IDLEX - idle exhaust emissions
mi - mile
N_2O - Nitrous oxide
NO_x - nitrogen oxides
PM - particulate matter
PMBW - break wear particulate matter emissions
PMTW - tire wear particulate matter emissions
RESTLOSS - resting evaporative losses
ROG - reactive organic gases
RUNEX - running exhaust emissions
RUNLOSS - running loss evaporative hydrocarbon emissions
STREX - start exhaust tailpipe emissions

References:

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 6c
Criteria Air Pollutants Emissions from Off-Highway Trucks (Variant)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Vehicle Type	Year	Fleet Category	Daily CAP Emissions			
			ROG	NOx	PM_{10}	$PM_{2.5}$
			[lb/day/subphase]			
Off-Highway Trucks	2026	HHDT	1.2E-04	1.3E-02	6.4E-04	2.8E-04
	2027	HHDT	1.2E-04	1.2E-02	6.3E-04	2.7E-04
	2028	HHDT	1.1E-04	1.2E-02	6.3E-04	2.7E-04

Notes:

1. The daily emissions from off-highway trucks are estimated based on the daily VMT calculated in Table 6a and emission factors from EMFAC2021, as shown in Table 6b.

Abbreviations:

EMFAC2021 - California Air Resources Board EMission FACtor model
g -gram
HHDT - Heavy-heavy duty trucks
NOx - nitrogen oxides
PM_{10} - particulate matter < 10 µm
$PM_{2.5}$ - particulate matter < 2.5 µm
ROG - reactive organic gases
yr - year

Table 7
Emission Factors for Entrained Roadway Dust
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Road Dust Equation[1]

E [lb/VMT] = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

Parameters	Value
E = annual average emission factor in the same units as k	[calculated]
k = particle size multiplier for particle size range	
PM_{10} (lb/VMT)	0.0022
$PM_{2.5}$ (lb/VMT)	3.3E-04
sL = roadway silt loading [grams per square meter - g/m^2]	0.50
W = average weight of vehicles traveling the road [tons]	2.4
P = number of "wet" days in county with at least 0.1 in of precipitation during the annual averaging period	32
N = number of days in the averaging period	365

Entrained Road Dust Emission Factors	
PM_{10} Emission Factor [lb/VMT]	2.8E-03
$PM_{2.5}$ Emission Factor [lb/VMT]	4.2E-04

Notes:

1. Road dust equation and parameters are from the California Air Resources Board's (ARB) 2021 Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust. The silt loading emission factor is assumed 0.5 g/m^3 according to BAAQMD CEQA Guidelines. The number of "wet" days for San Mateo county is from CalEEMod® Appendix G Table 2. Other parameters (average weight of vehicles, size multipliers) are from ARB 2021. $PM_{2.5}$ is assumed to be 15% of PM_{10} based on paved road dust sampling in California (ARB Speciation Profile #471), which is a more representative fraction than provided in the older AP-42 fugitive dust methodology as discussed in ARB 2021 (page 10).

Abbreviations:

ARB - [California] Air Resources Board
CalEEMod® - California Emissions Estimator Model®
EMFAC - EMission FACtor Model
g - gram
lb - pound
m^2 - meter squared
$PM_{2.5}$ - particulate matter less than 2.5 microns
PM_{10} - particulate matter less than 10 microns
VMT - vehicle miles traveled

References:

BAAQMD. 2023. California Environmental Quality Act Air Quality Guidelines. Available at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines

California Air Resources Board. 2021. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. March. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 8
Emissions Calculations for Entrained Road Dust for Martin Substation within Modeling Extent
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Entrained Road Dust Emission Factors

$PM_{2.5}$ Emission Factor [lb/VMT]	4.2E-04

Phase	Year	Total VMT (miles)	Total Emissions (lb/yr)
			Fugitive $PM_{2.5}$
Site Excavation (Including Trenching)	2026	4,912	2.1
	2027	3,015	1.3
	2028	595	0.25
Concrete Foundations	2026	1,496	0.63
	2027	1,320	0.55
	2028	1,320	0.55
Backfill and Grading	2026	595	0.25
	2027	793	0.33
	2028	238	0.10
Placement of Facilities	2026	147	0.062
Electrical Equipment/Gate Install	2026	3,695	1.6
	2027	4,429	1.9
	2028	2,376	1.0

Abbreviations:

lb - pound

$PM_{2.5}$ - particulate matter less than 2.5 microns

VMT - vehicle miles travelled

RAMBOLL

Table 9
Emissions Calculations for Entrained Road Dust for Linear Components within Modeling Extent
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Entrained Road Dust Emission Factors

$PM_{2.5}$ Emission Factor [lb/VMT]	4.2E-04

Phase	Year	Total VMT[1] (miles)	Total Emissions (lb/yr)
			Fugitive $PM_{2.5}$
Distribution Express Feeders	2026	6,328	2.7
Local Distribution System Separation	2026	2,667	1.1
	2027	2,667	1.1
System Reinforcements	2026	3,050	1.3
	2027	3,050	1.3
	2028	993	0.42

Notes:
1. The total VMT here represents the VMT from all trips within the modeling extent.

Abbreviations:
lb - pound
$PM_{2.5}$ - particulate matter less than 2.5 microns
VMT - vehicle miles travelled

Table 10
Emissions Calculations for Entrained Road Dust for the Variant within Modeling Extent
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Entrained Road Dust Emission Factors

$PM_{2.5}$ Emission Factor [lb/VMT]	4.2E-04

Phase	Year	Total VMT (miles)[1]	Total Emissions (lb/yr)
			Fugitive $PM_{2.5}$
Site Excavation and Preparation (Including Trenching)	2026	11,889	5.0
Trenching	2026	0	0
Concrete Foundations	2026	7,161	3.0
	2027	51	0.021
Backfill and Grading	2027	4,993	2.1
Placement of Facilities	2027	6,138	2.6
Electrical Equipment/Gate Install	2027	4,092	1.7
	2028	51	0.021

Notes:

1. The total VMT here represents the VMT from all trips within the modeling extent. The total VMT for trenching is included in Site Excavation and Preparation.

Abbreviations:

lb - pound

$PM_{2.5}$ - particulate matter less than 2.5 microns

VMT - vehicle miles travelled

Table 11a
Rail Emissions Input Assumptions
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Option B - Rail to Utah

Parameter		Input	Notes
Line-haul distance (miles/one-way)		145	Rail distance to SFBAAB boundary
Locomotives/train		2	Based on recent project experience
Weight of locomotive (tons)		208	General Electric ET44C4
Rail cars/train		50	Based on recent project experience
Weight of empty rail car (tons)[2]		38	Union Pacific small open-top hopper
Total weight of empty train (tons)		2,325	--
Material Exported per Car (tons/railcar)		83	Union Pacific small open-top hopper, lower end of load limit
Martin Substation	Material Exported by Rail in 2026 (tons)	4,055	Assume all excavated soil is hazardous waste based on the Project Description.
	Material Exported by Rail in 2027 (tons)	4,806	
	Material Exported by Rail in 2028 (tons)	1,051	
	Number of Trains in 2026	1	--
	Number of Trains in 2027	2	
	Number of Trains in 2028	1	
Variant	Material Exported by Rail in 2026 (tons)	29,231	Assume all excavated soil is hazardous waste based on the Project Description.
	Material Exported by Rail in 2027 (tons)	14,494	
	Number of Trains in 2026	8	--
	Number of Trains in 2027	4	

Notes:

1. Rail activity was provided in the form of total cubic yards of material to be exported by rail. Trains were assumed to travel south from the rail loading terminal at Pier 94 in San Francisco to San Jose, North through Oakland, then towards Sacramento. Emissions are calculated for the one-way trip distance to the edge of the San Francisco Bay Area Air Basin (SFBAAB).
2. The average weight of the empty train is calculated using the gross weight range on rail and the load limit range of the Union Pacific small open-top hopper.

References:

GE Transportation. 2016. "Full Locomotive Product Portfolio". Available at: https://issuu.com/getransportation/docs/ge-locomotive-product-catalog-2016

Union Pacific. 2018. "Open-Top Hoppers". Available at: https://www.up.com/customers/all/equipment/descriptions/open-top_hoppers/index.htm

Abbreviations:

SFBAAB - San Francisco Bay Area Air Basin

Table 11b
Rail Off-Site Line-Haul Emission Factors
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

US EPA Emission Factors (g/gal)[1]	HC	ROG	NO_x	CO	DPM	PM_{10}	$PM_{2.5}$	2026 Tier Distribution Activity[2]	2027 Tier Distribution Activity[2]	2028 Tier Distribution Activity
Pre-Tier	10	12	270	27	6.7	6.7	6.1	0.027%	0.022%	0.019%
Tier 0	10	12	179	27	6.7	6.7	6.1	1.4%	1.0%	0.72%
Tier 0+	6.2	7.5	150	27	4.2	4.2	3.8	2.0%	2.1%	1.6%
Tier 1	10	12	139	27	6.7	6.7	6.1	0.066%	0.047%	0.034%
Tier 1+	6.0	7.2	139	27	4.2	4.2	3.8	30%	30%	30%
Tier 2	5.4	6.5	103	27	3.7	3.7	3.4	2.0%	1.7%	1.4%
Tier 2+	2.7	3.2	103	27	1.7	1.7	1.5	36%	36%	37%
Tier 3	2.7	3.2	103	27	1.7	1.7	1.5	21%	21%	21%
Tier 4	0.83	1.0	21	27	0.31	0.31	0.29	7.9%	8.1%	8.4%
2026 Average (g/gal)[3]	3.8	4.5	109	27	2.5	2.5	2.3			
2027 Average (g/gal)[3]	3.7	4.5	109	27	2.4	2.4	2.2			
2028 Average (g/gal)[3]	3.7	4.4	108	27	2.4	2.4	2.2			

Notes:

1. Line haul emission factors are based on the US EPA Technical Highlights Emission Factors for Locomotives, Table 1. The $PM_{2.5}$ emission factor is 92% of PM_{10} for locomotive operations, and the emission factor for PM and PM_{10} are equivalent. The emission factor for reactive organic gases is estimated as 1.21 times the emission factor for hydrocarbons (HC).
2. Line haul locomotives tier distribution is from the CARB 2021 Emissions Inventory Aggregated at County/Air Basin/State.
3. Fleet average emission factors were calculated by applying CARB Tier distributions to the line haul emission factors for each construction year.

References:

US EPA. 2009. Technical Highlights Emission Factors for Locomotives. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100500B.pdf. Last accessed on 3/1/2024.

CARB. 2021 Emissions Inventory Aggregated at County/Air Basin/State, Freight Locomotives: Class I. Available at: https://ww2.arb.ca.gov/sites/default/files/2024-01/2021_line_haul_locomotive_emission_inventory_summaries%20web%20FINAL%202024V.xlsx

Abbreviations:

CARB - California Air Resources Board
g - gram
gal - gallon
HC - Hydrocarbons
NOx - Nitrogen oxides
ROG - Reactive organic gases
PM - particulate matter
US EPA - United States Environmental Protection Agency
PM_{10} - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter

Table 11c
Rail Line-Haul Fuel Consumption
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Inbound from Sacramento

Parameter[1]	Value	Notes
Negative Grade	-0.0047	Roseville to Oakland (ARB 2017)
Positive Grade	0.0038	Roseville to Oakland (ARB 2017)
1/(GTM/gal)	0.0010	
GTM/gal	970	

Outbound to Sacramento

Parameter[1]	Value	Notes
Negative Grade	-0.0038	Oakland to Roseville (ARB 2017)
Positive Grade	0.0047	Oakland to Roseville (ARB 2017)
1/(GTM/gal)	0.0011	
GTM/gal	895	

Fuel Consumption

Project Component	Year	Train Empty weight (tons)	Annual Freight (tons)	Annual Trains	One-Way Distance (mi)	GTM	Fuel Consumption (gallons)
Martin Substation	2026	2,325	4,055	1	145	925,080	1,033
	2027	2,325	4,806	2	145	1,371,056	1,531
	2028	2,325	1,051	1	145	489,531	547
Variant	2026	2,325	29,231	8	145	6,935,136	7,746
	2027	2,325	14,494	4	145	3,450,054	3,854

Notes:

[1] Gross ton-mile per gallon (GTM/gal) calculated per ARB Guidance as 1/(GTM/gal) = 0.00075 + 0.086*(Positive Grade) + 0.0098*(Negative Grade)

References:

California Air Resources Board (ARB). 2017. "2016 Line Haul Locomotive Model & Update". October. Available at: https://www.arb.ca.gov/msei/ordiesel.htm

Abbreviations:

ARB - California Air Resources Board
gal - gallon
GTM - Gross ton mile
mi - mile

Table 11d
Rail Emissions Summary
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Year	Annual Offsite Line Haul Emissions lbs/year			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Martin Substation	2026	10	249	5.6	5.2
	2027	15	368	8.2	7.6
	2028	5.3	131	2.9	2.7

Project Component	Year	Annual Offsite Line Haul Emissions lbs/year			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Variant	2026	78	1,868	42	39
	2027	38	925	21	19

Notes:

1. Emissions calculated based on ARB inventory data and projected locomotive fleet mix for 2026 -2028.
2. ROG Emissions converted from hydrocarbons by a factor of 1.21 (ARB 2017).

References:

California Air Resources Board (ARB). 2017. "2016 Line Haul Locomotive Model & Update". October. Available at: https://www.arb.ca.gov/msei/ordiesel.htm

Abbreviations:

NOx - Nitrogen oxides

ROG - Reactive organic gases

PM_{10} - particulate matter less than 10 micrometers in diameter

$PM_{2.5}$ - particulate matter less than 10 micrometers in diameter

Table 12a
Uncontrolled Criteria Air Pollutants Emissions- Project (Assume Rail Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Martin Substation	2026	Off-Road Equipment	68	586	23	21
		Onroad Vehicles	18	155	1.4	1.4
		Rail	10	249	5.6	5.2
		Paving	15	--	--	--
	2027	Off-Road Equipment	61	519	20	19
		Onroad Vehicles	17	97	1.0	1.0
		Rail	15	368	8.2	7.6
		Paving	17	--	--	--
	2028	Off-Road Equipment	51	424	16	15
		Onroad Vehicles	8.0	23	0.27	0.26
		Rail	5.3	131	2.9	2.7
		Paving	3.5	--	--	--
Distribution Express Feeders	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	126	1,036	39	36
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	28	231	7.7	7.0
		Onroad Vehicles	7.1	145	1.13	1.08
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	16	141	5.3	4.8
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	61	539	20	18
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	5.9	59	1.8	1.7
2027	3.7	32	1.1	1.0
2028	1.4	12	0.41	0.37

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.

2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be transferred to the Port of San Francisco transfer facility on Cargo Way (at Pier 94) by trucks and then conveyed by rail to the ECDC Landfill in Utah.

Table 12a
Uncontrolled Criteria Air Pollutants Emissions- Project (Assume Rail Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns in diameter
$PM_{2.5}$ - particulate matter less than 2.5 microns in diameter
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 12b
Uncontrolled Criteria Air Pollutants Emissions - Project (Assume Truck Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Martin Substation	2026	Off-Road Equipment	68	586	23	21
		Onroad Vehicles	20	326	3.0	2.8
		Paving	15	--	--	--
	2027	Off-Road Equipment	61	519	20	19
		Onroad Vehicles	20	292	2.8	2.7
		Paving	17	--	--	--
	2028	Off-Road Equipment	51	424	16	15
		Onroad Vehicles	8.6	64	0.66	0.63
		Paving	3.5	--	--	--
Distribution Express Feeders	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	126	1,036	39	36
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	28	231	7.7	7.0
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	16	141	5.3	4.8
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	61	539	20	18
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	5.9	59	1.8	1.7
2027	3.6	31	1.1	1.0
2028	1.3	12	0.39	0.36

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.

2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be hauled by trucks to the nearest class I landfill in Kern County.

Table 12b
Uncontrolled Criteria Air Pollutants Emissions - Project (Assume Truck Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 13a
Controlled Criteria Air Pollutants Emissions - Project (Assume Rail Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source[3]	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Martin Substation	2026	Off-Road Equipment	14	237	2.1	2.1
		Onroad Vehicles	18	155	1.4	1.4
		Rail	10	249	5.6	5.2
		Paving	15	--	--	--
	2027	Off-Road Equipment	12	217	1.9	1.9
		Onroad Vehicles	17	97	1.0	1.0
		Rail	15	368	8.2	7.6
		Paving	17	--	--	--
	2028	Off-Road Equipment	11	180	1.7	1.7
		Onroad Vehicles	8.0	23	0.27	0.26
		Rail	5.3	131	2.9	2.7
		Paving	3.5	--	--	--
Distribution Express Feeders	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	23	525	3.1	3.1
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	4.6	141	0.51	0.51
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	3.6	44	0.64	0.64
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	14	168	2.5	2.5
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	1.6	36	0.26	0.26
2027	1.0	18	0.14	0.14
2028	0.40	7.0	0.064	0.062

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.

2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be transferred to the Port of San Francisco transfer facility on Cargo Way (at Pier 94) by trucks and then conveyed by rail to the ECDC Landfill in Utah.

3. All off-road diesel equipment is assumed to use Tier 4 Final engines under controlled scenarios. Emissions from on-road vehicles and rail sources remain the same under both uncontrolled and controlled scenarios.

Table 13a
Controlled Criteria Air Pollutants Emissions - Project (Assume Rail Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 13b
Controlled Criteria Air Pollutants Emissions - Project (Assume Truck Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source[3]	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Martin Substation	2026	Off-Road Equipment	14	237	2.1	2.1
		Onroad Vehicles	20	326	3.0	2.8
		Paving	15	--	--	--
	2027	Off-Road Equipment	12	217	1.9	1.9
		Onroad Vehicles	20	292	2.8	2.7
		Paving	17	--	--	--
	2028	Off-Road Equipment	11	180	1.7	1.7
		Onroad Vehicles	8.6	64	0.66	0.63
		Paving	3.5	--	--	--
Distribution Express Feeders	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	23	525	3.1	3.1
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	4.6	141	0.51	0.51
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	3.6	44	0.64	0.64
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	14	168	2.5	2.5
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	1.6	36	0.25	0.24
2027	0.94	17	0.12	0.11
2028	0.37	6.4	0.047	0.046

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.
2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be hauled by trucks to the nearest class I landfill in Kern County.
3. All off-road diesel equipment is assumed to use Tier 4 Final engines under controlled scenarios. Emissions from on-road vehicles and rail sources remain the same under both uncontrolled and controlled scenarios.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 14a
Uncontrolled Criteria Air Pollutants Emissions - Variant (Assume Rail Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Project Variant	2026	Off-Road Equipment	587	5,051	195	179
		Onroad Vehicles	25	581	5.0	4.8
		Rail	78	1,868	42	39
		Paving	64	--	--	--
	2027	Off-Road Equipment	138	1,253	47	43
		Onroad Vehicles	19	302	2.7	2.5
		Rail	38	925	21	19
	2028	Off-Road Equipment	0.54	4.7	0.18	0.17
		Onroad Vehicles	0.064	0.63	0.0055	0.0052
Distribution Express Feeders	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	126	1,036	39	36
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	28	231	7.7	7.0
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	16	141	5.3	4.8
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	61	539	20	18
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	8.4	84	2.6	2.4
2027	4.0	37	1.2	1.1
2028	0.93	8.3	0.27	0.25

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.
2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be transferred to the Port of San Francisco transfer facility on Cargo Way (at Pier 94) by trucks and then conveyed by rail to the ECDC Landfill in Utah.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 14b
Uncontrolled Criteria Air Pollutants Emissions - Variant (Assume Truck Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Project Variant	2026	Off-Road Equipment	587	5,051	195	179
		Onroad Vehicles	46	2,019	17	17
		Paving	64	--	--	--
	2027	Off-Road Equipment	138	1,253	47	43
		Onroad Vehicles	27	769	6.8	6.5
	2028	Off-Road Equipment	0.54	4.7	0.18	0.17
		Onroad Vehicles	0.064	0.63	0.0055	0.0052
Distribution Express Feeders	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	400	3,303	129	119
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	395	3,245	124	114
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	126	1,036	39	36
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	28	231	7.7	7.0
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	16	141	5.3	4.8
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	61	539	20	18
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	8.2	82	2.5	2.3
2027	3.9	36	1.2	1.1
2028	0.93	8.3	0.27	0.25

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.
2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be hauled by trucks to the nearest class I landfill in Kern County.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 15a
Controlled Criteria Air Pollutants Emissions - Variant (Assume Rail Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source[3]	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Project Variant	2026	Off-Road Equipment	122	1,973	20	20
		Onroad Vehicles	25	581	5.0	4.8
		Rail	78	1,868	42	39
		Paving	64	--	--	--
	2027	Off-Road Equipment	33	436	5.7	5.7
		Onroad Vehicles	19	302	2.7	2.5
		Rail	38	925	21	19
		Paving	--	--	--	--
	2028	Off-Road Equipment	0.14	1.1	0.026	0.026
		Onroad Vehicles	0.064	0.63	0.0055	0.0052
Distribution Express Feeders	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	23	525	3.1	3.1
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	4.6	141	0.51	0.51
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	3.6	44	0.64	0.64
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	14	168	2.5	2.5
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	2.5	51	0.49	0.47
2027	1.1	22	0.21	0.20
2028	0.22	4.8	0.031	0.031

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.
2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be transferred to the Port of San Francisco transfer facility on Cargo Way (at Pier 94) by trucks and then conveyed by rail to the ECDC Landfill in Utah.
3. All off-road diesel equipment is assumed to use Tier 4 Final engines under controlled scenarios. Emissions from on-road vehicles and rail sources remain the same under both uncontrolled and controlled scenarios.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 15b
Controlled Criteria Air Pollutants Emissions - Variant (Assume Truck Haul)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Summary of Construction Emissions by Project Component and Construction Year

Project Component[1]	Year	Source[3]	CAP Emissions[2]			
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
			lb/yr			
Project Variant	2026	Off-Road Equipment	122	1,973	20	20
		Onroad Vehicles	46	2,019	17	17
		Paving	64	--	--	--
	2027	Off-Road Equipment	33	436	5.7	5.7
		Onroad Vehicles	27	769	6.8	6.5
		Paving	--	--	--	--
	2028	Off-Road Equipment	0.14	1.1	0.026	0.026
		Onroad Vehicles	0.064	0.63	0.0055	0.0052
Distribution Express Feeders	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	51	2,619	20	19
		Paving	13	--	--	--
Local Distribution System Separation	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	218	1.8	1.7
		Paving	6.8	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	22	206	1.8	1.7
		Paving	6.8	--	--	--
System Reinforcements	2026	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	24	605	4.6	4.4
		Paving	6.3	--	--	--
	2027	Off-Road Equipment	70	1,611	10	10
		Onroad Vehicles	23	572	4.5	4.3
		Paving	6.3	--	--	--
	2028	Off-Road Equipment	23	525	3.1	3.1
		Onroad Vehicles	7.3	175	1.4	1.4
		Paving	2.1	--	--	--
Operations Control Center	2026	Off-Road Equipment	4.6	141	0.51	0.51
		Onroad Vehicles	7.1	145	1.1	1.1
Modifications to Retain PGE Access to Non-Electrical Facilities	2026	Off-Road Equipment	3.6	44	0.64	0.64
		Onroad Vehicles	1.0	10	0.080	0.076
Operations and Maintenance Service Yards	2026	Off-Road Equipment	14	168	2.5	2.5
		Onroad Vehicles	1.8	13	0.11	0.10

Annual Average Daily Construction Emissions by Year

Year	ROG	NOx	PM_{10}	$PM_{2.5}$
	lb/day			
2026	2.3	49	0.37	0.36
2027	1.0	20	0.15	0.14
2028	0.22	4.8	0.031	0.031

Notes:

1. The estimated emissions include those from construction related to the telecommunications equipment. The telecommmunications equipment would be installed along the other Project components, and therefore do not require additional or separate construction activities.
2. Construction emissions were estimated with methodology equivalent to CalEEMod® 2022.1. Off-road equipment represents emissions from construction equipment, while onroad vehicles includes emissions from worker, vendor, and hauling trucks. This scenario assumes that all the hazardous materials will be hauled by trucks to the nearest class I landfill in Kern County.
3. All off-road diesel equipment is assumed to use Tier 4 Final engines under controlled scenarios. Emissions from on-road vehicles and rail sources remain the same under both uncontrolled and controlled scenarios.

Abbreviations:

CalEEMod® - California Emissions Estimator Model®
CAP - Criteria Air Pollutants
lb/day - pound per day
lb/yr - pounds per year
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - reactive organic gases

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 16
Estimated Emissions from Emergency Generator Operations
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Emergency Generator Emission Factors

Engine Type	Fuel	Engine Size Range (hp)		Engine Emission Factors[1] (g/bhp-hr)			
		Minimum	Maximum	ROG	NOx	DPM	$PM_{2.5}$
Emergency Generator	Diesel	300	600	1.0	2.9	0.15	0.15

Emergency Generator Modeled Emissions[2]

Scenario	Number of Engines	Load Factor	Size		Fuel Type	Annual Operation[3]	Annual Emissions, g/s	
			kW	hp		hr/yr	g/s DPM	g/s $PM_{2.5}$
Project Operation	1	0.73	300	402	Diesel	50	7.0E-05	7.0E-05

Emergency Generator CAP Annual Emissions

Annual Emissions (ton/yr)			
ROG	NO_x	PM_{10}	$PM_{2.5}$
0.0165	0.0461	0.0024	0.0024

Notes:

1. Engine emission factors for the diesel emergency generator were based on CalEEMod® User's Guide Appendix G, Table G-40.
2. Number, size, and fuel of the emergency generator engine was provided by Project Sponsor.
3. Per guidance from the City of San Francisco, 50 hours per year include operation for routine maintenance and testing and emergency uses.

Abbreviations:

ARB - [California] Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CalEEMod® - CALifornia Emissions Estimator MODel®
g/bhp-hr - grams per brake horsepower hour
hp - horsepower
hr - hour
kW - kilowatt
PM - particulate matter
PM_{10} - PM less than 10 microns in aerodynamic diameter
$PM_{2.5}$ - PM less than 2.5 microns in aerodynamic diameter
yr - year

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

San Francisco Planning. Draft Air Quality And Greenhouse Gas Analysis Guidelines.

Table 17
Criteria Air Pollutants Emissions from Operation
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Additional Sources	ROG	NOx	PM_{10}	$PM_{2.5}$	ROG	NOx	PM_{10}	$PM_{2.5}$
	ton/year				lb/day			
Emergency Generator	0.017	0.046	0.0024	0.0024	0.090	0.25	0.013	0.013
Employee Trips[1]	0.52	0.42	0.010	0.010	2.8	2.3	0.055	0.055
Total	**0.54**	**0.47**	**0.012**	**0.012**	**2.9**	**2.6**	**0.068**	**0.068**

Note:

1. 400 employees are provided by the Project Sponsor. One round trip per employee was assumed to calculate the mobile emissions. CalEEMod default trip length for General Light Industry land use was used.

References:

California Air Pollution Control Officers Association (CAPCOA). California Emissions Estimator Model (CalEEMod®), Version 2022.1. Available online at http://www.caleemod.com/

Table 18
Construction and Operational Exposure Parameters
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Construction

Receptor Type	Project Component	Year	Receptor Age Group	Exposure Parameters							
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2]	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Age Sensitivity Factor[5]	Averaging Time (AT)	Modeling Adjustment Factor[6]	Adjusted Intake Factor, Inhalation (IFinh)
				[L/kg-day]	[years]	[unitless]	[days/year]		[days]	[unitless]	[m^3/kg-day]
Residential	Martin Substation or Variant	2026	3rd Trimester	361	0.25	1.0	350	10	25,500	1	0.012
			Age 0-<2	1,090	0.75	1.0		10		1	0.11
		2027	Age 0-<2	1,090	1.0	1.0		10		1	0.15
		2028	Age 2-<16	572	1.0	1.0		3		1	0.024
School		2026	Age 2-<16	520	1.0	--	250	3		4.2	0.064
		2027	Age 2-<16	520	1.0	--		3		4.2	0.064
		2028	Age 2-<16	520	1.0	--		3		4.2	0.064
Daycare		2026	Age 0-<2	1,090	1.0	--	350	10		1	0.15
		2027	Age 0-<2	1,090	1.0	--		10		1	0.15
		2028	Age 2-<16	572	1.0	--		3		1	0.024
Offsite Worker		2026	Age 16-70	230	1.0	--	250	1		4.2	0.0095
		2027	Age 16-70	230	1.0	--		1		4.2	0.0095
		2028	Age 16-70	230	1.0	--		1		4.2	0.0095

Construction

Receptor Type	Project Component	Year	Receptor Age Group	Exposure Parameters							
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2]	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Age Sensitivity Factor[5]	Averaging Time (AT)	Modeling Adjustment Factor[6]	Adjusted Intake Factor, Inhalation (IFinh)
				[L/kg-day]	[years]	[unitless]	[days/year]		[days]	[unitless]	[m^3/kg-day]
Residential	Linear Components	--	Age 0-<2	1,090	0.50	1.0	350	10	25,500	1	0.075
School			Age 2-<16	520	0.50	--	250	3		4.2	0.032
Daycare			Age 0-<2	1,090	0.50	--	350	10		1	0.075
Offsite Worker			Age 16-70	230	0.50	--	250	1		4.2	0.0047

Operation

Receptor Type	Project Phase	Year	Receptor Age Group	Exposure Parameters							
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2]	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Age Sensitivity Factor[5]	Averaging Time (AT)	Modeling Adjustment Factor[6]	Adjusted Intake Factor, Inhalation (IFinh)
				[L/kg-day]	[years]	[unitless]	[days/year]		[days]	[unitless]	[m^3/kg-day]
Residential	Operation	All	3rd Trimester	361	0.25	1.0	350	10	25,500	1	0.012
			Age 0-<2	1,090	2.0	1.0		10		1	0.30
			Age 2-<16	572	14	1.0		3		1	0.33
			Age 16-30	261	14	0.73		1		1	0.037
School		All	Age 2-<16	520	7.0	--	250	3		1	0.11
Daycare		All	Age 0-<2	1,090	2.0	--	350	10		1	0.30
			Age 2-<16	572	5.0	--		3		1	0.118
Offsite Worker		All	Age 16-70	230	25	--	250	1		1	0.056

Table 18
Construction and Operational Exposure Parameters
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Notes:

1. Daily breathing rates by receptor type and age bin are consistent with Table 34 of Appendix E of the BAAQMD CEQA Guidelines (2023). Daycare children are modeled using parameters consistent with those of resident children, which conservatively assumes exposure 24 hours a day.
2. Annual exposure duration represents one full year. For all non-linear components, the exposure duration for all years is 1, as the health risk assessment is based on annual emissions. For the construction and operation scenario, residential receptors are assumed to begin the third trimester at the beginning of construction and continue exposure for 30 years after birth; School (K-6) receptor is assumed to be exposed during age 5-12; Daycare receptor is assumed to be exposed during age 0-7. Pre-school receptor is assumed to be exposed during age 2-14. For the construction of linear components, the exposure duration is assumed to be six months, as recommended by OEHHA guidance (2015).
3. Fraction of time spent at home is conservatively assumed to be 1 (i.e., 24 hours/day) for age groups from the third trimester to less than 16 years old based on the recommendation from BAAQMD (2023) and OEHHA (2015). The fraction of time at home for adults age 16-30 reflects default OEHHA guidance (OEHHA 2015) as recommended by BAAQMD (2023).
4. Exposure frequency is consistent with the BAAQMD CEQA Guidelines (2023) and was determined as follows:

   Residents/daycare: reflects default residential exposure frequency from CalEPA.

   School: reflects default residential exposure frequency for 0-2 age bin, consistent with the BAAQMD CEQA Guidelines (2023), and default worker exposure frequency for 2-16 age bin, assuming a child is at the school when the parents are at work.

   Worker: reflects default worker exposure frequency, consistent with the BAAQMD CEQA Guidelines (2023).
5. Age Sensitive Factors account for an "anticipated special sensitivity to carcinogens" of infants and children as recommended in the OEHHA Technical Support Document and current OEHHA guidance. This is consistent with the BAAQMD CEQA Guidelines (2023).
6. Modeling adjustment factors are calculated based on the methodology from OEHHA's Guidance Manual for Preparation of Health Risk Assessments (2015). For construction, the MAF for the school and worker receptors are calculated to adjust from 24 hours/day to 8 hours/day and from 7 days/week to 5 days/week ([24 hours/8 hours] * [7 days/5 days] = 4.2); Resident and daycare receptors are assumed to be exposed 24 hours/day and 7 days/week; as a result, the MAF is 1. Operational sources are expected 24 hours/day and 7 days/week; as a result, the MAF is 1 for all receptors.

Calculation:

IF_{inh} = DBR * FAH * EF * ED * CF / AT

CF = 0.001 (m^3/L)

MAF=$H_{Resident}/H_{Source}*D_{Resident}/D_{Source}*DF$

DF=$H_{Coin}/H_{Worker}*D_{Coin}/D_{Worker}$

Abbreviations:

AT - averaging time
BAAQMD - Bay Area Air Quality Management District
DBR - daily breathing rate
ED - exposure duration
EF - exposure frequency
FAH - fraction of time at home
$H_{Resident}$ - Hours per day of residential exposure (24 hours)
$D_{Resident}$ - Number of days per week that the resident is exposed (7 days)
DF - Discount Factor
H_{Coin} - Hour per day that the receptor's schedule coincides with when the source is emitting(hours)
D_{Worker} - Number of days that the receptor is at the site per week (days)
IF_{inh} - intake factor
kg - kilogram
L - liter
m^3 - cubic meter
OEHHA - Office of Environmental Health Hazard Assessment
MAF_{cancer} - Modeling Adjustment Factor for cancer risk
H_{Source} - Number of hours per day that the source operates (hours)
D_{Source} - Number of days per year that the source operates (days)
H_{Worker} - Hours that the receptor is at the site per day (hours)
D_{Coin} - Number of days per week that receptor's schedule coincides with when the source isemitting (days)

References:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. Available at https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf

BAAQMD. 2023. Air Quality Guidelines Appendix E: Recommended Methods For Screening and Modeling Local Risks and Hazards. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?la=en

Table 19
Toxicity Values
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Chemical[1]	Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$	Chronic REL ($\mu g/m^3$)
Diesel PM	1.1	5.0

Notes:

1. Chemicals presented in this table reflect air toxic contaminants in the proposed fuel types that are expected from off-road equipment and on-road truck trips and the emergency generator operation.

Abbreviations:

$\mu g/m^3$ - micrograms per cubic meter
ARB - [California] Air Resources Board
CalEPA - California Environmental Protection Agency
$(mg/kg\text{-}day)^{-1}$ - per milligram per kilogram-day
OEHHA - Office of Environmental Health Hazard Assessment
PM - particulate matter
REL - reference exposure level

Reference:

CalEPA. 2023. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. October 6.

Table 20a
Martin Substation/Variant - Uncontrolled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and PM2.5 for Receptors outside of San Francisco
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Construction (Project)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	µg/m^3
Martin Substation	1.9	0.0031	0.015
Year	--	2026	2026
UTMx	552096	552236	552236
UTMy	4173294	4173174	4173194
Receptor Type	Residential	Offsite Worker	Offsite Worker

Project Component	Construction (Variant)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	µg/m^3
Variant	13	0.026	0.12
Year	--	2026	2026
UTMx	552096	552236	552236
UTMy	4173294	4173174	4173174
Receptor Type	Residential	Offsite Worker	Offsite Worker

Note:

1. Excess lifetime cancer risks were estimated using the following equation:
   $Risk_{inh} = \Sigma C_i \times CF \times IF_{inh} \times CPF_i \times ASF$
   Where:
   $Risk_{inh}$ = Cancer Risk for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" ug/m^3
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m^3/kg-day)
   CPF_i = Cancer Potency Factor (mg/kg-day)$^{-1}$
   ASF = Age Sensitivity Factor (unitless)
2. Chronic HI for each receptor was estimated using the following equation:
   $HI_{inh} = \Sigma C_i$ / cREL
   Where:
   HI_{inh} = Chronic HI for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" (ug/m^3)
   cREL = Chronic Reference Exposure Level (ug/m^3)

Abbreviations:

HI - Hazard Index
m^3 - cubic meter
µg - microgram
UTM - Universal Transverse Mercator

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 20b
Martin Substation/Variant - Uncontrolled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and PM2.5 for Receptors in San Francisco
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component	Construction (Project)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	$\mu g/m^3$
Martin Substation	0.10	7.4E-05	0.0013
Year	--	2026	2026
UTMx	552380	552460	552400
UTMy	4173640	4173640	4173680
Receptor Type	Residential	Offsite Worker	Residential
In APEZ?	Yes	Yes	Yes

Project Component	Construction (Variant)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	$\mu g/m^3$
Variant	0.65	7.5E-04	0.0051
Year	--	2026	2026
UTMx	552380	552460	552460
UTMy	4173640	4173640	4173640
Receptor Type	Residential	Offsite Worker	Offsite Worker
In APEZ?	Yes	Yes	Yes

Note:

1. Excess lifetime cancer risks were estimated using the following equation:
   $Risk_{inh} = \Sigma C_i \times CF \times IF_{inh} \times CPF_i \times ASF$
   Where:
   $Risk_{inh}$ = Cancer Risk for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" ug/m^3
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m^3/kg-day)
   CPF_i = Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$
   ASF = Age Sensitivity Factor (unitless)
2. Chronic HI for each receptor was estimated using the following equation:
   $HI_{inh} = \Sigma C_i / cREL$
   Where:
   HI_{inh} = Chronic HI for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" (ug/m^3)
   cREL = Chronic Reference Exposure Level (ug/m^3)

Abbreviations:

HI - Hazard Index
m^3 - cubic meter
µg - microgram
UTM - Universal Transverse Mercator

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 21a
Martin Substation/Variant - Controlled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and PM2.5 for Receptors outside of San Francisco
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component[3]	Construction (Project)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	µg/m^3
Martin Substation	0.18	2.9E-04	0.0023
Year	--	2026	2026
UTMx	552096	552236	552236
UTMy	4173294	4173174	4173194
Receptor Type	Residential	Offsite Worker	Offsite Worker

Project Component[3]	Construction (Variant)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	µg/m^3
Variant	1.5	0.0027	0.015
Year	--	2026	2026
UTMx	552096	552236	552236
UTMy	4173294	4173174	4173174
Receptor Type	Residential	Offsite Worker	Offsite Worker

Note:

1. Excess lifetime cancer risks were estimated using the following equation:
   $Risk_{inh} = \Sigma C_i \times CF \times IF_{inh} \times CPF_i \times ASF$
   Where:
   $Risk_{inh}$ = Cancer Risk for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" ug/m^3
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m^3/kg-day)
   CPF_i = Cancer Potency Factor (mg/kg-day)$^{-1}$
   ASF = Age Sensitivity Factor (unitless)
2. Chronic HI for each receptor was estimated using the following equation:
   $HI_{inh} = \Sigma C_i / cREL$
   Where:
   HI_{inh} = Chronic HI for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" (ug/m^3)
   cREL = Chronic Reference Exposure Level (ug/m^3)
3. All off-road diesel equipment is assumed to use Tier 4 Final engines under controlled scenarios.

Abbreviations:

HI - Hazard Index
µg - microgram
m^3 - cubic meter
UTM - Universal Transverse Mercator

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 21b
Martin Substation/Variant - Controlled Maximum Project Excess Lifetime Cancer Risk, Chronic HI and PM2.5 for Receptors in San Francisco
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project Component[3]	Construction (Project)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	µg/m³
Martin Substation	0.014	1.2E-05	0.0010
Year	--	2026	2026
UTMx	552380	552460	552520
UTMy	4173640	4173640	4173800
Receptor Type	Residential	Offsite Worker	Offsite Worker
In APEZ?	Yes	Yes	Yes

Project Component[3]	Construction (Variant)		
	Excess Lifetime Cancer Risk[1]	Chronic HI[2]	$PM_{2.5}$ Concentration
	in a million	Unitless	µg/m³
Variant	0.090	9.5E-05	0.0022
Year	--	2026	2026
UTMx	552380	552460	552400
UTMy	4173640	4173640	4173680
Receptor Type	Residential	Offsite Worker	Residential
In APEZ?	Yes	Yes	Yes

Note:

1. Excess lifetime cancer risks were estimated using the following equation:
   $Risk_{inh} = \Sigma C_i \times CF \times IF_{inh} \times CPF_i \times ASF$
   Where:
   $Risk_{inh}$ = Cancer Risk for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" ug/m³
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m³/kg-day)
   CPF_i = Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$
   ASF = Age Sensitivity Factor (unitless)
2. Chronic HI for each receptor was estimated using the following equation:
   $HI_{inh} = \Sigma C_i / cREL$
   Where:
   HI_{inh} = Chronic HI for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" (ug/m³)
   cREL = Chronic Reference Exposure Level (ug/m³)
3. All off-road diesel equipment is assumed to use Tier 4 Final engines under controlled scenarios.

Abbreviations:

HI - Hazard Index
m³ - cubic meter
µg - microgram
UTM - Universal Transverse Mercator

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 22
Maximum Project Excess Lifetime Cancer Risk, Chronic HI, and PM2.5 from Hypothetical Health Risk Assessments (Linear Components, Rail, and Operations Control Center)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Hypothetical Receptors[1]

Phase	Project Components	Excess Lifetime Cancer Risk[2] in a million		Chronic HI[3] unitless		$PM_{2.5}$ Concentration $\mu g/m^3$	
		Uncontrolled	Controlled (Tier 4 Final)	Uncontrolled	Controlled (Tier 4 Final)	Uncontrolled	Controlled (Tier 4 Final)
Construction	Distribution Express Feeders	7.5	2.7	0.018	0.0065	0.14	0.089
	Local Distribution System Separation	5.4	0.56	0.013	0.0014	0.072	0.019
	System Reinforcements	5.8	1.0	0.014	0.0024	0.085	0.031
	Rail[4]	0.050	0.050	4.1E-05	4.1E-05	1.9E-04	1.9E-04
Operation	Emergency Generator	1.7	1.7	4.6E-04	4.6E-04	0.0023	0.0023
	Employee Vehicle Trips[5]	0.37	0.37	--	--	0.021	0.021

Note:

1. The maximum health risks among all receptor types are reported, where the maximum risks occur in hypothetical receptors with either resident or daycare assumptions.
2. Excess lifetime cancer risks were estimated using the following equation:
   $Risk_{inh} = \Sigma C_i \times CF \times IF_{inh} \times CPF_i \times ASF$
   Where:
   $Risk_{inh}$ = Cancer Risk for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" ug/m^3
   CF = Conversion Factor (mg/ug)
   IF_{inh} = Intake Factor for Inhalation (m^3/kg-day)
   CPF_i = Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$
   ASF = Age Sensitivity Factor (unitless)
3. Chronic HI for each receptor was estimated using the following equation:
   $HI_{inh} = \Sigma C_i / cREL$
   Where:
   HI_{inh} = Chronic HI for the Inhalation Pathway (unitless)
   C_i = Annual Average Air Concentration for Chemical "i" (ug/m^3)
   cREL = Chronic Reference Exposure Level (ug/m^3)
4. As a conservative estimate, heath risks from rail hauling for the Variant's construction are reported. The Variant's construction would generate a larger volume of excavated materials, thus requiring more rail trips and higher emissions compared to Martin Substation construction. The maximum health risks among all receptor types are reported.
5. Operational vehicle trips result from 400 new employees, totaling 800 new vehicle one-way trips per day. Cancer risks and $PM_{2.5}$ concentration from employee vehicle trips calculated following the San Francisco Planning Department Air Quality and Greenhouse Gas Analysis Guidelines, Appendix C: Technical Support Documentation for Development of a Health risk Screening Method for On-Road Vehicular Emissions in City and County of San Francisco. The equation for the correlation between vehicle volumes and health risks specifc to San Francisco is:
   $Risk_i$= Coefficient of Fit x $AADT_j$
   Where:
   i = the health risk impact measured in either cancer risk (one in a million) or annual average PM2.5 concentration (ug/m3)
   j = vehicle category, here passenger vehicles (cars) are assumed for the Project employee vehicles
   95th Percentile Coefficient of Fit for Cancer Risk = 4.64E-04 (Appendix C Table 3.1-C)
   95th Percentile Coefficient of Fit for $PM_{2.5}$ concentration = 2.59E-05 (Appendix C Table 3.2-C)

Abbreviations:

AADT - annual average daily traffic
HI - Hazard Index
m^3 - cubic meter
ug - microgram

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

San Francisco Planning Department. 2024. Air Quality and Greenhouse Gas Analysis Guidelines- Appendix C: Technical Support Documentation for Development of a Health risk Screening Method for On-Road Vehicular Emissions in City and County of San Francisco. July. Available at: https://sfplanning.org/air-quality.

Table 23
Existing Plus Project Health Risks Impacts for MEIs Located in San Francisco (Martin Substation)
SFPUC PG&E Asset Acquisition
San Francisco, CA

Uncontrolled

Source	Risk Assumption	Health Risks (Project)	
		Excess Lifetime Cancer Risk	$PM_{2.5}$ Concentration
		in a million	$\mu g/m^3$
Martin Substation	Estimated	0.10	0.0013
Distribution Express Feeders	Hypothetical Locations of Maximum Impacts	7.5	0.14
Local Distribution System Separation		5.4	0.072
System Reinforcements		5.8	0.085
Rail		0.050	1.9E-04
Emergency Generator		1.7	0.0023
Employee Vehicle Trips[1]		0.37	0.021
Total Project Risk		21	0.33
San Francisco Citywide Background Risk for Martin Substation[2]		59	10
Total Existing + Project / Cumulative Total Risk[3,4]		**80**	**11**

Controlled

Source	Risk Assumption	Health Risks (Project)	
		Excess Lifetime Cancer Risk	$PM_{2.5}$ Concentration
		in a million	$\mu g/m^3$
Martin Substation	Estimated	0.014	0.0010
Distribution Express Feeders	Hypothetical Locations of Maximum Impacts	2.7	0.089
Local Distribution System Separation		0.56	0.019
System Reinforcements		1.0	0.031
Rail		0.050	1.9E-04
Emergency Generator		1.7	0.0023
Employee Vehicle Trips[1]		0.37	0.021
Total Project Risk		6.4	0.16
San Francisco Citywide Background Risk for Martin Substation[2]		59	12
Total Existing + Project Risk / Cumulative Risk [3,4]		**65**	**12**

Notes:

1. Health risks from employee vehicle trips were estimated using San Francisco-specific regressions between vehicle volumes and health risks, as detailed in Table 22. The health risks from employee vehicle trpis are not included for MEIs outside of San Francisco.
2. Background cancer risks and $PM_{2.5}$ concentrations for maximally exposed individuals (MEIs) due to the construction of Martin Substation were obtained from the 2020 San Francisco Citywide HRA database. The background $PM_{2.5}$ concentrations differ between the uncontrolled and controlled scenarios because the $PM_{2.5}$ MEIs in San Francisco for the two scenarios were identified at different locations, as shown in Table 20b and Table 21b.
3. The total existing plus project conservatively combines the cancer risk and $PM_{2.5}$ concentration from all project components. Note the maximum health risks from linear components (Distribution Express Feeders, Local Distribution System Separation, and System Reinforcements), rail, emergency generator, and employee vehicle trips were used in the sum, conservatively assuming that MEIs from each Project component would be located at the same location. In reality, there is little likelihood that all MEIs from different Project components would be co-located.
4. No quantifiable risks from foreseeable future cumulative development sources were identified for this project, as listed in Table 27. Therefore, cumulative health risk impacts are considered the same as the existing plus project health risk impacts.

Abbreviations:

$\mu g/m^3$ - microgram per cubic meter
HI - hazard index
MEIs - maximally exposed individuals
UTM - Universal Transverse Mercator

References:

San Francisco Department of Public Health (SF DPH), San Francisco Planning Department (SF Planning), and Ramboll. 2020. San Francisco Citywide Health Risk Assessment: Technical Support Documentation. September.

Table 24
Existing Plus Project Health Risks Impacts for MEIs Located Outside of San Francisco (Martin Substation)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Uncontrolled

	Health Risks (Project)		
	Excess Lifetime Cancer Risk	**Chronic HI**	**$PM_{2.5}$ Concentration**
	in a million	**Unitless**	**$\mu g/m^3$**
Martin Substation	1.9	0.0031	0.0151
Distribution Express Feeders	7.5	0.018	0.14
Local Distribution System Separation	5.4	0.013	0.072
System Reinforcements	5.8	0.014	0.085
Rail	0.050	4.1E-05	1.9E-04
Total Project Risk	21	0.049	0.32
Background Risks at the Martin Substation MEIs			
Stationary Sources[1]	22	0.13	0
Roadways[2]	13	0.022	0.16
Railways[2]	6.0	0.0021	0.010
Total Existing + Project / Cumulative Risk[3,4]	**62**	**0.20**	**0.48**

Controlled

Project Component	Health Risks (Project)		
	Excess Lifetime Cancer Risk	**Chronic HI**	**$PM_{2.5}$ Concentration**
	in a million	**Unitless**	**$\mu g/m^3$**
Martin Substation	0.18	2.9E-04	0.0023
Distribution Express Feeders	2.7	0.0065	0.089
Local Distribution System Separation	0.56	0.0014	0.019
System Reinforcements	1.0	0.0024	0.031
Rail	0.050	4.1E-05	1.9E-04
Total Project Risk	4.5	0.011	0.14
Background Risks at the Martin Substation MEIs			
Stationary Sources[1]	22	0.13	0
Roadways[2]	13	0.022	0.16
Railways[2]	6.0	0.0021	0.010
Total Existing + Project / Cumulative Risk[3,4]	**45**	**0.17**	**0.31**

Notes:

1. Background health impacts from Stationary Sources at the identified MEIs due to the construction of Martin Substation were estimated using BAAQMD Stationary Source Screening Analysis Tool. Risk values listed are maximum values, not expected values. Results have been adjusted by the BAAQMD-recommended distance multiplier, where relevant.
2. Background health impacts from Roadway and Railway sources were determined using BAAQMD screening tools and are based on the maximum impact of a raster cell located at the identified MEIs due to the construction of Martin Substation.
3. The total existing plus project risk conservatively combines the cancer risk and $PM_{2.5}$ concentration from all project components, except for the emergency generator and the employee vehicle trips at the operations control center. This exclusion is due to the generator being located in southeast San Francisco, over 1,000 feet away from the identified MEIs in San Mateo County. Note the maximum health risks from linear components (Distribution Express Feeders, Local Distribution System Separation, and System Reinforcements) and rail, were used in the sum, conservatively assuming that MEIs from each Project component would be located at the same location. In reality, there is little likelihood that all MEIs from different Project components would be co-located.
4. No quantifiable risks from foreseeable future cumulative development sources were identified for this project, as listed in Table 27. Therefore, cumulative health risk impacts are considered the same as the existing plus project health risk impacts.

Abbreviations:

$\mu g/m^3$ - microgram per cubic meter
HI - hazard index
MEIs - maximally exposed individuals
UTM - Universal Transverse Mercator

Table 24
Existing Plus Project Health Risks Impacts for MEIs Located Outside of San Francisco (Martin Substation)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

References:

Bay Area Air Quality Management District (BAAQMD). 2020. Permitted Sources Risk and Hazards Map. June. Available at: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-Cancer-Risk/kz4a-ueki

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-Chronic-Hazard/sfnx-xg6j

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-PM2-5/r9gy-qwxe

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Cancer-Risk/6eut-z6mm

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Table 25
Existing Plus Project Health Risks Impacts for MEIs Located in San Francisco (Variant)
SFPUC PG&E Asset Acquisition
San Francisco, CA

Uncontrolled

Project Component	Risk Assumption	Health Risks (Variant)	
		Excess Lifetime Cancer Risk[1] in a million	$PM_{2.5}$ Concentration $\mu g/m^3$
Variant	Estimated	0.65	0.0051
Distribution Express Feeders	Hypothetical Locations of Maximum Impacts	7.5	0.14
Local Distribution System Separation		5.4	0.072
System Reinforcements		5.8	0.085
Rail		0.050	1.9E-04
Emergency Generator		1.7	0.0023
Employee Vehicle Trips[1]		0.37	0.021
Total Project Risk		22	0.33
San Francisco Citywide Background Risk for Variant[2]		59	10
Total Existing + Project Risk / Cumulative Risk[3,4]		**81**	**11**

Controlled

Project Component	Risk Assumption	Health Risks (Variant)	
		Excess Lifetime Cancer Risk[1] in a million	$PM_{2.5}$ Concentration $\mu g/m^3$
Variant	Estimated	0.090	0.0022
Distribution Express Feeders	Hypothetical Locations of Maximum Impacts	2.7	0.089
Local Distribution System Separation		0.56	0.019
System Reinforcements		1.0	0.031
Rail		0.050	1.9E-04
Emergency Generator		1.7	0.0023
Employees Vehicle Trips[1]		0.37	0.021
Total Project Risk		6.4	0.16
San Francisco Citywide Background Risk for Variant[2]		59	10
Total Existing + Project Risk / Cumulative Risk[3,4]		**65**	**11**

Notes:

1. Health risks from employee vehicle trips were estimated using San Francisco-specific regressions between vehicle volumes and health risks, as detailed in Table 22. The health risks from employee vehicle trpis are not included for MEIs outside of San Francisco.
2. Background cancer risks and $PM_{2.5}$ concentrations for maximally exposed individuals (MEIs) due to the construction of the Variant (New Substation) were obtained from the 2020 San Francisco Citywide HRA database.
3. The total existing plus project conservatively combines the cancer risk and $PM_{2.5}$ concentration from all project components. Note the maximum health risks from linear components (Distribution Express Feeders, Local Distribution System Separation, and System Reinforcements), rail, emergency generator, and employee vehicles trips, were used in the sum, conservatively assuming that MEIs from each Project component would be located at the same location. In reality, there is little likelihood that all MEIs from different Project components would be co-located.
4. No quantifiable risks from foreseeable future cumulative development sources were identified for this project, as listed in Table 27. Therefore, cumulative health risk impacts are considered the same as the existing plus project health risk impacts.

Abbreviations:

$\mu g/m^3$ - microgram per cubic meter
HI - hazard index
MEIs - maximally exposed individuals
UTM - Universal Transverse Mercator

References:

San Francisco Department of Public Health (SF DPH), San Francisco Planning Department (SF Planning), and Ramboll. 2020. San Francisco Citywide Health Risk Assessment: Technical Support Documentation. September.

Table 26
Existing Plus Project Health Risks Impacts for MEIs Located Outside of San Francisco (Variant)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Uncontrolled

	Health Risks (Variant)		
	Excess Lifetime Cancer Risk[1] in a million	**Chronic HI[2] Unitless**	**$PM_{2.5}$ Concentration $\mu g/m^3$**
Project Variant	13	0.026	0.122
Distribution Express Feeders	7.5	0.018	0.14
Local Distribution System Separation	5.4	0.013	0.072
System Reinforcements	5.8	0.014	0.085
Rail	0.050	4.1E-05	1.9E-04
Total Project Risk	32	0.072	0.42
Background Risks at the Variant MEIs			
Stationary Sources[1]	22	0.13	0
Roadways[2]	13	0.022	0.16
Railways[2]	6.0	0.0021	0.010
Total Existing + Project / Cumulative Risk[3,4]	**73**	**0.23**	**0.59**

Controlled

Project Component	Health Risks (Variant)		
	Excess Lifetime Cancer Risk[1] in a million	**Chronic HI[2] Unitless**	**$PM_{2.5}$ Concentration $\mu g/m^3$**
Project Variant	1.5	0.0027	0.015
Distribution Express Feeders	2.7	0.0065	0.089
Local Distribution System Separation	0.56	0.0014	0.019
System Reinforcements	1.0	0.0024	0.031
Rail	0.050	4.1E-05	1.9E-04
Total Project Risk	5.7	0.013	0.15
Background Risks at the Variant MEIs			
Stationary Sources[1]	22	0.13	0
Roadways[2]	13	0.022	0.16
Railways[2]	6.0	0.0021	0.010
Total Existing + Project / Cumulative Risk[3,4]	**47**	**0.168**	**0.32**

Notes:

1. Background health impacts from Stationary Sources at the identified MEIs due to the construction of the Variant (New Substation) were estimated using BAAQMD Stationary Source Screening Analysis Tool. Risk values listed are maximum values, not expected values. Results have been adjusted by the BAAQMD-recommended distance multiplier, where relevant.
2. Background health impacts from Roadway and Railway sources were determined using BAAQMD screening tools and are based on the maximum impact of a raster cell located at the identified MEIs due to the construction of the Variant (New Substation).
3. The total existing plus project risk conservatively combines the cancer risk and $PM_{2.5}$ concentration from all project components, except for the emergency generator and employee vehicle trips at the operations control center. This exclusion is due to the generator being located in southeast San Francisco, over 1,000 feet away from the identified MEIs in San Mateo County. Note the maximum health risks from linear components (Distribution Express Feeders, Local Distribution System Separation, and System Reinforcements) and rail, were used in the sum, conservatively assuming that MEIs from each Project component would be located at the same location. In reality, there is little likelihood that all MEIs from different Project components would be co-located.
4. No quantifiable risks from foreseeable future cumulative development sources were identified for this project, as listed in Table 27. Therefore, cumulative health risk impacts are considered the same as the existing plus project health risk impacts.

Abbreviations:

$\mu g/m^3$ - microgram per cubic meter
HI - hazard index
MEIs - maximally exposed individuals
UTM - Universal Transverse Mercator

Table 26
Existing Plus Project Health Risks Impacts for MEIs Located Outside of San Francisco (Variant)
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

References:

Bay Area Air Quality Management District (BAAQMD). 2020. Permitted Sources Risk and Hazards Map. June. Available at: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-Cancer-Risk/kz4a-ueki

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-Chronic-Hazard/sfnx-xg6j

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Roadway Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Roadway-Screening-Tool-PM2-5/r9gy-qwxe

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - Cancer Risk. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Cancer-Risk/6eut-z6mm

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - Chronic Hazard. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Bay Area Air Quality Management District (BAAQMD). 2022. CEQA Rail Screening Tool - PM2.5. Available at: https://data.bayareametro.gov/Environment/CEQA-Rail-Screening-Tool-Chronic-Hazard/p57h-bktk

Table 27
Foreseeable Future Projects Overlapping with Linear Components and Operations Control Center
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

Project No.[1]	Project Name	Overlap Geographically with:				Type of Project[4]
		Distribution Express Feeders[2]	Local Distribution System Separation	System Reinforcement	Operations Control Center[3]	
2	Executive Park Subarea Plan – Thomas Mellon Waterfront Residences/150 Executive Park Boulevard				x	Mixed-use: Residential and commercial
3	Harney-101 Transit Crossing Project (San Francisco Municipal Transportation Agency [SFMTA]/ San Francisco and Brisbane)	x		x	x	Transportation infrastructure improvement
4	Brisbane Baylands Specific Plan (Baylands Development Inc./ Brisbane)	x	x	x		Mixed-use: Residential and commercial, educational, park
5	Baylands North, formerly Visitacion Valley Redevelopment Area (Baylands Development Inc./ San Francisco)		x	x		Mixed-use: Residential
6	Transbay Downtown Rail Extension (DTX) Project (Transbay Joint Powers Authority/ Brisbane and San Francisco)			x		Transportation infrastructure improvement
7	PG&E Egbert Switching Station Project (PG&E/ Brisbane and San Francisco)	x	x	x	x	Utility system infrastructure
8	Midway Village Redevelopment (Mid-Pen Housing Coalition/ Daly City)		x		x	Mixed-use: Residential, commercial, educational
10	Sunnydale Hope SF Master Plan (Sunnydale Development Co., LLC, and San Francisco Housing Authority/ San Francisco)	x	x	x	x	Mixed-use: Residential, commercial, educational
11	Pacific Place Retail Conversion (McCall Design Group/ Daly City)	x	x	x	x	Mixed-use: Residential and retail
12	Cormorant Battery Storage Facility (Cormorant Energy. Daly City)	x	x	x		Utility system infrastruture
13	6225 Mission Street Mixed-Use Building (Tom Zhang/ Daly City)		x	x		Mixed-use
20	Vista Grande Drainage Basin Improvement (City of Daly City and SFPUC/ Daly City and San Francisco)		x	x		Drainage basin improvement

Notes

1. Project numbers listed in the table are consistant with Section 3.1.5 of the Draft EIR.
2. Projects are considered overlapped if they fall within a 1000-foot buffer of the Distribution Express Feeders line.
3. Operations Control Center would be at a location in southeast San Francisco.
4. Type of projects is defined based on the descriptions in the CEQA documents provided by Environmental Science Associates (ESA).

FIGURES

San Francisco County Boundary

Modeled Off-Road Diesel Construction Equipment Emissions for the Project

Modeling Extent (1,000 meter buffer area)

Modeled Off-Road Diesel Construction Equipment Emissions for the Variant

Modeled Haul Routes

0 2,500 5,000 Feet

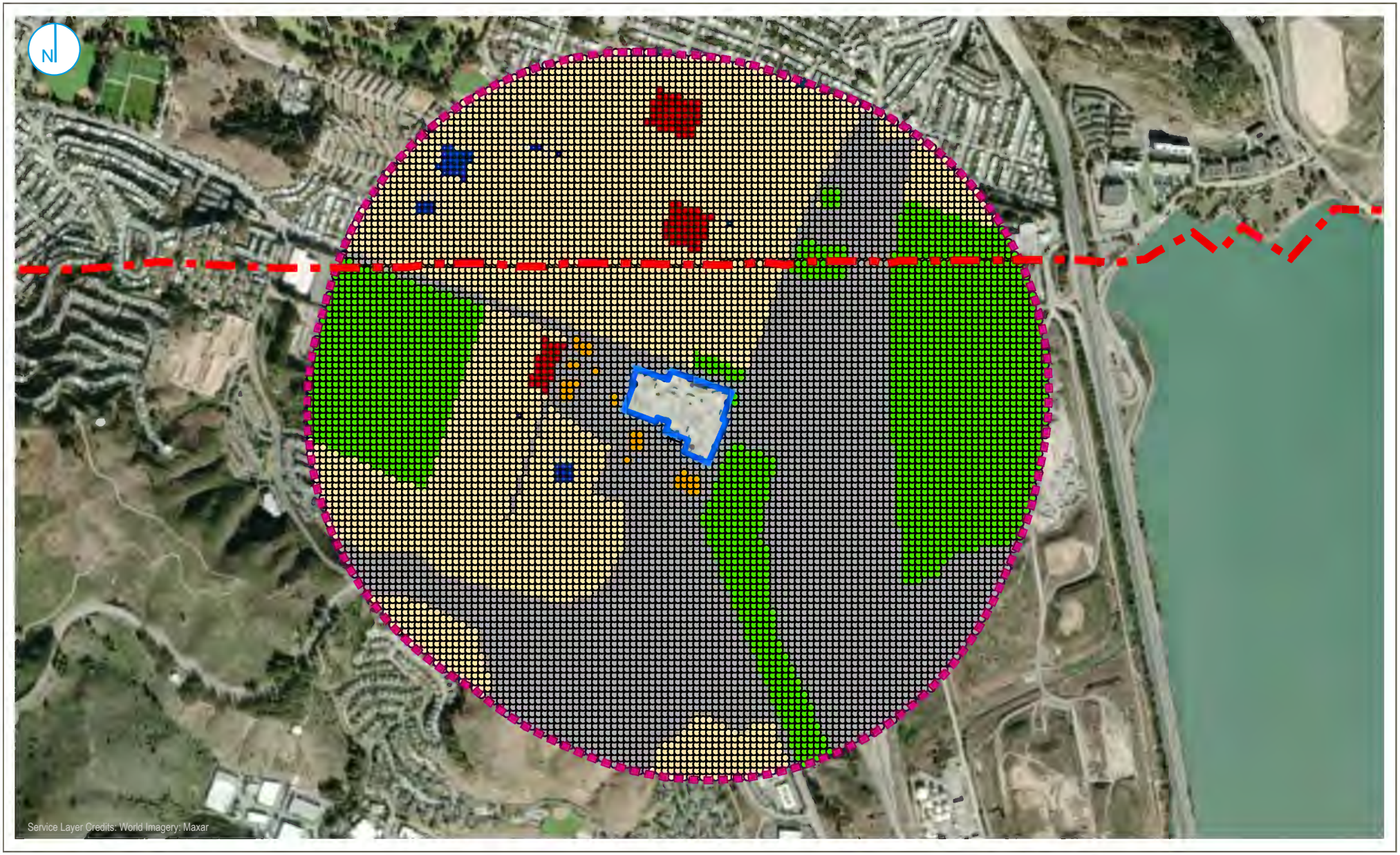
MODELED SOURCES FOR THE MARTIN SUBSTATION AND PROJECT VARIANT COMPONENTS

SFPUC PG&E Power Asset Acquisition
San Francisco, CA

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL



San Francisco County Boundary
Martin Substation Project Boundary
Modeling Extent (1,000 meter buffer area)

Receptor Type
Daycare
Nonsensitive
Offsite Worker
Onsite Worker
Residential
School

0 2,500 5,000 Feet

MODELED RECEPTORS FOR THE MARTIN SUBSTATION AND VARIANT COMPONENTS

SFPUC PG&E Power Asset Acquisition
San Francisco, CA

FIGURE 2

RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

- San Francisco County Boundary
- Martin Substation Project Boundary
- Project and Variant Cancer Risk MEI
- Project and Variant Chronic HI/ PM2.5 MEI
- Project and Variant Cancer Risk MEI (San Francisco)
- Project PM2.5 MEI (San Francisco)
- Project and Variant Chronic HI MEI (San Francisco)
- Variant PM2.5 MEI (San Francisco)

0 1,250 2,500 Feet

MAXIMALLY EXPOSED INDIVIDUAL (MEI) LOCATIONS FOR THE MARTIN SUBSTATION AND VARIANT COMPONENTS

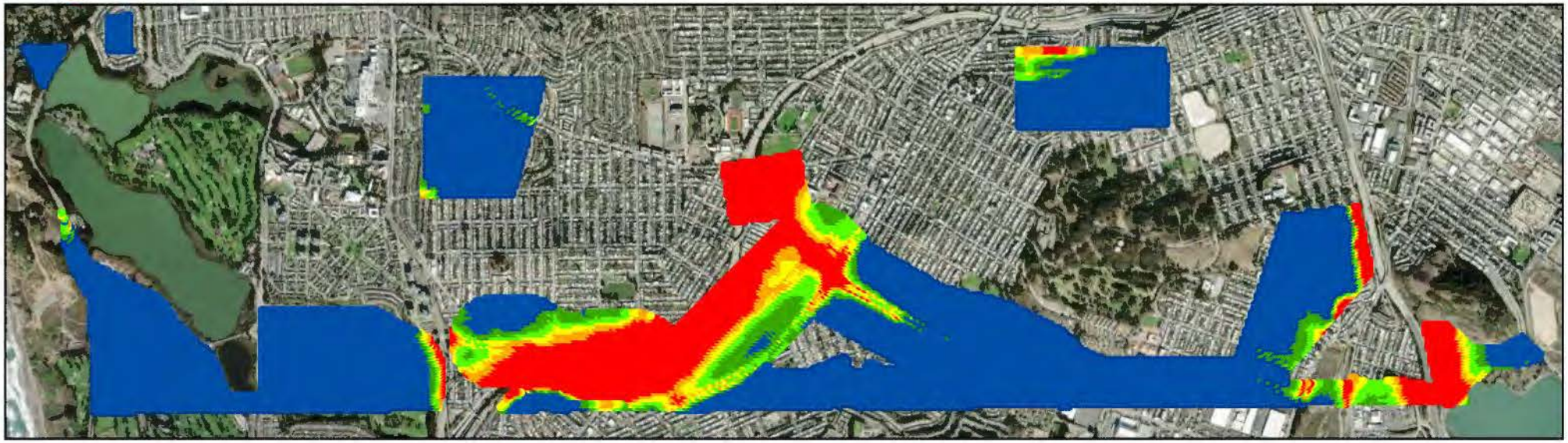
SFPUC PG&E Power Asset Acquisition
San Francisco, CA

FIGURE 3

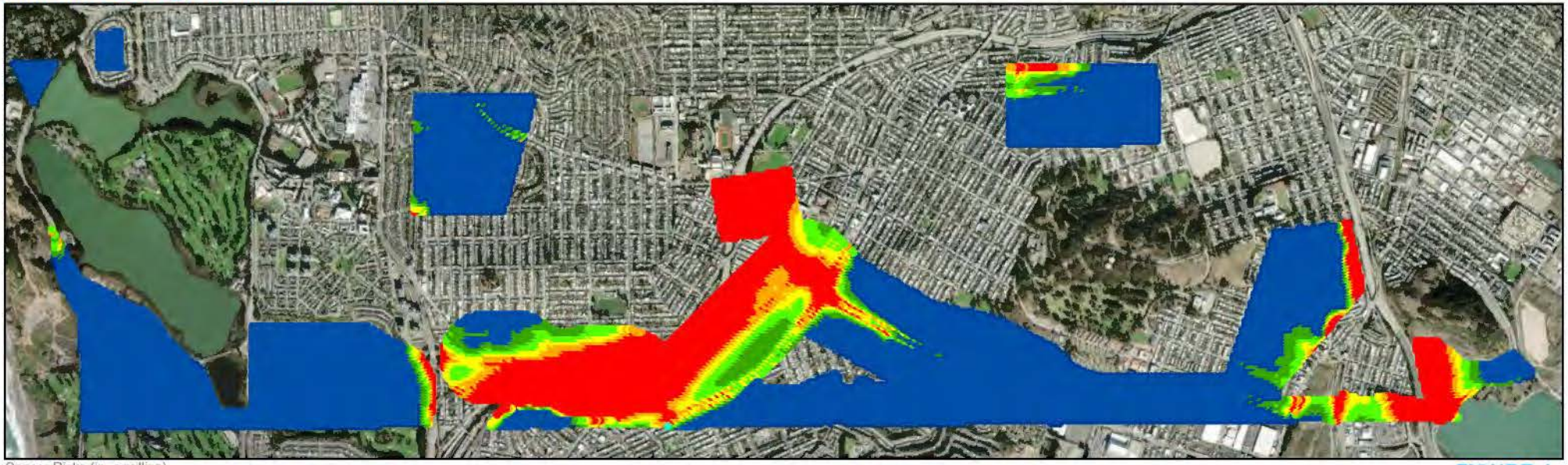
RAMBOLL AMERICAS ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

Existing Cancer Risks



Maximum Existing Plus Project Cancer Risks



Cancer Risks (in a million)

- < 70
- 70 - 79.9
- 80 - 89.9
- 90 - 99.9
- 100 - 109.9
- > 110

CANCER RISKS AT POSSIBLE RECEPTOR LOCATIONS FOR THE LINEAR COMPONENTS AND OPERATIONAL CONTROL CENTER

FIGURE 4a

* Existing cancer risk is derived from the 2020 Citywide HRA database, which only includes health risks within San Francisco.

SFPUC PG&E Power Asset Acquisition
San Francisco, CA

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

Existing $PM_{2.5}$ Concentration

Maximum Existing Plus Project $PM_{2.5}$ Concentration

PM2.5 (µg/m^3)

- < 9
- 9 - 9.9
- 10 - 10.9
- > 11

ANNUAL AVERAGE $PM_{2.5}$ CONCENTRATION AT POSSIBLE RECEPTOR LOCATIONS FOR THE LINEAR COMPONENTS AND OPERATIONAL CONTROL CENTER

FIGURE 4b

* Existing $PM_{2.5}$ Concentration is derived from the 2020 Citywide HRA database, which only includes health risks within San Francisco.

SFPUC PG&E Power Asset Acquisition
San Francisco, CA

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.
A RAMBOLL COMPANY

RAMBOLL

Appendix A
CEQA Air Quality and Health Risk Assessment Methodology

Prepared for
San Francisco Planning Department
San Francisco, California

Prepared by
Ramboll Americas Engineering Solutions, Inc.
San Francisco, California

Project Number
1690031841

Date
November 27, 2024

AIR QUALITY AND HEALTH RISK ASSESSMENT METHODOLOGY

PG&E POWER ASSET ACQUISITION PROJECT SAN FRANCISCO, CALIFORNIA

CASE NO. 2023-005370ENV

RAMBOLL

CONTENTS

1. INTRODUCTION 1
1.1 Project Description 1
1.1.1 Variant 3
1.2 Objective and Methodology Overview 3

2. EMISSIONS ESTIMATION METHODS 6
2.1 Calculation Methodologies for Construction Emissions 6
2.1.1 Off-Road Equipment 6
2.1.2 Construction On-road Mobile Sources 7
2.1.3 Asphalt Paving Off-Gassing 8
2.2 Calculation Methodologies for Operational Emissions 8

3. HEALTH RISK ASSESSMENT 10
3.1 Sources and Chemical Selection 10
3.1.1 Construction Off-road Equipment 10
3.1.2 Construction On-road Mobile Sources 10
3.1.3 Emergency Generator 11
3.2 Estimated Air Concentrations 11
3.2.1 AERMOD Modeling 11
3.2.2 Meteorological Data 11
3.2.3 Terrain and Land Use Considerations 11
3.2.4 Emission Rates 12
3.2.5 Source Parameters 13
3.2.6 Receptors 14
3.3 Risk Characterization Methods 14
3.3.1 Sources Evaluated 15
3.3.2 Exposure Assessment 15
3.3.3 Toxicity Assessment 17
3.4 Risk Characterization 17
3.4.1 Estimation of Cancer Risks 17
3.4.2 Estimation of Project Health Risks by Project Component 18
3.4.3 Estimation of Existing Plus Project Health Risks 18
3.5 Cumulative Health Risks 19
3.5.1 Impacts from Foreseeable Future Projects 19

4. DELIVERABLES 20

5. REFERENCES 21

TABLES

Table 1: Emissions Calculation Methodology
Table 2: Typical Activities for Linear Underground Construction in a Day
Table 3: Rail Emissions Input Assumptions
Table 4: Modeling Parameters
Table 5: Exposure Parameters

ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Air Dispersion Model
APEZ	Air Pollution Exposure Zone
ARB	(California) Air Resources Board
ASF	age sensitivity factor
BAAQMD	Bay Area Air Quality Management District
CalEPA	California Environmental Protection Agency
CalEEMod	California Emissions Estimator Model
CAP	criteria air pollutant
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CPF	cancer potency factor
Citywide HRA	San Francisco Citywide Health Risk Analysis database
DPM	diesel particulate matter
DTSC	California Department of Toxic Substances Control
ECDC	East Carbon Development Corporation
EMFAC	EMission FACtors model
ESA	Environmental Sciences Associates
g/s	gram per second
HHDT	Heavy-Heavy Duty Trucks
HI	Hazard Index
HRA	health risk assessment
LDA	light-duty auto
LDT1	light-duty trucks 1
LDT2	light-duty trucks 2
MAF	modeling adjustment factor
MEI	maximally exposed individual
MHDT	medium-heavy duty trucks
OEHHA	Office of Environmental Health Hazard Assessment
OFFROAD	(ARB) In-Use Off-Road Equipment model
PG&E	Pacific Gas and Electric
Planning Department	San Francisco Planning Department Environmental Planning Division
PM_{10}	fine particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$	fine particulate matter less than 2.5 micrometers in aerodynamic diameter
Ramboll	Ramboll Americas Engineering Solutions, Inc.
ROG	Reactive organic gases
SFBAAB	San Francisco Bay Area Air Basin
SFPUC	San Francisco Public Utilities Commission
TAC	toxic air contaminant
$\mu g/m^3$	microgram per cubic meter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1. INTRODUCTION

At the request of Environmental Sciences Associates (ESA), Ramboll Americas Engineering Solutions, Inc. (Ramboll) will conduct an analysis of criteria air pollutant (CAP) emissions and air quality health risk impacts associated with the implementation of the Pacific Gas and Electric (PG&E) Power Asset Acquisition Project (referred to hereafter as "Project"). This emissions and health risk assessment (HRA) scope of work describes the scope and methodologies for evaluation of the Project and cumulative air quality and health impacts from construction and operational sources. This analysis will be performed to support the Project's California Environmental Quality Act (CEQA) documentation at the request of the San Francisco Planning Department's Environmental Planning Division (Planning Department).

1.1 Project Description

San Francisco Public Utilities Commission (SFPUC) is the Project Sponsor, and the City and County of San Francisco (the "City") is the CEQA lead agency of this Project. SFPUC proposes to purchase PG&E-owned electrical transmission and distribution assets within and near San Francisco that are needed to provide electricity service to customers in San Francisco. In addition to the change in ownership of the power assets, the Project would include physical separations of PG&E's existing electric system into two separate systems, to allow both systems to be operated independently by SFPUC and PG&E. Implementation of the Project would:

1. Allow the City to provide and deliver Hetch Hetchy hydropower, and other clean power, to all San Francisco customers;
2. Improve the cost and efficiency of new electrical grid connections for critical City functions, such as public safety, affordable housing production, transportation, and schools; and
3. Own and manage the City's electric system with transparency and accountability, consistent with a cost-based, not-for-profit business model that will prioritize affordable, cost-effective, reliable, safe, and timely service in the City.

In order to physically separate the acquired power assets from PG&E's remaining electricity grid outside of the City, SFPUC would modify portions of the existing distribution infrastructure, construct new underground distribution feeders, and modify the existing Martin Substation (or construct a new substation, as a Variant, discussed in more detail in **Section 1.1.1**). As outlined in the Figure 2-1 of Chapter 2, Project Description, construction of the Project would occur primarily along the border between the City and County of San Francisco and San Mateo County, and in the City of Daly City, City of Brisbane, and Unincorporated San Mateo County. Construction would take 3 to 5 years after the purchase and transfer of the power assets. The Project components that would involve physical changes to the environment include:

- **Martin Substation Separation:** Martin Substation is an existing outdoor, air-insulated[1] substation located on the borderline of Daly City and the City of Brisbane, where PG&E's high-voltage transmission lines are reduced to lower voltage distribution lines to supply electricity to San Francisco. Construction occurring at this Project component would reconfigure and partition the Martin Substation into two interconnected utility systems. Construction activities are anticipated to include installation of new and relocation of existing transformers, demolition of

[1] Air-insulated substations have all equipment installed outdoors and utilize air as an insulator.

existing structures, installation of new foundation pads, excavation to access existing duct banks[2] for reconnection, construction of new underground duct banks and vaults, and installation of a galvanized fence. The Martin Substation separation would require construction within areas subject to California Department of Toxic Substances Control (DTSC) restrictions due to hazardous substances in soil and groundwater, and thus would require obtaining DTSC approval of a soil management plan and a health and safety plan prior to any excavation. The anticipated excavation associated with the Martin Substation separation is approximately 7,930 cubic yards. Construction of this Project component is anticipated to take approximately 33 months.

- **Distribution Express Feeders:** Approximately 3.8 miles of new underground distribution express feeders from Martin Substation would be constructed to connect Martin Substation and the existing distribution system in San Francisco. The proposed express feeders would be installed in duct banks. Underground construction would be completed using a cut-and-cover method (i.e., trenching) along roadway lanes. Approximately 0.3 miles of the duct bank alignment would be located in Brisbane, approximately 0.5 miles would be in Daly City, and approximately 3 miles would be in San Francisco. The proposed alignment includes segments of Geneva Avenue, Alemany Boulevard/Huron Avenue, Sickles Avenue, Sagamore Street, and Brotherhood Way. Every 400 feet along the trench, the installation of below-grade concrete vaults will require larger excavations, approximately 11 feet wide and 15 feet deep. A detailed construction schedule for the alignment was not determined at the time of preparation of this scope of work. The linear trenching work would proceed at a rate of approximately 40 feet per day with a maximum open trench length of 100 to 400 feet occurring on each city block at a time. Construction of this Project component is anticipated to take approximately 12 months in total.
- **Local Distribution System Separation:** Construction of this Project component would reconfigure and separate overhead and below ground distribution lines around the San Francisco-San Mateo County Border, requiring both overhead and underground construction with trenching activities. Along the San Francisco and San Mateo County border, there would be three major construction areas: Southwest, Central, and Southeast border areas. Construction activities for this Project component would include disconnecting existing line segments, adding or replacing telecommunications and electrical equipment, modifying existing line voltages, and reconnecting line segments to the appropriate utility. The speed of work and maximum open trench length will be the same as the distribution express feeders, as discussed above. Exact locations where construction activities would occur were not determined at the time of preparation of this scope of work. Construction of this Project component is anticipated to take approximately 24 months.
- **System Reinforcements:** This Project component would be implemented to maintain system reliability and the ability to restore power in the event of outages for utilities on either side of the San Francisco-San Mateo County Border. Underground construction activities as well as the speed of work and maximum open trench lengths for system reinforcements would be similar to those for the distribution express feeders and local distribution system separation, as discussed above. At the time of preparing this scope of work, the exact locations of daily construction activities have not been determined. Construction of this Project component is anticipated to take approximately 28 months.

[2] A duct bank is an underground concrete trench designed to protect a series of conduits (polyvinyl chloride [PVC], high-density polyethylene [HDPE]) housing electrical cables.

- **Other separation components:** Other separation components include 1) modifications to retain PG&E access to non-electrical facilities, 2) operations control center, 3) operations and maintenance service yards; materials and equipment storage, and 4) telecommunications equipment. An existing building in the southeastern part of the City will be modified to house the proposed operations control center. Interior modifications for the operations control center, which are expected to take 14 months, would not require any heavy construction equipment. Except for the telecommunications equipment, which would be installed and incorporated into other excavation work (or in certain locations would not require excavation), miscellaneous construction activities involving diesel construction equipment for these project components are not anticipated to last more than two months each.

Operations and maintenance activities subsequent to the completion of Project construction would involve routine inspections, meter readings, periodic testing, and as-needed repairs and replacement, which are similar types of activities that currently occur to maintain the existing PG&E power system. In addition, the operations control center, whose exact location is not known at the time of preparation of this scope of work, would be located in an existing building within the southeastern part of San Francisco and operate a 300-kilowatt emergency diesel generator to serve as emergency backup power for the building. Up to 400 employees may be hired by SFPUC for Project operations and would be based at SFPUC offices, service yards, and the operations control center.

1.1.1 Variant

The Variant of the Project would construct a new, gas-insulated[3] substation instead of reconfiguring the existing Martin Substation. The new substation proposed by the Variant would be at 731 Schwerin Street in the City of Daly City, adjacent to the existing Martin Substation. Construction of the new substation would use the similar equipment as the Martin Substation separation, with the addition of pile drivers for substation building construction. The anticipated excavation associated with the Variant is approximately 34,980 cubic yards.

Construction and operation of the new substation at this location would require construction within areas subject to DTSC restrictions due to hazardous substance in soil and groundwater, and thus would require obtaining DTSC approval of a soil management plan and a health and safety plan prior to any excavation.

New incoming transmission and distribution lines from Martin Substation to the new substation and outgoing transmission and distribution lines from the new substation to the existing system would be constructed. All other Project components would be the same for the Variant. Construction of this Project component is anticipated to take approximately 26 months.

1.2 Objective and Methodology Overview

The purpose of the air quality analysis is to assess potential CAP and health risks and hazards that would result from the implementation of the Proposed Project, consistent with the City's Air Quality and Greenhouse Gas Analysis Guidelines (Planning Department, 2024), as well as the guidelines and methodologies from air quality agencies, specifically, the Bay Area Air Quality Management District

[3] In a gas insulated substation, the equipment uses sulfur hexafluoride (SF_6) gas to insulate the high voltage equipment. SF_6 gas is an inert, non-toxic, and non-combustible gas that is denser than air and used as an insulating medium for electric equipment.

(BAAQMD), the California Air Resources Board (ARB), the California Office of Environmental Health Hazard Assessment (OEHHA), and the US Environmental Protection Agency (USEPA).

The Project is an infrastructure alteration project. Construction activities could occur in four jurisdictions (City and County of San Francisco, Daly City, City of Brisbane, and Unincorporated San Mateo County). At the time of preparation of this scope of work, construction details of the Martin Substation component and the Variant were known. However, daily construction details and exact locations for other Project components were not known, including those for the linear construction work and the interior modifications for an operations control center. Construction on linear components, which includes distribution express feeders, local distribution system separation, and system reinforcements, progresses at a set speed per day per crew, but the exact trenching locations for each construction day are unknown. To capture maximum possible impacts from the Project, Ramboll will evaluate the construction activities using conservative assumptions (designed to produce the maximum possible impacts) for each Project component.

For the purpose of estimating the highest possible average daily CAP emissions, the same construction start date will be assumed for the construction of the Martin Substation (and Variant), distribution express feeders, local distribution system separation, reinforcements, and the other separation components. Underground construction work involving trenching is the highest emitting construction activity that could occur for distribution express feeders, local distribution system separation, and system reinforcement. While some overhead construction activities are required as a part of the construction of local distribution system separation and system reinforcement and would emit less than underground construction work, all construction of the linear components will be conservatively assumed to be completed using the construction equipment needed for underground construction, for the purpose of estimating highest possible average daily emissions. Other Project components with defined construction activities, such as the Martin Substation (and Variant), will be evaluated for construction CAP emissions based on their detailed construction schedule.

For the purpose of estimating health risk impacts of the Project's construction, detailed construction schedules will be used to estimate the emissions of toxic air contaminants (TACs), when available. The construction sources in the HRA will include diesel-powered construction equipment and on-road haul trucks. For Project components whose construction locations and activities were not known at the time of preparation of this scope of work, the underground construction activities will be assumed to estimate TAC emissions conservatively. Health risk impacts from each Project component will be combined to provide the Project health risk impacts where Project components overlap one another geographically. A quantitative HRA will not be performed for the other separation components.[4] This is because construction activities, except for telecommunications equipment installation, are not anticipated to last longer than two months at each of these locations and OEHHA does not recommend assessing cancer risks from projects lasting less than two months. In addition, interior modifications to the operations control center would not require the use of diesel fueled heavy construction equipment and therefore would not generate substantial sources of TAC emissions.

The SFPUC's operations of the Project and the Variant would remain substantially the same as existing operation and maintenance practices by PG&E. However, the new substation under the Variant would

[4] As discussed previously, other separation components consist of 1) modifications to retain PG&E access to non-electrical facilities, 2) operations control center, 3) operations and maintenance service yards; materials and equipment storage, and 4) telecommunications equipment. Note that telecommunications equipment would be installed and incorporated into other excavation work, which will not require a separate quantitative HRA.

include new building operations. For operations of the Project and the Variant, as many as 400 new employees could be potentially hired and would be assigned to various SFPUC locations in San Francisco. Ramboll will quantify the maximum net increase in operational emissions that could result from the implementation of the Project and the Variant. For the HRA, the operational sources for the Project will include a diesel generator and Project-related traffic, such as diesel trucks and passenger vehicles.

Ramboll will identify maximally exposed individual (MEI) receptors among all receptors. There may be multiple locations of MEIs, depending on the health risk end points (cancer risks, non-cancer hazard index, or annual average $PM_{2.5}$ concentration), receptor types, jurisdictions in which each receptor is located, and control scenarios. Ramboll will also conduct an analysis on the existing plus project cancer risk and $PM_{2.5}$ concentrations at these MEI locations. For MEIs identified in San Francisco, this estimate includes the cancer risk and $PM_{2.5}$ concentrations resulting from other sources of stationary, area, and mobile emissions as calculated in the San Francisco Citywide Health Risk Analysis database (Citywide HRA) in addition to health impacts from the Project construction and operation at the MEI receptor. For MEIs located outside of San Francisco, existing health risk information will be based on existing stationary sources, roadway, and rail data available from BAAQMD. For all the MEIs identified, Ramboll will determine the existing health risks at the MEI receptors and add Project impacts to determine the exiting plus project impact. Additionally, Ramboll will conduct a cumulative HRA, which includes existing plus project health risks and potential health risks from reasonably foreseeable future projects within 1,000 ft of the identified MEIs.

This scope of work summarizes methods for estimating the Project's CAP emissions and health risk impacts. This section provides an overview of the Project and a summary of the methodologies. **Section 2** presents the detailed methodologies for estimating CAP emissions. **Section 3** presents the detailed methodologies for the HRA for the existing plus project, and cumulative impacts. **Section 4** presents the deliverables subsequent to the approval of this scope of work. **Section 5** includes a list of references cited in this report.

2. EMISSIONS ESTIMATION METHODS

Ramboll will estimate the CAP and TAC emissions associated with construction of the Project and the Variant. Ramboll will also estimate net operational CAP and TAC emissions of the Project and the Variant. Methodologies to be used to calculate CAP and TAC emissions for all Project components are summarized in **Table 1** and discussed in detail below.

2.1 Calculation Methodologies for Construction Emissions

Construction emissions will be calculated for off-road equipment, on-road vehicles, rail, and off-gassing from asphalt paving.

A detailed construction schedule and equipment list will be developed by SFPUC for selected Project components, which includes the type, quantity, construction schedule and hours of operation anticipated for each piece of equipment for each Project component. Project components that will have construction details are the Martin Substation and other separation components. The Variant will also have construction details.

Linear construction at a speed of 40 feet per day per crew is anticipated for the following linear components: distribution express feeders, local distribution system separations, and system reinforcements. For the local distribution system separations, most of the underground construction with trenching activities will take place in the Southeast border areas, while overhead construction will primarily occur in the Central border areas. Since the exact locations of daily construction activities are not yet determined, and given that underground construction work, such as trenching, has a higher emission impact compared to overhead construction, Ramboll will conservatively assume underground construction activities will occur in all work areas for the local distribution system separations. Similarly, for distribution express feeders and system reinforcements, Ramboll will assume daily underground construction activities for the entire duration of these two Project components. This approach ensures the most conservative estimates for daily average CAP emissions and TAC emission rates. Refinements will be considered if the estimated Project's construction CAP emissions exceed the BAAQMD thresholds due to the conservative assumptions. A typical day of underground construction activities and equipment use is shown in **Table 2**.

Construction schedules and activities will be used to estimate construction emissions using the California Emissions Estimator Model version 2022.1 (CalEEMod) or equivalent methodologies. All diesel-fueled off-road equipment emissions of PM with an aerodynamic diameter less than 10 microns (PM_{10}) will be assumed to be diesel particulate matter (DPM), which is a TAC.

2.1.1 Off-Road Equipment

For diesel-powered off-road construction equipment, Ramboll will use CalEEMod and methodologies consistent with CalEEMod to estimate emissions. The CalEEMod emissions methodology for off-road construction equipment relies on the ARB In-Use Off-Road Equipment model (OFFROAD2017), which incorporates statewide survey data to develop emission factors based on the fleet average for each year of construction.[5] Unless specified, all construction off-road equipment will be assumed to be diesel powered and use fleet-average tier engines. In CalEEMod, construction equipment during a given construction year in the OFFROAD model is a mix of Tier 1, 2, 3 Tier 4 Interim and Tier 4 Final

[5] Although ARB has released an updated model as OFFROAD2021, the newer version does not generate "default" fleet data the way OFFROAD2017 does. As such, OFFROAD2017 is still used in CalEEMod version 2022.1.0. Until ARB updates default fleet mix data, OFFROAD2017 will continue to be used.

engines, based on statewide equipment inventory for that given year. The OFFROAD2017 model also identifies average horsepower and load factor for each type of equipment. Load factors for each piece of equipment will be based on the default load factor in OFFROAD2017, which are included in CalEEMod. The methodology to be used to calculate emissions from off-road equipment is presented in **Table 1**.

Emissions without control measures will be calculated assuming the CalEEMod default fleet averages. Emissions under the controlled scenario will be calculated assuming all off-road diesel construction equipment would be equipped with Tier 4 final engines.

2.1.2 Construction On-road Mobile Sources

On-road mobile sources from Project construction include vehicle trips associated with workers, vendors, and demolition hauling trips.

The emission factors for running emissions of criteria pollutants in CalEEMod are from EMFAC2021, the latest ARB Emission Factors model for on-road emissions. Emission factors vary by vehicle type, fuel type, and calendar year. Consistent with CalEEMod methodology, Ramboll will assume that construction worker trips are 25% Light-Duty Auto (LDA), 50% Light-Duty Truck 1 (LDT1) and 25% LDT2 vehicle classes, vendor trips are 50% diesel Medium-Heavy Duty Trucks (MHDT) and 50% diesel Heavy-Heavy Duty Trucks (HHDT), and haul trips are 100% HHDT. EMFAC2021 incorporates the emission effects from the Pavley Clean Car Standards and the Advanced Clean Cars program.

Exhaust emissions from water trucks will not be calculated using CalEEMod or equivalent methodologies. Water trucks were conservatively assumed to be heavy heavy-duty diesel trucks (HHDT) and emissions were estimated using EMFAC2021.

CalEEMod default methods and parameters were used to calculate the annual average emission factors for fugitive PM_{10} and $PM_{2.5}$ emissions from on-road trucks and passenger vehicles. The weighted average San Francisco-specific silt loading factor was calculated based on travel fraction by roadway category and silt loading parameters, obtained from the CARB's Entrained Road Travel Emission Inventory Source Methodology Document. The average silt loading factor was then used to calculate fugitive roadway PM_{10} and $PM_{2.5}$ emission factors.

Martin Substation or Variant

Some of the excavated materials from construction of the Project components would need to be disposed in a fully permitted hazardous waste facility in compliance with applicable laws and regulations. According to SFPUC, all the excavated materials for the Martin Substation separation and Variant (new substation) are assumed to be hazardous. The amounts of excavated materials to be disposed will be provided by the SFPUC. Since the disposal will either occur at a permitted disposal facility located in Kern County, California, or at the East Carbon Development Corporation (ECDC) Landfill in Utah, two disposal options will be analyzed:

> Option A: Hazardous materials will be hauled by trucks to the nearest class I landfill in Kern County.
>
> Option B: Hazardous materials will be transferred to the Port of San Francisco transfer facility on Cargo Way (at Pier 94) by trucks and then conveyed by rail to the ECDC Landfill in Utah.

With Option A, the hazardous waste will be exported from the Martin Substation or Variant site to Kern County. All haul truck trips hauling hazardous waste will be assumed to be 80 miles each way (160-

mile round trip), the approximate distance to the southern edge of the San Francisco Bay Area Air Basin (SFBAAB).

With Option B, the haul trips are assumed to travel from the Martin Substation or Variant site to the Port of San Francisco transfer facility on Cargo Way (at Pier 94), covering approximately 4.2 miles one way. Then, the hazardous materials will be conveyed by rail to the landfill in Utah, with each one-way export trip consisting of 145 miles of travel to the eastern edge of the SFBAAB. Rail input assumptions are summarized in **Table 3**.

Both options assume a soil import trip of either 20 or 50 miles. For the purposes of this analysis, the import trip of 50 miles will be used as a conservative estimate. The major routes for construction haul trucks accessing the Martin Substation and the Variant would be via Geneva Avenue to Bayshore Boulevard, and then to US 101.

Linear Components and Other Components

According to SFPUC, all the excavated materials from the linear components are assumed to be non-hazardous. The amounts of excavated materials to be disposed in the facilities within the SFBAAB will be provided by the SFPUC. For the purposes of this analysis, Ramboll will also assume that all haul truck trips transporting excavated materials to the disposal site in Livermore would have a one-way export and import trip length of 50 miles.

For estimating TAC emissions for HRA, Ramboll will consider DPM and $PM_{2.5}$ emissions from vendor and hauling trucks, and only $PM_{2.5}$ emissions from worker trips as light-duty passenger vehicles used by construction workers are not anticipated to generate substantial amounts of DPM emissions. Ramboll will exclude exhaust and evaporative emissions of TACs from gasoline worker vehicles because these worker vehicles would not substantially increase annual average daily traffic (AADT) on any roadway segments, as discussed in more details in **Section 3.1.2**.

The methodology used to calculate emissions from on-road sources is presented in **Table 1**.

2.1.3 Asphalt Paving Off-Gassing

Reactive organic gases (ROG) emissions result from the curing of liquid-based asphalt. Consistent with CalEEMod methodologies, ROG emissions will be calculated based on area paved. In the absence of specific information on area paved, Ramboll will conservatively assume the total area disturbed from construction of the linear Project components (distribution express feeders, local distribution system separations, and system reinforcements) to be paved 100% by asphalt. Asphalt paving areas at the Martin Substation and the Variant will be determined based on the site plans.

Because the exact paving locations disturbed from the linear components are not available, this input for estimating asphalt paving off-gassing emissions will be conservatively assumed to be the lengths of the linear components multiplied by the width of trench, which is 11 feet according to Chapter 2, Project Description.

2.2 Calculation Methodologies for Operational Emissions

As discussed in **Section 1.2**, Ramboll will calculate the net (Project minus existing conditions) increase in operational CAP emissions using CalEEMod or equivalent methodologies. It is conservatively assumed that Project operations would only occur after all the Project components complete construction. Annual total and daily average CAP emissions will be reported.

A screening-level HRA will be done for Project-related traffic operations, based on the AADT screening level discussed in **Section 3.1.2**.

The Project would include a 300-kilowatt diesel emergency generator at the operations control center. Operational emissions for the emergency generator will be calculated assuming a maximum of 50 hours per year of operations for routine maintenance testing.

3. HEALTH RISK ASSESSMENT

The air toxics analysis will evaluate health risks and $PM_{2.5}$ concentrations resulting from the Proposed Project. For the Project, this would include construction off-road equipment, construction haul truck trips, and operational traffic and diesel generator emissions. The methodologies used to evaluate emissions from the Project are based on the most recent BAAQMD CEQA Guidelines (BAAQMD 2023), the most recent Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015), and planning department guidance. The same analyses will also be conducted for the Variant.

3.1 Sources and Chemical Selection

The cancer risk analysis in the HRAs is based on DPM concentrations from on- and off-road equipment. Diesel exhaust, a complex mixture that includes hundreds of individual constituents, is identified by the State of California as a known carcinogen (California Environmental Protection Agency [CalEPA] 1998). Under California regulatory guidelines, DPM is used as a surrogate measure of exposure for the mixture of chemicals that make up diesel exhaust. CalEPA and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to use of a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole mixture because the identity of all chemicals in the mixture may not be known and/or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, CalEPA has concluded that "potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multi-pathway cancer risk from the speciated components" (OEHHA 2003).

3.1.1 Construction Off-road Equipment

For HRA purposes, Ramboll will include exhaust DPM and $PM_{2.5}$ emissions from off-road construction equipment. For the linear construction work, given that overhead construction activities require less heavy construction equipment than the underground construction, Ramboll will conservatively estimate the TAC emissions from underground construction for all linear work areas. These estimated TAC emission rates will then be used to evaluate health risk impacts.

For estimating TAC emissions and health risks, the uncontrolled scenario assumes the CalEEMod default fleet average, while the controlled scenario assumes Tier 4 final engines for all off-road diesel construction equipment.

3.1.2 Construction On-road Mobile Sources

On-road mobile sources include vehicle trips associated with workers, vendors, and hauling trips. For HRA purposes, Ramboll will consider DPM and $PM_{2.5}$ emissions from vendor and hauling trucks, and only $PM_{2.5}$ emissions from worker trips. Light-duty passenger vehicles used by construction workers are not anticipated to generate substantial amounts of DPM or other TAC emissions.

Ramboll assumes that exhaust and evaporative TAC emissions from gasoline-fired construction vehicles are negligibly small. Ramboll will demonstrate that quantification of health risk impacts from gasoline vehicles using a health risk screening method based on the City's Air Quality and Greenhouse Gas Analysis Guidelines, Appendix C Technical Support Documentation for Development of a Health Risk Screening Method for On-Road Vehicular Emissions in City and County of San Francisco (Planning Department 2024).

3.1.2.1 Rail Activity

As discussed in **Section 2.1.2**, for Option B excavated materials classified as hazardous waste will be conveyed by rail to the landfill in Utah. Ramboll will conservatively estimate DPM and $PM_{2.5}$ emissions resulting from rail activity along the haul route from Martin Substation or Variant to the edge of SFBAAB. Their associated health risks will be evaluated using a hypothetical screening-level HRA. In the HRA, the maximum health risks over a span of 1,000 feet in either direction (for a total length of 2,000 feet), along the tracks from a hypothetical receptor situated adjacent to the rail tracks will be estimated. This extension of 1,000 feet in either direction is based on the recommended zone of influence with the 1,000-foot radius, as specified by BAAQMD CEQA Guidelines for risk assessments (BAAQMD 2023).

3.1.3 Emergency Generator

DPM and $PM_{2.5}$ emissions from the operational diesel emergency generator will be estimated for HRA purposes.

3.2 Estimated Air Concentrations

As discussed in the next section, concentrations of TACs from the Project construction and operational emissions will be estimated using the USEPA's preferred atmospheric dispersion modeling system (AERMOD).

3.2.1 AERMOD Modeling

Ramboll will use the most recent version of the American Meteorological Society/Environmental Protection Agency regulatory air dispersion model (AERMOD Version 23132) to evaluate ambient air concentrations of TACs and $PM_{2.5}$ at off-site receptors (USEPA 2023). The dispersion modeling is based on only primary air pollutants and includes directly emitted PM and TACs. The dispersion models used do not account for the complex chemical reactions which produce secondary air pollutants in the atmosphere and near-source exposures tend to be driven by primary pollutants, so all emitted compounds are assumed to be nonreactive and secondary pollutants are not considered. For each receptor location, the model estimates air concentrations (or air dispersion factors when unit emissions are modeled) that result from emissions from multiple sources.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological data, topographical data, and receptor parameters. When site-specific information is unknown, Ramboll will use default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations.

3.2.2 Meteorological Data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. For this HRA, the Mission Bay meteorological data for the year 2008 will be used. Both the San Francisco International Airport and Mission Bay meteorological stations present a similar pattern of wind conditions. However, the Mission Bay meteorological station was chosen because it is closer to the Project components, and it aligns with the Citywide HRA.

3.2.3 Terrain and Land Use Considerations

Elevation for all emissions sources will be imported from the National Elevation Dataset maintained by the United States Geological Survey ([USGS] 2013) for the Project components whose exact locations are known.

An important consideration in an air dispersion modeling analysis is whether or not to model an area as urban. Due to the urban nature of San Francisco and San Mateo County, the Project will be modeled with the urban option in AERMOD, which accounts for increased turbulence associated with the urban heat island effect. For the hypothetical receptor detailed in **Section 3.2.5**, the terrain will be assumed flat with the urban option to minimize complexities, ensuring a conservative estimate in assessing health impacts.

3.2.4 Emission Rates

3.2.4.1 Construction Emission Rates

Emissions will be modeled using the χ/Q ("chi over q") method, such that each source has a unit emission rate (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of [µg/m^3]/[g/s]). Actual emission rates will be multiplied by the dispersion factors to obtain concentrations.

For the construction sources, emissions will be modeled to reflect the actual hours of the day that construction activity would occur, based on information from SFPUC. Construction activities during the night are anticipated at the Martin Substation. However, the use of all heavy-duty diesel machinery will only occur during regular construction hours, with the exception of a few small generator sets, each with 14 horsepower, that can operate up to 24 hours a day for dewatering needs. In addition, although the Project site spans several jurisdictions, including the City and County of San Francisco, Brisbane, Daly City, and Unincorporated San Mateo County, construction hours from 7:00 AM to 8:00 PM are assumed for the Project for the purpose of dispersion modeling. This time period will be used as AERMOD EMISFACT and for calculating emission rates from DPM emissions from all equipment, including the generator sets.

For annual average ambient air concentrations over the construction phase, the estimated annual average dispersion factors will be multiplied by the annual average emission rates. The emission rates would vary day to day, with some days having no emissions. To estimate an annual average, the model assumes a constant emission rate during the entire year. Thus, the average emissions rates will be calculated by taking the total mass of emissions and dividing by the hours considered in the model. The equipment would be expected to operate at most 8 hours per day, but this 8-hour period can occur anytime in the operating window of 7:00 AM to 8:00 PM. Because the exact timing of when the equipment would operate is not known, the eight hours of emissions will be averaged over the operating hours of meteorology. While construction using heavy equipment is expected to generally occur Monday through Friday, the emissions will be averaged over 365 days per year as meteorology conditions are not dependent upon day of the week (note this differs from the approach for mass emissions, which will be averaged over 260 workdays per year). Weekends will be included in the meteorology data in order to generate more representative averages.

3.2.4.2 Operational Emission Rates

Emergency generators are assumed to have the potential to be tested at any hour of day; as a result, no variable emission rate factor (AERMOD EMISFACT) will be applied. As the location of the generator is unknown at the time of preparing the scope of work, it is assumed that one emergency generator will be installed at ground level at a hypothetical building location, surrounded by residential receptors located 20 feet away or more from the source. The estimated annual average dispersion factors at the hypothetical receptors within 1,000-foot buffer centered around this location will be modeled using AERMOD, which will likely produce more conservative (worst-case) results.

Emission rates of Project-related traffic will not be included in the model, as they are evaluated in the AADT screening-level health risk assessment described in **Section 3.1.2**.

3.2.5 Source Parameters

Source location and parameters are necessary to model the dispersion of air emissions. According to the BAAQMD CEQA Guidelines (BAAQMD 2023), source parameters for the Project are summarized in **Table 4**.

3.2.5.1 Martin Substation or Variant Construction

For the Proposed Project, on-site construction will occur for reconfiguring the existing Martin Substation site. Area sources will be used to represent the on-site construction activities in AERMOD. The on-site construction area sources will be modeled with the recommended release parameters in the BAAQMD CEQA Guidelines (BAAQMD 2023): a release height of 5 meters and an initial vertical dimension of 1.16 meters. Construction on-road activity will be included with the off-road area sources, to account for the potential for truck travel in any direction.

For the Variant, a new substation at the Daly City Yard will be constructed with new transmission lines. The new substation construction will be modeled as area sources using AERMOD. Construction of the new incoming transmission lines from Martin Substation to the new substation and outgoing distribution lines from the new substation to the existing distribution system will be integrated into the area source.

On-road construction haul trips will be modeled in AERMOD as adjacent volume sources within 1,000 meters of the Project boundary, with the number of sources dependent on the length and width of the roadway segment. For AERMOD modeling, the release height of volume sources for on-road trucks will be set to 3.4 meters, and the initial vertical dimension will be set to 3.16 meters, consistent with the BAAQMD CEQA Guidelines (BAAQMD 2023). Initial lateral dimensions will be calculated for each segment based on the width of the modeled roadway plus a six-meter mixing zone, all divided by a factor of 2.15 consistent with the USEPA AERMOD User's Guide. On-road construction worker trips are negligible and will be excluded from the HRA, based on the AADT screening level described in **Section 3.1.2**.

Rail emissions will be modeled as adjacent volume sources, where rail source parameters were derived from BAAQMD's CEQA guidelines (BAAQMD 2023). Because a range of heights was specified in the BAAQMD's CEQA guidelines, a release height of 5.6 m was selected based on the Roseville Rail Yard Study (CARB 2004). The number of rail sources was based on the geometry of the routes. Rail activity will be modeled assuming activity could occur at any time of the day.

3.2.5.2 Linear Construction

As described in **Section 2.1**, linear construction refers to construction of the distribution express feeders, local distribution system separation, and system reinforcements. Because the exact locations and activities for these Project components are not known at the time of preparation of this methodology document, Ramboll will conservatively estimate the maximum health risk impacts from the linear construction. To capture the maximum health risk on the downwind side, a rectangular area source perpendicular to the predominant wind direction will be used to model emissions from underground construction activities in each construction day in AERMOD. The rectangular area source will have the width of the trenches and its length will be the linear feet of construction activities that can be completed in a day (40 feet per day). The area source will shift in one direction by 40 feet in every subsequent day. 50 such days would occur in the zone of influence, a buffer with 1,000 feet in

radius. Receptors will be placed in the zone of influence. Assuming the construction activities are identical each day, each receptor will be exposed to 2,000 feet of linear construction emissions before construction activities move beyond the 1,000-foot buffer centered at the receptor. The maximum health risks over a span of 1,000 feet in either direction (for a total length of 2,000 feet), along the linear work, are expected to occur at the hypothetical receptor located adjacent to the linear construction area sources and directly downwind from the midpoint of the construction activities. The MEI for the linear construction emissions of 2,000-foot construction will be evaluated assuming the worst-case exposure parameters for a conservative estimate. The construction area sources for the linear activities will be modeled with the same release parameters described above for Martin Substation construction.

On-road haul trips for the linear construction will also be modeled using the hypothetical receptor method mentioned above as adjacent volume sources along a straight line in the zone of influence. All on-road haul trips would travel the entire length of the hypothetical roadway of 2,000 feet. Similar to the Martin Substation truck trips, modeling parameters of the volume sources for on-road trucks will be consistent with the BAAQMD CEQA Guidelines (BAAQMD 2023). On-road construction worker trips are negligible and will be excluded from the HRA.

3.2.5.3 Rail

Because of the extent of the rail line, a hypothetical HRA will also be conducted for rail emissions. Similar to linear construction mentioned above, volume sources representing 2,000 feet of a hypothetical rail line will be modeled in a straight line perpendicular to the predominant wind direction, within a zone of influence with a radius of 1,000 feet. The maximum health risks are also expected to occur at the hypothetical receptor located adjacent to the rail sources and directly downwind from the midpoint of the rail line.

3.2.5.4 Emergency Generator

Following the BAAQMD CEQA Guidelines (BAAQMD 2023), if stack information for the proposed emergency generator is unavailable at the time of the analysis, emergency generator emissions will be modeled in AERMOD as point sources with the source parameters in **Table 4**.

3.2.6 Receptors

For the hypothetical screening-level HRA, in order to evaluate health impacts to receptors for the Project components, hypothetical receptors will be placed within 1,000 feet of the modeled sources. For Martin Substation and the Variant, receptors will be placed within 1,000 meters of the Project to account for receptors in San Francisco. On-site workers within the PG&E property boundary and off-site workers, along with sensitive populations including daycares, schools, hospitals, or residences, will be identified and evaluated in the analysis. Receptors will be modeled at a height of 1.5 meters above terrain height, a default breathing height for ground-floor receptors, with the exception of linear construction modeling, which will model the hypothetical receptors at a height of zero meters from terrain height, to be conservative (BAAQMD 2023). As discussed previously, average annual dispersion factors will be estimated for each receptor location.

3.3 Risk Characterization Methods

BAAQMD has recently released updated CEQA Guidelines, which incorporates the OEHHA Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015). This evaluation will utilize the BAAQMD CEQA Guidelines (BAAQMD 2023) and OEHHA Guidance (2015); details of this methodology are discussed below.

Ramboll will estimate health risk impacts associated with both the Proposed Project and the Variant.

3.3.1 Sources Evaluated

Ramboll will evaluate excess lifetime cancer risk and $PM_{2.5}$ concentration for nearby sensitive receptor exposure to emissions from the construction and operational activities of the Project. The health risks will account for construction and operational sources described in **Section 3.2.5**, above. The HRA will be calculated using the methodology explained in the following sections.

3.3.2 Exposure Assessment

Ramboll will conservatively model all receptor grids (20-meter spacing) within 1,000 feet of the Project.

Potentially Exposed Populations: This analysis will evaluate health risks based on the BAAQMD CEQA Guidelines (BAAQMD 2023).

For assessing impacts to exposed populations from emissions resulting from the Project construction emissions, sensitive receptors will be evaluated as a fetus *in utero* at the beginning of the third trimester at the start of construction until the end of construction.

Exposure Assumptions: The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations from construction emissions will be obtained using the BAAQMD CEQA Guidelines (BAAQMD 2023). **Table 5** shows the exposure duration in each age group, age sensitivity factor (ASF), and resulting exposure parameters that will be used for the HRA. Following OEHHA 2015 Guidance, exposure assumptions for daycare children are assumed consistent with those of resident children, which conservatively assumes exposure 24 hours a day.

The HRA for the linear components would evaluate construction emissions and exposure over 50 workdays along a 2,000-foot hypothetical roadway, with progress at a rate of 40 feet per day, as discussed in **Section 3.2.5.2**. OEHHA's Guidelines recommend that the exposure for projects longer than 2 months but less than 6 months be assumed to last 6 months (OEHHA 2015). Therefore, an exposure duration of 0.5 year will be assumed for the linear components. In addition, the age group with the most conservative exposure assumption will be assumed for the linear components because the analysis period is less than one year. The age group with the highest intake factor is age 0 to 2 years for both residential and daycare receptors.

Calculation of Intake: The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, can be calculated as follows:

$$IF_{inh} = \frac{DBR * FAH * EF * ED * CF}{AT}$$

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
FAH	=	Frequency of Time at Home (unitless)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
CF	=	Conversion Factor, 0.001 (m^3/L)

The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in the BAAQMD CEQA Guidelines (BAAQMD 2023).

3.3.2.1 Age Sensitivity Factors

Consistent with the BAAQMD CEQA Guidelines (BAAQMD 2023), the estimated excess lifetime cancer risks for a resident will be adjusted using ASFs that account for an "anticipated special sensitivity to carcinogens" of infants and children as recommended in the OEHHA 2015 Guidance (OEHHA 2015). Cancer risk estimates will be weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) is applied to ages 16 and older. **Table 5** presents the ASF values that will be used for the HRA.

3.3.2.2 Modeling Adjustment Factor

OEHHA (2015) recommends applying a modeling adjustment factor (MAF) to the annual average concentration modeled assuming continuous emissions (i.e., 24 hours per day, 7 days per week), when the actual emissions are less than 24 hours per day and exposures are concurrent with construction activities occurring at the Project.

The modeled construction impacts will be annualized over seven days per week, 24 hours per day to capture all variations of wind, temperature and other factors that can occur over a year. Because these emissions to which school or workers would be exposed would occur only during business hours or work shifts, the annual average modeled concentration emissions will be multiplied by a factor for those populations. These concentrations represent the theoretical maximum average concentrations over the operating period to which the off-site sensitive receptors might be exposed. The MAF conservatively assumes that all construction emissions are concentrated within the hours when sensitive receptors are present. The BAAQMD's CEQA Guidelines recommend a MAF of 4.2 to be applied for worker and students assuming a standard schedule of 8 hours a day, five days a week. The exposure point concentrations for the sensitive receptors are calculated using the following equation:

$$C_i = C_{i,annual} \times MAF$$

Where:

C	=	Exposure point concentration of chemical i (µg/m^3)
$C_{i,annual}$	=	Annual average concentration of chemical i (µg/m^3)
MAF	=	Modeling adjustment factor (unitless)

MAF is not applicable in cases where the source is continuous, e.g., operations of the proposed emergency generator.

3.3.3 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories – cancer and non-cancer endpoints. Toxicity values that are used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

The carcinogenic effects of DPM will be evaluated in this HRA. Ramboll will utilize the CalEPA-approved (CalEPA 2018) inhalation cancer potency factor for DPM to evaluate DPM emitted from construction sources. The cancer potency factor (CPF) for DPM that will be used for the HRA is 1.1 $(mg/kg\text{-}day)^{-1}$.

3.4 Risk Characterization

3.4.1 Estimation of Cancer Risks

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical-specific CPF.

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF \times ASF$$

Where:

$Risk_{inh}$	=	Cancer risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)
C_i	=	Annual average air concentration for $chemical_i$ (µg/m^3)
CF	=	Conversion factor (mg/µg)
IF_{inh}	=	Intake factor for inhalation (m^3/kg-day)
CPF_i	=	Cancer potency factor for $chemical_i$ (mg chemical/kg body weight-day)$^{-1}$
ASF	=	Age sensitivity factor (unitless)

3.4.2 Estimation of Project Health Risks by Project Component

Results for cancer risk, chronic hazard index (HI), and $PM_{2.5}$ concentrations will be presented for the MEIs, which are the locations where the maximum health impacts are estimated to occur. The maximum health impacts of each Project component will be evaluated. However, the physical locations of the maximum impacts from the construction of the Martin Substation (and its Variant) are the only ones that can be specifically identified. For the MEIs identified in the hypothetical HRAs for the linear components, rail, and the emergency generator, only the relative locations of MEI in relation to the sources will be determined, i.e., the exact physical locations of these MEIs will not be identified.

3.4.3 Estimation of Existing Plus Project Health Risks

For MEIs identified in San Francisco, Ramboll will conduct an existing plus project HRA of cancer risk and $PM_{2.5}$ concentrations at off-site receptors resulting from other existing sources of stationary, area, and mobile emissions as calculated in the Citywide HRA in addition to health impacts from Project construction and operations. Because exact locations and construction schedules of some of the Project components are unknown, Ramboll will not include the analysis to determine whether the APEZ is expanded or not.

3.4.3.1 MEIs for Martin Substation and the Variant

The MEIs identified for Martin Substation and the Variant could overlap geographically with other Project components, such as the distribution express feeders, and be exposed to emissions from these Project components. For a conservative estimate, the maximum health risks resulting from the linear construction, rail, and generator operations may be combined with the MEI risks from exposure to the Martin Substation (or Variant) construction. This combination depends on whether the MEI locations for Martin Substation (or Variant) might overlap with the other Project components. The combined risks from the applicable Project components will be added to the existing risks. Ramboll will use the Citywide HRA database to determine the existing cancer risk and $PM_{2.5}$ concentrations at the identified MEIs in San Francisco and will add Project impacts to determine the existing plus project impact. The Citywide HRA does not report Chronic HI, therefore, existing plus project results will not be calculated for Chronic HI.

If there are also MEIs located outside of San Francisco that are predicted to have higher health risk impacts compared to the MEIs located in San Francisco, Ramboll will also evaluate health risks from existing nearby sources. Ramboll will use the BAAQMD's HRA screening tools to evaluate the health risks from existing permitted stationary sources, roadways, railways and other existing TAC sources within 1,000 feet of the Project boundary.

3.4.3.1 MEIs with Hypothetical Locations

As discussed in **Section 3.4.2**, physical locations of the MEIs will not be available from the HRAs for the following Project components: distribution express feeders, local distribution system separation, system reinforcements, and the proposed emergency generator at the operations control center. Health risk values identified at the MEIs will be assumed for all the receptors within the potential geographical areas of each of these Project components, then added to the existing risks from the

Citywide HRA database.[6] The resulting existing plus Project health risks will be conservative, and the ranges of health risk values will be presented in figures.

3.5 Cumulative Health Risks

The cumulative analysis includes Project impacts added to existing risks and reasonably foreseeable future projects. Existing plus project risks are discussed in **Section 3.4.3**.

3.5.1 Impacts from Foreseeable Future Projects

After identifying potential MEI locations both in and outside of San Francisco, Ramboll will review the list of cumulative projects provided by ESA and determine which of these projects could potentially contribute to cumulative air quality impacts. This analysis will focus on the cumulative air quality impacts related to local risks and hazards; other cumulative air quality impacts regarding air quality plan consistency, criteria air pollutants emissions, and odors will be addressed in the Project's CEQA environmental review documents.

Ramboll will need MEI locations to determine what cumulative projects could occur within 1,000 feet of these receptors. The locations of MEIs impacted by the Martin Substation and the Variant will be determined based on analysis conducted under **Sections 3.1 - 3.4**. Environmental documents for the cumulative projects within 1,000 feet of the MEIs near Martin Substation and the Variant will be reviewed, including but not limited to their project descriptions and health risk assessments, if available. Ramboll will discuss the potential cumulative impacts from each of these projects based on the factors that commonly affects HRAs, including but not limited, the distances between the projects and their MEIs, the relative orientations between the projects in comparison with the prevailing local meteorology, and the timing and extent of the cumulative project's physical impacts to the environment.

As discussed in **Section 3.4.2**, exact locations of MEIs from the hypothetical HRAs will not be identified. Therefore, Ramboll will not provide any quantitative discussions on the cumulative projects that could result in impacts for these linear components and the proposed emergency generator at the operations control center. However, Ramboll will provide a summary of the cumulative projects that could occur in the same location as one or more of these Project components. Ramboll will review the available environmental documents for these cumulative projects and provide a qualitative discussion of the additional health risk impacts that could occur as a result of construction and operation of these cumulative projects.

[6] Geographical areas for each of these Project components are identified in Figure 2-1 of the Project Description. Zone of influence of the Distribution Express Feeders is within 1.000 feet of the work area (i.e., the alignment) and will be used in this analysis.

4. DELIVERABLES

Ramboll anticipates two drafts and one final version of this methodology document to be submitted to the Planning Department. Upon completion of the final methodology document, Ramboll will complete the analysis of the CAP emissions, Project HRA, existing plus project HRA, and cumulative HRA and present the preliminary information to ESA and the Planning Department. Ramboll will meet with the Planning Department and ESA to determine preliminary control scenarios to be applied to the Project. Ramboll will then prepare an air quality technical report consisting of the following:

- Documentation of any additional details or revisions from the approved Air Quality and Health Risk Assessment Methodology and reasons for those additions.
- CAP and HRA results for uncontrolled and controlled scenarios of the Project. This section will include listing the control strategies modeled and the methodology for modeling the effectiveness of the strategies.
- Documentation of assumptions and modeling uncertainties.
- Supporting information, including AERMOD inputs and outputs (electronic).

Ramboll anticipates three drafts and one final version of the air quality technical report to be submitted to the Planning Department.

5. REFERENCES

BAAQMD. 2023. California Environmental Quality Act Guidelines. April. Available online at: https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines

California Air Resources Board (CARB). 2004. Roseville Rail Yard Study. Available online at: https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/rrstudy/rrstudy101404.pdf.

California Environmental Protection Agency (CalEPA), Office of Environmental Health Hazard Assessment (OEHHA). 1998. Findings of the Scientific Review Panel on The Report on Diesel Exhaust, as adopted at the Panel's April 22, 1998, meeting.

CalEPA, OEHHA. 2018. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. May. Available at: https://www.arb.ca.gov/toxics/healthval/contable.pdf.

Office of Environmental Health Hazard Assessment (OEHHA). 2003. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August. Available at: https://oehha.ca.gov/media/downloads/crnr/hrafinalnoapp.pdf

OEHHA. 2015. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August. Available at: http://www.oehha.ca.gov/air/hot_spots/pdf/HRAguidefinal.pdf

San Francisco Department of Public Health (SF DPH), San Francisco Planning Department (SF Planning), and Ramboll. 2020. San Francisco Citywide Health Risk Assessment: Technical Support Documentation. September.

San Francisco Planning Department. 2024. Air Quality and Greenhouse Gas Analysis Guidelines. July. Available at: https://sfplanning.org/air-qualityUnited States Environmental Protection Agency (USEPA). Metabolically Derived Human Ventilation Rates: A Revised Approach Based Upon Oxygen Consumption Rates (Final Report, 2009). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-06/129F, 2009.

USEPA. 2022. User's Guide for the AMS/EPA Regulatory Model (AERMOD). Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. EPA-454/B-23-008, October 2023). Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. EPA-454/B-21-001, April 2021). Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

United States Geological Survey (USGS). 2013. National Elevation Dataset. Available at: http://viewer.nationalmap.gov/viewer/

TABLES

Table 1
Criteria Air Pollutants and Toxic Air Contaminants Emissions Calculation Methodology
PG&E Power Assets Acquisition Project
San Francisco, California

Type	Source	Methodology and Formula	Reference
Construction Equipment	Off-Road Equipment[1]	$Ec = \Sigma(EFc * HP * LF * Hr * C)$	OFFROAD2017 and ARB/USEPA Engine Standards
Construction On-Road Mobile Sources[2]	Exhaust – Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
	Exhaust - Idling	$E_I = \Sigma(EF_I * \text{Trip Number} * T_I * C)$	EMFAC2021
	Brake Wear and Tire Wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
Operational Generator Emissions[3]	Stationary Source	$E_{SS} = EF_{SS} * Hr * C$	--
Net Operational Emissions	Mobile[4]	CalEEMod®	CalEEMod®

Notes:

1. E_C: off-road equipment exhaust emissions (lb)
   EF_C: emission factor (g/hp-hr). CalEEMod 2022.1. default emission factors used
   HP: equipment horsepower from original buidling Type analysis
   LF: equipment load factor. OFFROAD2017
   Hr: equipment hours
   C: unit conversion factor
2. On-road mobile sources include truck and passenger vehicle trips. Emissions associated with mobile sources were calculated using the following formulas.
   E_R: running exhaust and running losses emissions (lb)
   EF_R: running emission factor (g/mile). From EMFAC2021
   VMT: vehicle miles traveled
   C: unit conversion factor

   E_I: idling emissions (lb)
   EF_I: vehicle idling emission factor (g/hr-trip). From EMFAC2021.
   T_I: idling time
   C: unit conversion factor

   $E_{BW, TW}$: brake wear and tire wear emisions (lb)
   $EF_{BW, TW}$: Brake wear and tire wear emission factors (g/mile). From EMFAC2021
3. Operational emissions from the generator were calculated using the following formulas:
   E_{SS}: Stationary Source emissions.
   EF_{SS}: Stationary Source emission factor
   Hr: hours of operation per year (hr)
   C: unit conversion factor
4. Building-related emission sources are assumed to remain the same compared to the existing conditions.

Abbreviations:

ARB: California Air Resources Board
EF: Emission Factor
EMFAC: EMission FACtor Model
g: gram
HP: horsepower
lb: pound
LF: Load Factor
mi: mile
USEPA: United States Environmental Protection Agency
VMT: vehicle miles traveled

References:

ARB/USEPA. 2013. Table 1: ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards. Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls

ARB. 2021. EMission FACtors Model, 2021 (EMFAC2021). Available online at: https://arb.ca.gov/emfac/emissions-inventory

California Air Pollution Control Officers Association. 2023. CALifornia Emissions Estimator MODel (CalEEMod) Version 2022.1. Available online at: https://www.caleemod.com/

Table 2
Typical Activities for Linear Underground Construction in a Day
PG&E Power Assets Acquisition Project
San Francisco, California

Duration[1]	Equipment Type[2]	Fuel	Number	Horsepower[2]	Hours/Day[2]	Utilization Percent[2]
1 Work Day	Tractors/Loaders/Backhoes	Diesel	2	84	8	50%
	Excavators	Diesel	2	36	8	50%
	Plate Compactors	Diesel	2	8	8	50%
	Water Buffalo with pump on trailer	Diesel	2	4	8	100%
	Street Sweeper	Diesel	2	24	8	100%
	Concrete/Industrial Saws	Diesel	2	33	8	10%
	Generator Sets	Diesel	2	14	24	100%
	Air Compressors	Electric	2	37	8	100%
	Roller	Diesel	2	36	8	25%
	Jack Hammer	Electric	2	83	8	100%
	Paver	Diesel	2	81	8	25%
	Cable pulling equipment	Diesel	2	200	8	25%

Notes:

1. The linear speed of underground construction for linear Project components (distribution express feeders, local distribution system separation, and system reinforcements) is assumed to be 40 feet per day per crew.

2. Equipment type, quantities, hours per day, and the utilization percent are provided by San Francisco Public Utilities Commission. Default CalEEMod horsepower will be assumed for equipment whose information is available in CalEEMod.

Table 3
Rail Emissions Input Assumptions
PG&E Power Assets Acquisition Project
San Francisco, California

Parameter	Input	Notes
Line-haul trip length within SFBAAB (miles/one-way)[1]	145	Rail distance to SFBAAB boundary
Locomotives/train	2	Based on previous project experience
Weight of locomotive (tons)	208	General Electric ET44C4
Rail cars/train	50	Based on previous project experience
Weight of empty rail car (tons)[2]	38	Union Pacific small open-top hopper
Total weight of empty train (tons)	2,325	--
Material Exported per Car (tons/railcar)	83	Union Pacific small open-top hopper, lower end of load limit
Material Exported by Rail (tons)[3]	To be determined	Based on information from SFPUC

Notes:

1. The final destination for soil disposal by train is the ECDC landfill in Utah. Trains are conservatively assumed to travel south from the rail loading terminal at Pier 94 in San Francisco, passing through San Jose and Oakland stations, then towards Sacramento, based on the Union Pacific Service Unit and Regions Map. Emissions are calculated for the round-trip distance to the edge of SFBAAB.
2. The average weight of the empty train is calculated using the gross weight range on rail and the load limit range of the Union Pacific small open-top hopper.
3. Material exported by rail will be provided by SFPUC in the form of total curbic yards and will determine the number of trains required to export the materials.

Abbreviations:

SFBAAB - San Francisco Bay Area Air Basin
SFPUC - San Francisco Public Utilities Commission

References:

Union Pacific Service Unit and Regions Map. https://www.up.com/cs/groups/public/@uprr/@corprel/documents/digitalmedia/img_up_svc-unit-regions.png

GE Transportation. 2016. "Full Locomotive Product Portfolio". Available at: https://issuu.com/getransportation/docs/ge-locomotive-product-catalog-2016

Union Pacific. "Open-Top Hoppers". Available at: https://www.up.com/customers/all/equipment/descriptions/open-top_hoppers/index.htm

Table 4
Modeling Parameters
PG&E Power Assets Acquisition Project
San Francisco, California

Construction Sources

Source	Source Type[1]	Number of Sources[2]	Source Dimension	Release Height[3,4]	Initial Vertical Dimension[5]	Initial Lateral Dimension[6]
			[m]	[m]	[m]	[m]
Off-Road Construction Equipment - Martin Substation and Variant	Area	2	Project Component Area	5.0	1.16	--
Off-Road Construction Equipment - Linear Construction[7]	Area	50	3.4 m width x 12.2 m length	5.0	1.16	--
Haul Trucks for Martin Substation and Variant	Volume	73	33.0	3.4	3.16	15.3
Haul Trucks for Linear Work[8]	Volume	45	13.9	3.4	3.16	6.47
Rail Line	Volume	57	--	5.6	3.78	5.12

Operational Sources

Source[9]	Source Type	Number of Sources	Stack Height	Stack Velocity	Exit Diameter	Stack Temperature
			[m]	[m/s]	[m]	K
Generators	Point	1	3.66	45.3	0.183	739.8

Notes:

1. Construction off-road equipment will be modeled as an area source covering the area under construction. The number of sources will depend on the site geometry and construction phases. This information will be provided by the Project Sponsor.
2. Off-road equipment for construction of the Substation and the Variant will be modeled as two sources. The number of on-road sources is based on the geometry of the truck or traffic routes.
3. Release height of a modeled area source representing construction equipment will be set to 5 meters, consistent with SCAQMD LST Guidance. Based on USEPA's AERMOD guidance, initial lateral and vertical dimensions were determined by dividing the side length by 4.3.
4. Parameters for on-road haul truck volume sources are based on the BAAQMD's CEQA Guidelines. Rail source parameters were derived from BAAQMD's CEQA guidelines. Because a range of heights was specified in the guidance, a release height of 5.6 m was selected based on the Roseville Rail Yard Study (CARB, 2004).
5. Initial vertical dimension of construction equipment exhaust area source is based on the BAAQMD's CEQA Guidelines the vertical dimension of an elevated source divided by 4.3). Release height and initial vertical dimension of on-road haul trucks are also based on the 2023 BAAQMD's CEQA Guidelines for trucks' parameters.
6. Initial lateral dimension is based on the width of plume divided by 2.15 according to the BAAQMD's CEQA Guidelines.
7. The area source dimension of linear construction is based on the daily trenching work speed of 40 ft and the trench width of 11 ft.
8. As the exact locations of daily trenching construction activities are not yet determined, the trenching work can occur in various locations for linear components: distribution express feeders, local distribution system separations, and system reinforcements. For the purpose of analysis, the road width for trenching work is conservatively assumed to be 26 feet, which is the minimum roadway width in San Francisco (San Francisco Public Works).
9. The stack parameters of emergency generator for the operations control center were obatined from Table 10 of BAAQMD's CEQA Guidelines Appendix E.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CARB - California Air Resources Board
m - meter

References:

Bay Area Air Quality Management District (BAAQMD). 2023. California Environmental Quality Act (CEQA) Air Quality Guidelines, Appendix E. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?la=en.

California Air Resources Board (CARB). 2004. Roseville Rail Yard Study. Available online at: https://ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/rrstudy/rrstudy101404.pdf

San Francisco Public Works. Minimum Infrastructure and Roadway Requirements. Available online at: https://sfpublicworks.org/services/acceptance.

South Coast Air Quality Management District. 2008. Final Localized Significance Threshold Methodology. July. Available at: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

USEPA. 2022. User's Guide for the AMS/EPA Regulatory Model (AERMOD). Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. EPA-454/B-22-007, June 2022). Available at: https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf

Table 5
Exposure Parameters
PG&E Power Assets Acquisition Project
San Francisco, California

Population	Receptor Age Group	Exposure Parameters						
		Daily Breathing Rate (DBR)[1]	Duration in Age Group (ED)[2]	Fraction of Time at Home (FAH)[3]	Exposure Frequency (EF)[4]	Averaging Time (AT)	Intake Factor, Inhalation (IF_{inh})[5]	Age Sensitivity Factor (ASF)[6]
		[L/kg-day]	[years]	[unitless]	[days/year]	[days]	[m^3/kg-day]	--
Residents	3rd Trimester	361	0.25	1.0	350	25,550	0.0012	10
	Age 0-<2 Years	1,090	2.0	1.0	350	25,550	0.030	10
	Age 2-<16 Years	572	14	1.0	350	25,550	0.11	3
	Age 16-30 Years	261	14	0.73	350	25,550	0.037	1
Worker	Age 16- 70 Years	230	25	--	250	25,550	0.056	1
School	Age 0-<2 Years	1,090	2.0	--	250	25,550	0.021	10
	Age 2-<16 Years	520	14	--	250	25,550	0.071	3
Daycare[7]	Age 0-<2 Years	1,090	2.0	--	350	25,550	0.030	10
	Age 2-<16 Years	572	14	--	350	25,550	0.11	3

Notes:

1. Daily breathing rates reflect default breathing rates from BAAQMD's CEQA Guidelines as follows: 95th percentile 24-hour daily breathing rate for 3rd trimester and age 0-<2 years; 80th percentile for ages 2 years and older.
2. Duration in age group reflects the maximum exposure duration of each receptor types, consistent with the BAAQMD's CEQA Guidelines (2023). Project's emissions may not extend to the entire durations noted here.
3. Fraction of time spent at home is conservatively assumed to be 1 (i.e., 24 hours/day) for age groups from the third trimester to less than 16 years old based on the recommendation from BAAQMD.
4. Exposure frequency reflects maximum exposure frequency recommended by BAAQMD's 2022 CEQA Guidelines. Student/Daycare receptors may have lower exposure frequency based on the facility's operating schedule.
5. Intake factor does not include ASFs or modelling adjustment factor for intermittent exposure for worker and student receptors.
6. Based on OEHHA 2015, age sensitivity factors (ASFs) are unitless.
7. Daycare children are modeled using parameters consistent with those of resident children, which conservatively assumes exposure 24 hours a day.

Calculation:

IF_{inh} = DBR * FAH * EF * ED * CF / AT

CF = 0.001 (m^3/L)

Abbreviations:

AT - averaging time
BAAQMD - Bay Area Air Quality Management District
DBR - daily breathing rate
ED - exposure duration
EF - exposure frequency
ASF - Age sensitivity factor
IF_{inh} - intake factor
kg - kilogram
L - liter
m^3 - cubic meter
OEHHA - Office of Environmental Health Hazard Assessment

References:

Bay Area Air Quality Management District (BAAQMD). 2023. California Environmental Quality Act (CEQA) Air Quality Guidelines, Appendix E. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?la=en.

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

RAMBOLL

Appendix B
Relevant Pages of CalEEMod2022 Outputs for Operational Mobile Sources

SFPUC_PGE Custom Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

1.2. Land Use Types

2. Emissions Summary

2.5. Operations Emissions by Sector, Unmitigated

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	SFPUC_PGE
Operational Year	2028
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.60
Precipitation (days)	18.8
Location	37.71020292370514, -122.49293634997107
County	San Francisco
City	San Francisco
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1140
EDFZ	1
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.24

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
General Light Industry	1.00	1000sqft	0.02	1,000	0.00	—	—	—

2. Emissions Summary

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.26	2.90	2.06	26.7	0.06	0.04	5.83	5.87	0.04	1.48	1.52	—	6,420	6,420	0.33	0.25	16.7	6,519
Area	0.03	0.03	< 0.005	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.18	0.18	< 0.005	< 0.005	—	0.18
Energy	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	20.1	20.1	< 0.005	< 0.005	—	20.2
Water	—	—	—	—	—	—	—	—	—	—	—	0.44	0.84	1.28	0.05	< 0.005	—	2.75
Waste	—	—	—	—	—	—	—	—	—	—	—	0.67	0.00	0.67	0.07	0.00	—	2.34
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.26	0.26
Total	3.30	2.93	2.07	26.8	0.06	0.04	5.83	5.87	0.04	1.48	1.52	1.11	6,441	6,442	0.44	0.25	17.0	6,545
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.24	2.87	2.39	25.8	0.06	0.04	5.83	5.87	0.04	1.48	1.52	—	6,146	6,146	0.35	0.27	0.43	6,236
Area	0.02	0.02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	20.1	20.1	< 0.005	< 0.005	—	20.2
Water	—	—	—	—	—	—	—	—	—	—	—	0.44	0.84	1.28	0.05	< 0.005	—	2.75
Waste	—	—	—	—	—	—	—	—	—	—	—	0.67	0.00	0.67	0.07	0.00	—	2.34
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.26	0.26
Total	3.26	2.89	2.40	25.8	0.06	0.04	5.83	5.87	0.04	1.48	1.52	1.11	6,167	6,168	0.47	0.27	0.69	6,262
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.19	2.83	2.28	25.1	0.06	0.04	5.76	5.80	0.04	1.47	1.50	—	6,154	6,154	0.34	0.26	7.23	6,249
Area	0.03	0.03	< 0.005	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.09	0.09	< 0.005	< 0.005	—	0.09

Energy	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	20.1	20.1	< 0.005	< 0.005	—	20.2
Water	—	—	—	—	—	—	—	—	—	—	—	0.44	0.84	1.28	0.05	< 0.005	—	2.75
Waste	—	—	—	—	—	—	—	—	—	—	—	0.67	0.00	0.67	0.07	0.00	—	2.34
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.26	0.26
Total	3.22	2.85	2.29	25.1	0.06	0.04	5.76	5.80	0.04	1.47	1.50	1.11	6,175	6,176	0.46	0.27	7.49	6,274
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.58	0.52	0.42	4.57	0.01	0.01	1.05	1.06	0.01	0.27	0.27	—	1,019	1,019	0.06	0.04	1.20	1,035
Area	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.01	0.01	< 0.005	< 0.005	—	0.01
Energy	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.33	3.33	< 0.005	< 0.005	—	3.35
Water	—	—	—	—	—	—	—	—	—	—	—	0.07	0.14	0.21	0.01	< 0.005	—	0.45
Waste	—	—	—	—	—	—	—	—	—	—	—	0.11	0.00	0.11	0.01	0.00	—	0.39
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.04	0.04
Total	0.59	0.52	0.42	4.58	0.01	0.01	1.05	1.06	0.01	0.27	0.27	0.18	1,022	1,023	0.08	0.04	1.24	1,039

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	3.26	2.90	2.06	26.7	0.06	0.04	5.83	5.87	0.04	1.48	1.52	—	6,420	6,420	0.33	0.25	16.7	6,519
Total	3.26	2.90	2.06	26.7	0.06	0.04	5.83	5.87	0.04	1.48	1.52	—	6,420	6,420	0.33	0.25	16.7	6,519

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	3.24	2.87	2.39	25.8	0.06	0.04	5.83	5.87	0.04	1.48	1.52	—	6,146	6,146	0.35	0.27	0.43	6,236
Total	3.24	2.87	2.39	25.8	0.06	0.04	5.83	5.87	0.04	1.48	1.52	—	6,146	6,146	0.35	0.27	0.43	6,236
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.58	0.52	0.42	4.57	0.01	0.01	1.05	1.06	0.01	0.27	0.27	—	1,019	1,019	0.06	0.04	1.20	1,035
Total	0.58	0.52	0.42	4.57	0.01	0.01	1.05	1.06	0.01	0.27	0.27	—	1,019	1,019	0.06	0.04	1.20	1,035

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
General Light Industry	800	800	800	292,000	8,202	8,202	8,202	2,993,585

Appendix C
AERMOD Outputs (Submitted Electronically)

Appendix D
BAAQMD's Confirmed Stationary Sources

From: BAAQMD CEQA
To: Public Records; BAAQMD CEQA
Subject: RE: Public Records Number 2024-04-0099 - Stationary Source Request
Date: Friday, May 10, 2024 2:28:01 PM

Hello Amy,

We are confirming the health risks of the attached file you submitted is the most up to date information and can be used for further analysis for air pollution impacts.

Thank you,

BAAQMD CEQA Team
ceqa@baaqmd.gov

@Public Records – this completes this request.

From: Amy Chen <ACHEN@ramboll.com>
Sent: Friday, April 12, 2024 1:03 PM
To: Public Records <PublicRecords@baaqmd.gov>
Subject: Public Records Number 2024-04-0099 - Stationary Source Request

CAUTION: This email originated from outside of the BAAQMD network. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi,

I would like to submit this public records request for stationary sources near a project in Brisbane city. As stated in the request form, could you please:
1. Verify the health risks of the attached sources are up-to-date and can be used in a cumulative health risk assessment with the most recent Health Risk Calculator with Distance Multiplier.
2. Provide permits or health risk details of new emission sources that are not included in the attached, if any.

Please inform me if you require any further information.

Thank you,
Amy

Amy Chen

Consultant

M 310-689-8304

achen@ramboll.com

Ramboll

1111 Broadway
Suite 1400
Oakland, CA 94607
USA

https://ramboll.com

Classification: Confidential

Screening Report

Area of Interest (AOI) Information

Area : 10,174,978.83 ft²

Apr 12 2024 12:42:20 Pacific Daylight Time

Summary

Name	Count	Area(ft²)	Length(ft)
Permitted Stationary Sources	8	N/A	N/A

Permitted Stationary Sources

#	Facility_I	Facility_N	Address	City	State
1	14159	Pacific Gas and Electric	3004 Geneva Avenue	Daly City	CA
2	17020	Tiger's Autobody & Paint	23 Industrial Way	Brisbane	CA
3	17835	Pacific Gas & Electric Company - Martin Substation	3150 Geneva Avenue	Brisbane	CA
4	23129	Bayshore Sanitary District	36 Industrial Way	Brisbane	CA
5	102818	Seven Eleven #19235	2700 Bayshore Blvd	Daly City	CA
6	110024	Chevron Bayshore	2690 Bayshore Blvd	Daly City	CA
7	200304	Giannini's Auto Body Shop	460 TALBERT ST	Daly City	CA
8	0	Pacific Gas and Electric	3004 Geneva Avenue	Daly City	CA

#	Zip	County	Latitude	Longitude	Details
1	94014	San Mateo	37.706288	-122.412956	*No Data*
2	94005	San Mateo	37.700976	-122.407929	*No Data*
3	94005	San Mateo	37.705402	-122.409730	Generator
4	94005	San Mateo	37.700370	-122.407773	Generator
5	94014	San Mateo	37.705101	-122.407220	Gas Dispensing Facility
6	94014	San Mateo	37.705685	-122.406864	Gas Dispensing Facility
7	94014	San Mateo	37.706177	-122.408664	*No Data*
8	94014	San Mateo	37.706288	-122.412956	Gas Dispensing Facility

#	NAICS	NAICS_Sect	NAICS_Subs	NAICS_Indu	Cancer_Ris
1	221112	Utilities	Utilities	Fossil Fuel Electric Power Generation	0.021000
2	811121	Other Services (except Public Administration)	Repair and Maintenance	Automotive Body, Paint, and Interior Repair and Maintenance	0.000000
3	238210	Construction	Specialty Trade Contractors	Electrical Contractors and Other Wiring Installation Contractors	0.135000
4	221320	Utilities	Utilities	Sewage Treatment Facilities	4.213000
5	447110	Retail Trade	Gasoline Stations	Gasoline Stations with Convenience Stores	27.582000
6	447110	Retail Trade	Gasoline Stations	Gasoline Stations with Convenience Stores	44.681000
7	811121	Other Services (except Public Administration)	Repair and Maintenance	Automotive Body, Paint, and Interior Repair and Maintenance	0.000000
8	221112	Utilities	Utilities	Fossil Fuel Electric Power Generation	1.962000

#	Chronic_Ha	PM25	Count
1	0.000000	0.000000	1
2	0.004000	0.000000	1
3	0.000000	0.000000	1
4	0.002000	0.006000	1
5	0.120000	0.000000	1
6	0.194000	0.000000	1
7	0.003000	0.000000	1
8	0.009000	0.000000	1

NOTE: A larger buffer than 1000 feet may be warranted depending on proximity to significant sources.

APPENDIX G
TRANSPORTATION AND CIRCULATION SUPPORTING DOCUMENTATION

G.1 PG&E Power Asset Acquisition EIR Project Travel Demand Summary

G.2 PG&E Power Asset Acquisition EIR Comparison of Peak Hour Volumes and Capacities during Construction of Distribution Express Feeders

PAGE INTENTIONALLY BLANK

Adavant Consulting

Memorandum

To: Karen Lancelle – Environmental Science Associates

From: José I. Farrán – Adavant Consulting

Date: July 23, 2024 **Final Version**

Re: PG&E Power Asset Acquisition EIR – Case No. 2023-005370ENV
Project Travel Demand Summary

This memorandum summarizes the assumptions and methodology used to develop the travel demand for the proposed purchase by the City and County of San Francisco of Pacific Gas and Electric Company (PG&E)-owned electrical transmission and distribution assets located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within the City. The City would also carry out other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco.

The analysis presents the estimate of project-generated person and vehicle trips that would travel to and from the various project sites associated with this proposal during construction and operation of the proposed project.

The travel demand analysis presented in this document is based, as applicable, on standard methodology and practices used in the evaluation of transportation impacts as part of environmental review in San Francisco, which are described in detail in the *Transportation Impact Analysis Guidelines for Environmental Review* (SF Guidelines)[1] prepared by the San Francisco Planning Department (department). Travel demand for project construction is not included in the SF Guidelines. To estimate travel demand due to project construction the travel demand analysis relies on the methodology and assumptions utilized in the California Environmental Quality Act (CEQA) analysis of the San Francisco Public Utilities Commission's (SFPUC) Southeast Plant Biosolids Digester Facilities Project (BDFP FEIR),[2] a previous large infrastructure construction project in the general vicinity of the project sites. Specifically, truck trip generation rates, the a.m. and p.m. peak hour percentages of

---

1 San Francisco Planning Department, *Transportation Impact Analysis Guidelines*, October 2019. Referred to in this memorandum as SF Guidelines.

2 San Francisco Planning Department, *Biosolids Digester Facilities Project EIR*. Case Number 2015-000644ENV; Final EIR Certification: March 8, 2018. Referred to in this memorandum as BDFP EIR.

the daily trips[3], truck origins and destinations, and other relevant travel demand methodology developed for the transportation evaluation in the BDFP EIR were also applied to this analysis. Other assumptions used in the travel demand analysis, such as mode of travel by project employees (construction workers and project operations-related commuters) and their trip origins and destinations, were obtained from the SF Guidelines with adjustments to account for the areas where the proposed project sites are located. Furthermore, since the SF Guidelines do not include data for the analysis of the a.m. peak hour, the appropriate trip generation rates for the a.m. peak hour were also derived from transportation information presented in the BDFP EIR, as well as professional judgment.

PROJECT DESCRIPTION

The proposed project includes several components to be built or modified as part of the project. Some of the assets proposed to be acquired would be physically separated from PG&E's electricity grid near the San Francisco and San Mateo County border. To separate these assets, the City would modify portions of PG&E's existing transmission and distribution infrastructure, reconnect the terminals of some of the existing transmission lines at/near Martin Substation[4] at the intersection of Geneva Avenue and Bayshore Boulevard in Brisbane, construct new overhead and underground distribution lines, and modify the existing Martin Substation (or, as part of a project variant, construct a new adjacent substation).

Implementation of the proposed project would require reconfiguration or construction of the following project components (a detailed description of each component can be found in the Draft EIR's Project Description document[5]):

- Martin Substation Separation –Reconfigure and partition the existing PG&E Martin Substation into two interconnected utility systems—one serving San Francisco and one serving PG&E's remaining customers in San Mateo County.
- Distribution Express Feeders – Install approximately 3.8 miles of duct banks for new underground distribution express feeders from the Martin Substation, consisting of approximately 0.3 mile of duct banks in Brisbane, approximately 0.5 mile in Daly City, and approximately 3 miles in San Francisco.

---

3 The a.m. and p.m. peak hour percentages of the daily trip generation are used to estimate project demand for a 60 minute period, one in the morning and one in the evening, during which travel is at its highest level; peak hour percentages generally vary between 2 and 20 percent, depending on the type of land use and the period.

4 The Martin Substation is located at 3052 Geneva Ave, Daly City, California 94014.

5 San Francisco Planning Department, *PG&E Power Asset Acquisition Administrative Draft EIR, Chapter 2 – Project Description,* Case No. 2023-005370ENV.

- Local Distribution System Separation[6] – Reconfigure and separate overhead and underground distribution lines around the county border, including approximately 3.9 miles of underground work.
- System Reinforcements – Install and replace overhead and underground equipment to maintain service reliability on existing lines, including approximately 4.2 miles of underground work. Operations Control Center within an existing building in the southeastern part of San Francisco, upgrade utilities, install fencing and new standby diesel generator.
- New Operations and Maintenance Service Yards – Modify existing yards (e.g., fencing) for materials and equipment storage in the southeastern part of San Francisco.

A project variant would construct a new substation (the New City Substation) at the Daly City Yard that is adjacent to the existing Martin Substation, instead of implementing the Martin Substation Separation. The other components of the project variant would be the same as the proposed project, as listed above.

Once the reconfiguration or construction of the above project components is completed, the SFPUC would be responsible for the continued operations and maintenance of the acquired electrical transmission and distribution system within San Francisco. The SFPUC anticipates approximately 400 employees may be hired for administration, operation, and maintenance of the electrical system. The employees would be based at various SFPUC offices, operations and maintenance service yards, and the operations control center, as described below.

Approximately 183 staff would be based at SFPUC's existing offices at 525 Golden Gate Avenue in San Francisco. Another 183 staff would be based at the operations and maintenance service yard(s).[7] Approximately 35 staff would be based at the operations control center[8], spread across three shifts. Operation of the project variant would consist of the same activities as those planned under the proposed project.

PROPOSED PROJECT AND PROJECT VARIANT TRAVEL DEMAND

The travel demand forecasts for the proposed project are based on the methodology and information presented in the SF Guidelines, as appropriate, as well as supplemental information gathered from the BDFP EIR that accounts for the specific characteristics of the proposed project, as discussed above. In the case of the proposed project, two separate travel demand scenarios were evaluated: project construction and project operation.

---

6 The local distribution system separation work would occur along the City of San Francisco's southern border. See the Draft EIR's Project Description document for further details.

7 The location of one or more operations and maintenance service yards has not yet been established, but they would be located in southeastern San Francisco.

8 As noted above, the exact location of the Operations Control Center has not yet been determined. However, it will be within an existing building in the southeastern part of San Francisco.

The travel demand model developed for the analysis of the proposed project includes four sequential steps (trip generation, mode of travel, trip distribution, and trips assignment). The results of implementing the model are presented in the following tables, which separately identify each project component.

PROJECT AND VARIANT CONSTRUCTION

Table 1 and Table 2 document the assumptions for construction-activity regarding the number of construction workers and average daily trucks, respectively. Note that in Table 2, for each project component where separate periods of construction were identified as part of the project description, the period of highest daily truck generation (highlighted in yellow) was selected, instead of the overall average for the entire construction period. More detailed information is provided in Appendix A through Appendix D,

Table 1
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Trip Generation Activity by Component [a]

Component	Trip Generation Parameters	Construction Workers
Martin Substation		
Proposed Project	Number of daily workers	10
	Avg one-way person trips per day [b]	20
Project Variant (New City Substation)	Number of daily workers	10
	Avg one-way person trips per day [b]	20
Linear Components		
Distribution Express Feeders	Number of daily workers	12
	Avg one-way person trips per day [b]	24
Local Distribution System Separation	Number of daily workers	12
	Avg one-way person trips per day [b]	24
System Reinforcements	Number of daily workers	10
	Avg one-way person trips per day [b]	20
Operations Control Center		
Exterior Work	Number of daily workers	20
	Avg one-way person trips per day [b]	40
Interior Work [c]	Number of daily workers	20
	Avg one-way person trips per day [b] [c]	40
Modifications to retain PG&E access		
	Number of daily workers	6
	Avg one-way person trips per day [b]	12
Operations and Maintenance Service Yards		
	Number of daily workers	6
	Avg one-way person trips per day [b]	12

Notes:

a. See **Appendix A** for more detailed calculations.

b. Estimates two daily person trips per worker, to the site and back, based on BDFP EIR methodology. This assumes that construction workers would either bring their own lunch to the site or travel (generally walk) a short distance to nearby food trucks or lunch place.

c. The number of construction workers for "Interior Work" has been estimated by subtracting the values for "Exterior Work" from the total number of construction workers shown in Table 2-10 of the Project Description.

Source: Environmental Science Associates, Adavant Consulting – May 2024.

Table 2
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Truck Trip Generation Activity by Component [a]

Component	Trip Generation Parameters	Haul Trucks	Vendor Trucks		Sum of All Trucks
			Concrete	Others	
Martin Substation					
Proposed Project	One-way truck trips (in+out) [b]	1,396	1,464	100	2,960
	Number of weeks [c]	39	28	13	80
	Avg. one-way truck trips per weekday [d]	8	12	2	8
Project Variant (New City Substation)	One-way truck trips (in+out) [b]	5,198	7,434	350	12,982
	Number of weeks [c]	81	28	40	149
	Avg. one-way truck trips per weekday [d]	14	54	2	18
Linear Components					
Distribution Express Feeders	One-way truck trips (in+out) [b]	6,066	4,180	196	10,442
	Number of months [c]				12
	Avg. one-way truck trips per weekday [d]				40
Local Distribution System Separation	One-way truck trips (in+out) [b]	966	570	20	1,556
	Number of months [c]				24
	Avg. one-way truck trips per weekday [d]				4
System Reinforcements	One-way truck trips (in+out) [b]	3,045	3,288	256	6,589
	Number of months [c]				28
	Avg. one-way truck trips per weekday [d]				12
Operations Control Center					
Exterior Work	One-way truck trips (in+out) [b]	334	116	82	532
	Number of months [c] [e]	1.0	0.5	0.5	2.0
	Avg. one-way truck trips per weekday [d]	16	12	8	14
Interior Work	One-way truck trips (in+out) [b] [f]				270
	Number of months [c]				12
	Avg. one-way truck trips per weekday [d]				2
Modifications to retain PG&E access					
	One-way truck trips (in+out) [b]	10	44	60	114
	Number of months [c]				1
	Avg. one-way truck trips per weekday [d]				6
Operations and Maintenance Service Yards					
	One-way truck trips (in+out) [b]	10	88	60	158
	Number of months [c]				2
	Avg. one-way truck trips per weekday [d]				4

Table 2 continues on the next page

Table 2 (Cont.)
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Truck Trip Generation Activity by Component [a]

Notes:

a. Values in cells highlighted in yellow correspond to the maximum average daily truck trips and are used to represent the daily truck trip generation for each component; see **Appendix A** for more detailed calculations.
b. One-way truck trips represent twice the value of the estimated number of round truck trips; half of the one-way truck trips are inbound and the other half are outbound.
c. Assumes 52 weeks in a year, and 22 working days in a month.
d. The average daily truck trip calculation is the result of dividing the number of total one-way truck trips by the number of weeks, and then by five days in a week; the outcome is then rounded up to the nearest even integer number.
e. The total duration required to perform the exterior work (two months) has been reasonably allocated to each truck category.
f. The number of trucks for "Interior Work" has been estimated by subtracting the values for "Exterior Work" from the total truck value shown in Table 2-10 of the Project Description.

Source: Environmental Science Associates, Adavant Consulting – May 2024.

Table 3 summarizes the number of daily trucks trips derived from **Table 2**, and presents an estimate of the number of trucks trips during the a.m. and p.m. peak hours, assuming an 8-hour day for truck operations, based on BDFP EIR methodology. The estimates for the Proposed Project and the Project Variant are presented separately, given that construction of the new substation component under the Variant would generate a higher number of truck trips (54 daily trips, and eight trips during the a.m. or p.m. peak hour) than the reconfiguration and update of the existing Martin substation component under the Project (12 daily trips, and two trips during the a.m. or p.m. peak hour). Conservatively, for the purposes of the transportation impact analysis, it is assumed that the truck trip generation of the various components would occur concurrently.

Table 4 presents the estimated number of daily, a.m. peak hour, and p.m. peak hour person-trips associated with the construction workers of each component; per the information presented in **Table 1**, the number of construction workers is the same for both the Proposed Project and the Project Variant. The analysis assumes two daily commuter trips per worker, to the site and back, based on BDFP EIR methodology, which means that construction workers would either bring their own lunch to the site or travel (generally walk) a short distance to nearby food trucks or a lunch place. On the same basis, in order to estimate the number of trips during the a.m. and p.m. peak hours, the transportation impact analysis assumes, conservatively,[9] that half of the daily construction worker person-trips are inbound during the a.m. peak hour and the other half outbound during the p.m.

[9] Depending on the construction work schedule, it is likely that workers arrive or depart outside the a.m. or p.m. peak hour.

peak hour. Similarly, it is also assumed that the construction worker trip generation of the various components would occur concurrently.

Table 3
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Truck Daily and Peak Hour Trips by Component [a]

Component	Daily Truck Trips [b]	AM Peak Hour Truck Trips [c]	PM Peak Hour Truck Trips [c]
Proposed Project			
Martin Substation	12	2	2
Distribution Express Feeders	40	6	6
Local Distribution System Separation	4	2	2
System Reinforcements	12	2	2
Operations Control Center	16	2	2
Modifications to retain PG&E access	6	2	2
Operations and Maintenance Service Yards	4	2	2
Total	**94**	**18**	**18**
Project Variant			
New City Substation	54	8	8
Distribution Express Feeders	40	6	6
Local Distribution System Separation	4	2	2
System Reinforcements	12	2	2
Operations Control Center	16	2	2
Modifications to retain PG&E access	6	2	2
Operations and Maintenance Service Yards	4	2	2
Total	**136**	**24**	**24**

Notes:

a. See **Appendix A** for more detailed calculations.
b. Conservatively assumed that all highest daily truck a trip values shown in **Table 2** for the various components occur concurrently.
c. Assumed an 8-hour day for truck operations based on BDFP EIR methodology (the AM and PM peak hour truck trip calculations for each component have been rounded up to the nearest even integer value). Half of the daily, AM peak hour and PM peak hour truck trips are assumed inbound and the other half outbound, during each period based on BDFP EIR methodology.

Source: Adavant Consulting – May 2024.

Table 4
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Daily and Peak Hour Person Trips by Component [a]

Component	Daily Worker Person Trips [b]	AM Peak Hour Worker Person Trips [c]	PM Peak Hour Worker Person Trips [c]
Martin Substation/New City Substation	20	10	10
Distribution Express Feeders	24	12	12
Local Distribution System Separation	24	12	12
System Reinforcements	20	10	10
Operations Control Center	40	20	20
Modifications to retain PG&E access	12	6	6
Operations and Maintenance Service Yards	12	6	6
Total	**152**	**76**	**76**

Notes:
a. See **Appendix A** for more detailed calculations.
b. Estimated two daily commuter trips per worker, to the site and back, based on BDFP EIR methodology, which assumed that construction workers would either bring their own lunch to the site or travel (generally walk) a short distance to nearby food trucks or a lunch place.
c. Half of the daily construction worker person trips were assumed to be inbound during the AM peak hour and the other half outbound during the PM peak hour, based on BDFP EIR methodology.

Source: Adavant Consulting – May 2024.

Table 5 summarizes the construction worker way of travel allocation of trips, developed from the SF Guidelines for a project located in the Outer Mission/Mission Hills area of San Francisco. Similar to BDFP EIR assumptions for construction worker travel, the percentages for walk, bicycle, and other ways of travel, except public transit, were added to auto travel. This is because construction workers are more likely to drive to the project construction sites, and this would present the most conservative analysis of potential impacts due to construction worker travel. The way of travel allocation is the same for all components.

Table 6 presents the results of applying the way of travel allocation from **Table 5** to the construction worker daily, a.m. peak hour, and p.m.. peak hour trip generation estimates shown in **Table 4**.

Table 5
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Way of Travel Percentages by Component [a]

Component	Way of Travel Percentages [b]			
	Auto	Transit	Other [c]	Total
Martin Substation/New City Substation	96%	4%	0%	100%
Distribution Express Feeders	96%	4%	0%	100%
Local Distribution System Separation	96%	4%	0%	100%
System Reinforcements	96%	4%	0%	100%
Operations Control Center	96%	4%	0%	100%
Modifications to retain PG&E access	96%	4%	0%	100%
Operations and Maintenance Service Yards	96%	4%	0%	100%

Notes:
a. See **Appendix E** for more detailed information.
b. Way of travel percentages for all locations were based on SF Guidelines data for the Outer Mission/Mission Hills area; similar to BDFP EIR assumptions, walk, bicycle, and other ways of travel percentages (except public transit) for construction workers were added to auto travel.
c. Walk, bicycle travel, etc.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 6
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Person-trips by Way of Travel, Component, and Time Period [a]

Component	Daily Person-trips			AM/PM Peak Hour Person-trips [b]		
	Auto	Transit	Total	Auto	Transit	Total
Martin Substa./New City Substa.	19	1	20	10	0	10
Distribution Express Feeders	23	1	24	12	0	12
Local Distribution System Separation	23	1	24	12	0	12
System Reinforcements	19	1	20	10	0	10
Operations Control Center	39	1	40	19	1	20
Modifications to retain PG&E access	12	0	12	6	0	6
Operations and Maint. Service Yards	12	0	12	6	0	6
Total	**147**	**5**	**152**	**75**	**1**	**76**

Notes:
a. Based on the way of travel percentages shown in **Table 4**; see **Appendix B** for more detailed calculations.
b. Peak hour construction worker person trips were assumed to be inbound in the AM and outbound in the PM, based on BDFP EIR methodology.

Source: Adavant Consulting – May 2024.

Table 7 presents the number of construction vehicle trips during the day, the a.m. peak hour, and the p.m. peak hour. They were calculated by applying an average vehicle occupancy of 1.13 occupants per vehicle, obtained from the SF Guidelines for a site located in the Outer Mission/Mission Hills area of San Francisco, to the person trip estimates shown in Table 6.

Table 7
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Daily Vehicle Trips by Component [a]

Component	Average Vehicle Occupancy [b]	Vehicle Trips		
		Daily	AM Peak Hour [c]	PM Peak Hour [c]
Martin Substation/New City Substation	1.13	16	8	8
Distribution Express Feeders	1.13	20	10	10
Local Distribution System Separation	1.13	20	10	10
System Reinforcements	1.13	16	8	8
Operations Control Center	1.13	34	17	17
Modifications to retain PG&E access	1.13	10	5	5
Operations and Maintenance Service Yards	1.13	10	5	5
Total		**126**	**63**	**63**

Notes:
a. See Appendix C and Appendix E for more detailed calculations.
b. Average vehicle occupancy rates were obtained from the SF Guidelines for the Outer Mission/Mission Hills area;
c. Half of the daily construction worker auto person trips were assumed to be inbound during the AM peak hour and the other half outbound during the PM peak hour, based on BDFP EIR methodology.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 8 summarizes the inbound/outbound splits for construction workers and construction trucks. All construction worker trips were assumed to be inbound in the a.m. peak hour and all outbound in the p.m. peak hour, based on BDFP EIR methodology. Similarly, trucks were assumed to generate half inbound trips and half outbound trips (i.e. one round trip) during each peak hour.

Table 8
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Inbound/Outbound Percentages by Peak Period [a]

	Construction Workers [b]				Trucks [c]	
	AM Peak Hour		PM Peak Hour		AM and PM Peak Hours	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
All Components	100%	0%	0%	100%	50%	50%

Notes:
a. See **Appendix C** for more detailed calculations.
b. Construction worker trips assumed to be all inbound in the AM peak hour and all outbound in the PM peak hour, based on BDFP EIR methodology.
c. Trucks would generate half inbound trips and half outbound trips (i.e. one round trip) during the two peak hours, based on BDFP EIR methodology.

Source: Adavant Consulting, SF Guidelines – May 2024.

The inbound/outbound percentages from **Table 8** were then applied to the peak hour construction worker vehicle trips shown in **Table 7**, and the peak hour truck trips shown in **Table 3**, to obtain the inbound/outbound vehicle trips for the Proposed Project and the Project Variant. The results are summarized in **Table 9** and **Table 10**, respectively.

Table 9
PG&E Power Asset Acquisition
Proposed Project
Construction Worker Vehicle Trips by Component and Time Period [a]

Component	Construction Workers		Trucks		All Vehicles		
	In	Out	In	Out	In	Out	Total
Daily							
Martin Substation	8	8	6	6	14	14	28
Distribution Express Feeders	10	10	20	20	30	30	60
Local Distribution System Separation	10	10	2	2	12	12	24
System Reinforcements	8	8	6	6	14	14	28
Operations Control Center	17	17	8	8	25	25	50
Modifications to retain PG&E access	5	5	3	3	8	8	16
Operations and Maint. Service Yards	5	5	2	2	7	7	14
Total	**63**	**63**	**47**	**47**	**110**	**110**	**220**
AM Peak Hour							
Martin Substation	8	0	1	1	9	1	10
Distribution Express Feeders	10	0	3	3	13	3	16
Local Distribution System Separation	10	0	1	1	11	1	12
System Reinforcements	8	0	1	1	9	1	10
Operations Control Center	17	0	1	1	18	1	19
Modifications to retain PG&E access	5	0	1	1	6	1	7
Operations and Maint. Service Yards	5	0	1	1	6	1	7
Total	**63**	**0**	**9**	**9**	**72**	**9**	**81**
PM Peak Hour							
Martin Substation	0	8	1	1	1	9	10
Distribution Express Feeders	0	10	3	3	3	13	16
Local Distribution System Separation	0	10	1	1	1	11	12
System Reinforcements	0	8	1	1	1	9	10
Operations Control Center	0	17	1	1	1	18	19
Modifications to retain PG&E access	0	5	1	1	1	6	7
Operations and Maint. Service Yards	0	5	1	1	1	6	7
Total	**0**	**63**	**9**	**9**	**9**	**72**	**81**

Note:

a. Based on the information presented in **Table 3**, **Table 7** and **Table 8**; see **Appendix C** for more detailed calculations.

Source: Adavant Consulting – May 2024.

Table 10
PG&E Power Asset Acquisition
Project Variant
Construction Worker Vehicle Trips by Component and Time Period [a]

Component	Construction Workers		Trucks		All Vehicles		
	In	Out	In	Out	In	Out	Total
Daily							
New City Substation	8	8	27	27	35	35	70
Distribution Express Feeders	10	10	20	20	30	30	60
Local Distribution System Separation	10	10	2	2	12	12	24
System Reinforcements	8	8	6	6	14	14	28
Operations Control Center	17	17	8	8	25	25	50
Modifications to retain PG&E access	5	5	3	3	8	8	16
Operations and Maint. Service Yards	5	5	2	2	7	7	14
Total	**63**	**63**	**68**	**68**	**131**	**131**	**262**
AM Peak Hour							
New City Substation	8	0	4	4	12	4	16
Distribution Express Feeders	10	0	3	3	13	3	16
Local Distribution System Separation	10	0	1	1	11	1	12
System Reinforcements	8	0	1	1	9	1	10
Operations Control Center	17	0	1	1	18	1	19
Modifications to retain PG&E access	5	0	1	1	6	1	7
Operations and Maint. Service Yards	5	0	1	1	6	1	7
Total	**63**	**0**	**12**	**12**	**75**	**12**	**87**
PM Peak Hour							
New City Substation	0	8	4	4	4	12	16
Distribution Express Feeders	0	10	3	3	3	13	16
Local Distribution System Separation	0	10	1	1	1	11	12
System Reinforcements	0	8	1	1	1	9	10
Operations Control Center	0	17	1	1	1	18	19
Modifications to retain PG&E access	0	5	1	1	1	6	7
Operations and Maint. Service Yards	0	5	1	1	1	6	7
Total	**0**	**63**	**12**	**12**	**12**	**75**	**87**

Note:

a. Based on the information presented in **Table 3**, **Table 7** and **Table 8**; see **Appendix C** for more detailed calculations.

Source: Adavant Consulting – May 2024.

Table 11 summarizes the construction worker trip Origin/Destination distribution, developed from the SF Guidelines for a site located in the Outer Mission/Mission Hills area of San Francisco.

Table 11
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Trip Distribution Assumptions [a]

Worker Place of Origin	Percent Distribution[b]
San Francisco NE Quadrant (Superdistrict 1)	8%
San Francisco NW Quadrant (Superdistrict 2)	9%
San Francisco SE Quadrant (Superdistrict 3)	27%
San Francisco SW Quadrant (Superdistrict 4)	15%
East Bay	12%
North Bay	5%
South Bay	24%
All Origins/Destinations	**100%**

Notes:
a. See **Appendix E** for more detailed information.
b. Based on SF Guidelines data for the Outer Mission/Mission Hills area, where construction would take place.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 12 presents the results of applying the trip Origin/Destination distribution from Table 11 to the construction worker a.m. and p.m.. peak hour vehicle trips shown in Table 10, and the transit person trips shown in Table 6.

Table 12
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Worker Vehicle and Transit Trip Distribution by Component
during the AM and PM peak hours [a]

Component	Place of Origin/Destination [b]							
	SF SD1	SF SD2	SF SD3	SF SD4	East Bay	North Bay	South Bay	Total
Vehicle Trips								
Martin Substa./New City Substa.	1	1	2	1	1	0	2	8
Distribution Express Feeders	1	2	2	1	1	1	2	10
Local Distribution System Separation	1	1	3	1	1	1	2	10
System Reinforcements	1	1	2	1	1	0	2	8
Operations Control Center	1	1	5	3	2	1	4	17
Modifications to retain PG&E access	0	0	2	1	1	0	1	5
Operations and Maint. Service Yards	0	0	1	1	1	0	2	5
Total	**5**	**6**	**17**	**9**	**8**	**3**	**15**	**63**
Transit Person Trips								
Martin Substa./New City Substa.	0	0	0	0	0	0	0	0
Distribution Express Feeders	0	0	0	0	0	0	0	0
Local Distribution System Separation	0	0	0	0	0	0	0	0
System Reinforcements	0	0	0	0	0	0	0	0
Operations Control Center	0	0	1	0	0	0	0	1
Modifications to retain PG&E access	0	0	0	0	0	0	0	0
Operations and Maint. Service Yards	0	0	0	0	0	0	0	0
Total	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**

Notes:
a. See **Appendix D** for more detailed calculations. Peak hour vehicle and transit person-trips were assumed to be inbound during the AM and outbound during the PM, based on BDFP EIR methodology.
b. Calculated from Origin/Destination percentages shown in **Table 11**;

Source: Adavant Consulting – May 2024.

Table 13 presents the trip distribution for construction trucks, based on the truck trip generation data presented in **Table 3**, combined with truck origins and destinations derived from the BDFP EIR; the data are presented separately for the Proposed Project and the Project Variant. Half of the trucks trips are assumed to be inbound and the other half outbound during both the a.m. and the p.m. peak hours, based on BDFP EIR methodology.

Table 13
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Construction Truck Trip Distribution by Component
during the AM and PM peak hours [a]

Component	Total Truck Trips [b]	Max. Demand Truck Type [c]	Place of Origin/Destination [d]		
			Amador St S. Francisco	Peninsula & South Bay	East Bay and beyond
Proposed Project					
Martin Substation	2	Concrete	2		
Distribution Express Feeders	6	All Combined		3	3
Local Distribution System Separation	2	All Combined		1	1
System Reinforcements	2	All Combined		1	1
Operations Control Center	2	Haul (In+Out)		2	
Modifications to retain PG&E access	2	All Combined		1	1
Operations and Maint. Service Yards	2	All Combined		1	1
Total	**18**		**2**	**9**	**7**
Project Variant					
New City Substation	8	Concrete	8		
Distribution Express Feeders	6	All Combined		3	3
Local Distribution System Separation	2	All Combined		1	1
System Reinforcements	2	All Combined		1	1
Operations Control Center	2	Haul (In+Out)		2	
Modifications to retain PG&E access	2	All Combined		1	1
Operations and Maint. Service Yards	2	All Combined		1	1
Total	**24**		**8**	**9**	**7**

Notes:
a. See **Appendix D** for more detailed calculations.
b. Half of the trucks trips were assumed to be inbound and the other half outbound during each of the AM and the PM peak hours, based on BDFP EIR methodology.
c. Type of truck generating the maximum number of trips per day, per **Table 2**.
d. Based on construction truck origins and destinations derived from the BDFP EIR.

Source: Adavant Consulting – May 2024.

PROJECT AND VARIANT OPERATIONS

Table 14 documents the trip generation assumptions once the Proposed Project or the Project Variant become fully operational. Note that the operational assumptions are the same in both cases. The trip generation assumptions for the office building at 525 Golden Gate Avenue were derived from the SF Guidelines. For the Operations and Maintenance Yards, it was assumed that each worker would generate four daily trips, two commuter trips (one inbound and one outbound) to the site, plus two service related trips (one inbound and one outbound) during the work period; only the commuter trips have been assumed to occur during the peak hours, following the BDFP EIR methodology. For the Control Center, it was assumed that each worker would generate two daily commuter trips during the peak hours, based on BDFP EIR methodology, which means that workers would either bring their own lunch to the site or travel (generally walk) a short distance to nearby food trucks or a lunch place. The peak hour trip percentages presented in Table 14 were based on the SF Guidelines for an office building (525 Golden Gate Avenue), or the expected commuter patterns (Service Yards and Control Center), as detailed in the table.

Table 14
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Daily and Peak Hour Trip Generation by Site Location [a]

Site Location	Daily			AM/PM Peak Hours	
	Employees	One-way Trip Rate (trips per employee)	One-way Person Trips	% of Daily Trips	Person Trips
525 Golden Gate Ave (administration)	183	4.0 [b]	732	10% [e]	73
Operations and maint. service yards	183	4.0 [c]	732	25% [f]	183
Operations Control Center (3 shifts)	35	2.0 [d]	70	67% [g]	24
Total	**401**		**1,534**		**280**

Notes:

a. See Appendix A for more detailed calculations.
b. Based on trip generation rates for office workers obtained from the SF Guidelines; assumed an employment density of 270 gsf per worker (based on SF Planning data).
c. Assumed that each service yard worker would generate four daily trips, two commuter trips (one inbound and one outbound) plus two work/service related trips (one inbound and one outbound).
d. Two commuter daily trips per worker based on BDFP EIR methodology, which assumed that operations control center workers would either bring their own lunch to the site or travel (generally walk) a short distance to nearby food trucks or a lunch place.
e. SF Guidelines value for office workers.
f. Assumed that only commuter trips would occur during the peak hours, one inbound in the AM and one outbound in the PM, based on BDFP EIR methodology. Work/service related trips are assumed to occur outside the AM or the PM peak hours.
g. Conservatively assumed that a shift change (about 12 workers each) would occur during the AM and the PM peak hours.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 15 summarizes the way of travel allocation for the Proposed Project and Project Variant operational trips, obtained from the SF Guidelines for an office building located in the Downtown, Civic Center, North Beach area of San Francisco (525 Golden Gate Avenue), as well as a site located in the Outer Mission/Mission Hills area (Service Yards and Operations Control Center) of San Francisco. Similar to BDFP EIR assumptions, given the proposed locations of the Service Yards and the Control Center, as well as their work schedule, the percentages for walk, bicycle, and other ways of travel, except public transit, were added to auto travel.

Table 15
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Way of Travel Percentages by Site Location [a]

Site Location	Way of Travel Percentages [b]			
	Auto	Transit	Other [c]	Total
525 Golden Gate Ave (administration) [d]	25%	29%	46%	100%
Operations and maint. service yards [e]	96%	4%	0%	100%
Operations Control Center [e]	96%	4%	0%	100%

Notes:
a. See Appendix E for more detailed information.
b. Similar to BDFP EIR assumptions, walk, bicycle, and other ways of travel percentages (except public transit) for construction workers were added to auto travel.
c. Walk, bicycle travel, etc.
d. Way of travel percentages obtained from the SF Guidelines for the Downtown, Civic Center, North Beach area.
e. Way of travel percentages obtained from the SF Guidelines for the Outer Mission/Mission Hills area.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 16 presents the results of applying the way of travel allocation from Table 15 to the daily, a.m. peak hour, and p.m.. peak hour person-trip generation estimates shown in Table 14.

Table 16
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Person-trips by Way of Travel, Site Location, and Time Period [a]

Site Location	Daily Person-trips				AM/PM Peak Hour Person-trips			
	Auto	Transit	Other	Total	Auto	Transit	Other	Total
525 Golden Gate Ave (admin)	180	215	337	732	18	21	34	73
Ops. and maint. service yards	706	26	0	732	176	7	0	183
Operations Control Center	67	3	0	70	23	1	0	24
Total	**953**	**244**	**337**	**1,534**	**217**	**29**	**34**	**280**

Note:
a. Based on the way of travel percentages shown in **Table 15** to the trip generation data presented in **Table 14**; see **Appendix B** for more detailed calculations.

Source: Adavant Consulting – May 2024.

Table 17 presents the number of vehicle trips related to Project/Variant operations during the day, the a.m. peak hour, and the p.m. peak hour. They were calculated by applying an average vehicle occupancy of 1.20 (525 Golden Gate Avenue) and 1.13 (Service Yards and Operations Control Center) people per vehicle to the person trip estimates shown in **Table 16**. The average vehicle occupancy values were derived from the SF Guidelines for a site located in Downtown, Civic Center, North Beach area, as well as the Outer Mission/Mission Hills area of San Francisco, respectively.

Table 17
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Daily Vehicle Trips by Site Location [a]

Site Location	Average Vehicle Occupancy [b]	Vehicle Trips		
		Daily	AM Peak Hour	PM Peak Hour
525 Golden Gate Ave (administration)	1.20	150	15	15
Operations and maintenance service yards	1.13	624	156	156
Operations Control Center	1.13	60	20	20
Total		**834**	**191**	**191**

Notes:
a. See **Appendix C** and **Appendix E** for more detailed calculations.
b. Average vehicle occupancy rates for 525 Golden Gate Avenue were obtained from the SF Guidelines for the Downtown, Civic Center, North Beach area, while average vehicle occupancy rates for the service yard and control center were obtained from the SF Guidelines for the Outer Mission/Mission Hills area.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 18 summarizes the inbound/outbound splits for Project/Variant operations workers. The Inbound/Outbound percentages for 525 Golden Gate Avenue building during the p.m. peak hour were based on SF Guidelines data for the Downtown, Civic Center, North Beach area, while the values for the a.m. peak hour were assumed to be the reverse of the p.m., based on BDFP EIR methodology. For the Service Yards it was assumed that worker commuter trips would be all inbound in the a.m. peak hour and all outbound in the p.m. peak hour, also based on BDFP EIR methodology. For the Operations Control Center, it was conservatively assumed that two of the three worker shift changes would occur, one each, during the a.m. and p.m. peak hours.

Table 18
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Inbound/Outbound Percentages by Site Location and Peak Period [a]

Site Location	AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound
525 Golden Gate Ave (administration) [b]	51%	49%	49%	51%
Operations and maintenance service yards [c]	100%	0%	0%	100%
Operations Control Center (3 shifts) [d]	50%	50%	50%	50%

Notes:
a. See Appendix C and Appendix E for more detailed calculations.
b. Inbound/Outbound percentages for 525 Golden Gate Avenue during the PM peak hour were obtained from the SF Guidelines for the Downtown, Civic Center, North Beach area. Values for the AM peak hour were assumed to be the reverse of the PM peak hour, based on BDFP EIR methodology.
c. Assumed operations and maintenance service yard worker commuter trips were all inbound in the AM peak hour and all outbound in the PM peak hour, based on BDFP EIR methodology.
d. Conservatively assumed that worker shift changes would occur during the AM and PM peak hours.

Source: Adavant Consulting, SF Guidelines – May 2024.

The inbound/outbound percentages shown in Table 18 were then applied to the peak hour worker vehicle trips shown in Table 17 to obtain the inbound/outbound vehicle trips during Project/Variant operations. The results are summarized in Table 19.

Table 19
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Vehicle-trips by Site Location, and Time Period [a]

Site Location	Daily			AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
525 Golden Gate Ave (admin)	75	75	150	8	7	15	7	8	15
Ops. and maint. service yards	312	312	624	156	0	156	0	156	156
Operations Control Center	30	30	60	10	10	20	10	10	20
Total	**417**	**417**	**834**	**174**	**17**	**191**	**17**	**174**	**191**

Note:
a. Based on the information presented in Table 17 and Table 18; see Appendix C for more detailed calculations.

Source: Adavant Consulting – May 2024.

Table 20 presents the operations worker trip Origin/Destination distribution, developed from the SF Guidelines for a site located in the Downtown, Civic Center, North Beach area (525 Golden Gate Avenue) or the Outer Mission/Mission Hills area (Service Yards and Operations Control Center) of San Francisco.

Table 20
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Trip Distribution Assumptions [a]

Worker Place of Origin	Site Location	
	525 Golden Gate Avenue [b]	Service Yards and Operations Control Center [c]
San Francisco NE Quadrant (Superdistrict 1)	14.6%	8%
San Francisco NW Quadrant (Superdistrict 2)	14.1%	9%
San Francisco SE Quadrant (Superdistrict 3)	20.4%	27%
San Francisco SW Quadrant (Superdistrict 4)	2.5%	15%
East Bay	22.2%	12%
North Bay	9.9%	5%
South Bay	16.4%	24%
All Origins/Destinations	**100.0%**	**100%**

Notes:
a. See Appendix E for more detailed information.
b. Based on SF Guidelines data for the Downtown, Civic Center, North Beach area, where the building is located.
c. Based on SF Guidelines data for the Outer Mission/Mission Hills area, where the sites are located.

Source: Adavant Consulting, SF Guidelines – May 2024.

Table 21 presents the results of applying the trip Origin/Destination distribution from Table 20 to the operations worker a.m. and p.m.. peak hour vehicle trip totals shown in Table 19, while Table 22 summarizes the results of applying the same trip Origin/ Destination distribution percentages to the transit person trip totals presented in Table 16.

Table 21
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Vehicle Trip Distribution by Site Location during the AM and PM peak hours [a]

Site Location	Place of Origin/Destination [b]							
	SF SD1	SF SD2	SF SD3	SF SD4	East Bay	North Bay	South Bay	Total
AM PEAK HOUR								
Inbound								
525 Golden Gate Ave (admin)	1	1	2	0	2	1	1	8
Ops. and maint. service yards	13	14	41	25	18	6	39	156
Operations Control Center	1	1	3	1	1	1	2	10
Total	**15**	**16**	**46**	**26**	**21**	**8**	**42**	**174**
Outbound								
525 Golden Gate Ave (admin)	1	1	1	0	2	1	1	7
Ops. and maint. service yards	0	0	0	0	0	0	0	0
Operations Control Center	1	1	3	1	1	1	2	10
Total	**2**	**2**	**4**	**1**	**3**	**2**	**3**	**17**
PM PEAK HOUR								
Inbound								
525 Golden Gate Ave (admin)	1	1	1	0	2	1	1	7
Ops. and maint. service yards	0	0	0	0	0	0	0	0
Operations Control Center	1	1	3	1	1	1	2	10
Total	**2**	**2**	**4**	**1**	**3**	**2**	**3**	**17**
Outbound								
525 Golden Gate Ave (admin)	1	1	2	0	2	1	1	8
Ops. and maint. service yards	13	14	41	25	18	6	39	156
Operations Control Center	1	1	3	1	1	1	2	10
Total	**15**	**16**	**46**	**26**	**21**	**8**	**42**	**174**

Notes:
a. See Appendix D for more detailed calculations.
b. Based on peak hour vehicle trip totals presented in Table 19 and Origin/Destination percentages shown in Table 20;

Source: Adavant Consulting – May 2024.

Table 22
PG&E Power Asset Acquisition
Proposed Project and Project Variant
Operations Worker Transit Trip Distribution by Site Location during the AM and PM peak hours [a]

Site Location	Place of Origin/Destination [b]							
	SF SD1	SF SD2	SF SD3	SF SD4	East Bay	North Bay	South Bay	Total
AM PEAK HOUR								
Inbound								
525 Golden Gate Ave (admin)	1	2	2	0	3	1	2	11
Ops. and maint. service yards	1	1	2	1	1	0	1	7
Operations Control Center	0	0	0	1	0	0	0	1
Total	**2**	**3**	**4**	**2**	**4**	**1**	**3**	**19**
Outbound								
525 Golden Gate Ave (admin)	2	1	2	0	2	1	2	10
Ops. and maint. service yards	0	0	0	0	0	0	0	0
Operations Control Center	0	0	0	0	0	0	0	0
Total	**2**	**1**	**2**	**0**	**2**	**1**	**2**	**10**
PM PEAK HOUR								
Inbound								
525 Golden Gate Ave (admin)	2	1	2	0	2	1	2	10
Ops. and maint. service yards	0	0	0	0	0	0	0	0
Operations Control Center	0	0	0	0	0	0	0	0
Total	**2**	**1**	**2**	**0**	**2**	**1**	**2**	**10**
Outbound								
525 Golden Gate Ave (admin)	1	2	2	0	3	1	2	11
Ops. and maint. service yards	1	1	2	1	1	0	1	7
Operations Control Center	0	0	0	1	0	0	0	1
Total	**2**	**3**	**4**	**2**	**4**	**1**	**3**	**19**

Notes:
a. See **Appendix D** for more detailed calculations.
b. Based peak hour transit trip totals presented in **Table 16** and Origin/Destination percentages shown in **Table 20**;

Source: Adavant Consulting – May 2024.

APPENDIX A
ACTIVITY SUMMARIES

PG&E Acquisition Project
Construction Trip Generation Activity [a]

Table A-1 Martin Substation/New City Substation

Project/Variant	Parameters	Haul Trucks (Import+Export)	Vendor Trucks		All Trucks	Construction Workers
			Concrete	Vault, Cable and Others		
Proposed Project	Round truck trips	698	732	50	**1,480**	
	One-way truck trips (in+out) [b]	1,396	1,464	100	**2,960**	
	Number of weeks	39	28	13	**80**	
	Number of months [c]	9	6	3	**18**	
	Avg. one-way truck trips per weekday [d]	8	12	2	**8**	
	Construction worker crews (5 p.)					2
	Number of daily workers					10
	Avg. one-way person trips per weekday [e]					20
Project Variant (New City Substation)	Round truck trips	2,599	3,717	175	**6,491**	
	One-way truck trips (in+out) [b]	5,198	7,434	350	**12,982**	
	Number of weeks	81	28	40	**149**	
	Number of months [c]	19	6	9	**34**	
	Avg. one-way truck trips per weekday [d]	14	54	2	**18**	
	Construction worker crews (5 p.)					2
	Number of daily workers					10
	Avg. one-way person trips per weekday [e]					20

Table A-2 Linear Components

Project Component	Parameters	Haul Trucks (Import+Export)	Vendor Trucks		All Trucks	Construction Workers
			Concrete	Vault, Cable and Others		
Distribution Express Feeders	Round truck trips	3,033	2,090	98	**5,221**	
	One-way truck trips (in+out) [b]	6,066	4,180	196	**10,442**	
	Number of months				**12**	
	Avg. one-way truck trips per weekday [d]				40	
	Construction worker crews (6 p.)					2
	Number of daily workers					12
	Avg. one-way person trips per weekday [e]					24
Local Distribution System Separation	Round truck trips	483	285	10	**778**	
	One-way truck trips (in+out) [b]	966	570	20	**1,556**	
	Number of months				**24**	
	Avg. one-way truck trips per weekday [d]				4	
	Construction worker crews (6 p.)					2
	Number of daily workers					12
	Avg. one-way person trips per weekday [e]					24
System Reinforcements	Round truck trips	1,522	1,644	128	**3,295**	
	One-way truck trips (in+out) [b]	3,045	3,288	256	**6,589**	
	Number of months				**28**	
	Avg. one-way truck trips per weekday [d]				12	
	Construction worker crews (5 p.)					2
	Number of daily workers					10
	Avg. one-way person trips per weekday [e]					20

PG&E Acquisition Project
Construction Trip Generation Activity [a]

Table A-3 Operations Control Center

Project Component	Parameters	Haul Trucks (Import+Export)	Vendor Trucks		All Trucks	Construction Workers
			Concrete	Vault, Cable and Others		
Exterior Work	Round truck trips	167	58	41	**266**	
	One-way truck trips (in+out) [b]	334	116	82	**532**	
	Number of months [g]	1	0.5	0.5	**2**	
	Avg. one-way truck trips per weekday [d]	16	12	8	14	
	Construction worker crews (5 p.)					4
	Number of daily workers					20
	Avg. one-way person trips per weekday [e]					40
Interior Work [f]	Round truck trips				135	
	One-way truck trips (in+out) [b]				**270**	
	Number of months				**12**	
	Avg. one-way truck trips per weekday [d]				2	
	Construction worker crews (5 p.)					4
	Number of daily workers					20
	Avg. one-way person trips per weekday [e]					40

Table A-4 Modifications to retain PG&E access

	Parameters	Haul Trucks (Import+Export)	Vendor Trucks		All Trucks	Construction Workers
			Concrete	Vault, Cable and Others		
	Round truck trips	5	22	30	**57**	
	One-way truck trips (in+out) [b]	10	44	60	**114**	
	Number of months				**1**	
	Avg. one-way truck trips per weekday [d]				6	
	Construction worker crews (3 p.)					2
	Number of daily workers					6
	Avg. one-way person trips per weekday [e]					12

Table A-5 Operations and Maintenance Service Yards

	Parameters	Haul Trucks (Import+Export)	Vendor Trucks		All Trucks	Construction Workers
			Concrete	Vault, Cable and Others		
	Round truck trips	5	44	30	**79**	
	One-way truck trips (in+out) [b]	10	88	60	**158**	
	Number of months				**2**	
	Avg. one-way truck trips per weekday [d]				4	
	Construction worker crews (3 p.)					2
	Number of daily workers					6
	Avg. one-way person trips per weekday [e]					12

Notes:

[a] Values in cells highlighted in yellow are used to estimate the daily truck and construction worker trip generation for each project component (represent highest value).

[b] Half of the truck trips are inbound and the other half are outbound, based on Biosolids EIR assumptions.

[c] Assumes 52 weeks in a year, and 22 working days in a month.

[d] The truck trip calculation result is rounded up to the nearest even integer number.

[e] Half of the construction worker person trips are inbound and the other half are outbound, based on Biosolids EIR assumptions.

[f] The number of trucks and construction workers for "Interior Work" has been estimated by subtracting the values for "Exterior Work" from the total corresponding values shown in Table 2-10 of the Project Description.

[g] The total duration required to perform the exterior work (two months) has been reasonably allocated to each truck category.

PG&E Acquisition Project
Construction Trip Generation Activity [a]

Table A-6 All Project/Variant Components Daily and Peak Hour Trips

Project/Variant	Project/Variant Components	Daily Trips		AM/PM Peak Hour Trips	
		Truck Trips [h]	Worker Person Trips	Truck Trips [i]	Worker Person Trips [j]
Proposed Project	Martin Substation	12	20	2	10
	Distribution Express Feeders	40	24	6	12
	Local Distribution System Separation	4	24	2	12
	System Reinforcements	12	20	2	10
	Operations Control Center	16	40	2	20
	Modifications to retain PG&E access	6	12	2	6
	Operations and Maintenance Service Yards	4	12	2	6
	Total All Proposed Project Components	**94**	**152**	**18**	**76**
Project Variant	New City Substation	54	20	8	10
	Distribution Express Feeders	40	24	6	12
	Local Distribution System Separation	4	24	2	12
	System Reinforcements	12	20	2	10
	Operations Control Center	16	40	2	20
	Modifications to retain PG&E access	6	12	2	6
	Operations and Maintenance Service Yards	4	12	2	6
	Total All Project Variant Components	**136**	**152**	**24**	**76**

Notes:

[h] Conservatively assumes that all highest daily truck and construction trip values for the various components occur concurrently.

[i] Assumes an 8-hour day for truck operations, based on Biosolids EIR; number has been rounded up to the nearest even value.

[j] Assumes all construction worker trips are all inbound in the AM peak hour and all outbound in the PM peak hour, based on Biosolids EIR assumptions.

PG&E Acquisition Project
Operations Trip Generation Activity

Table A-7 Daily and Peak Hour Person Trips

Project/Variant	Locations	Number of Daily Employees	Daily One-way Trips Rate	Daily One-way Person Trips	Peak Hour % of Daily Trips	Peak Hour Person Trips
Proposed Project and Project Variant	525 Golden Gate Ave (administration)	183	4.0 [a]	732	10% [c]	73
	Operations and maintenance service yards	183	4.0 [b]	732	25% [d]	183
	Operations Control Center (3 shifts)	35	2.0 [b]	70	33% [e]	24
	Total	**401**		**1,534**		**280**

Notes:

[a] Based on trip generation rates for office workers from the SF Guidelines; assumes an employment density of 270 gsf per worker (based on SF Planning data).

[b] Two daily trips per worker, based on Biosolids EIR assumptions.

[c] SF Guidelines for office workers.

[d] All service yard worker trips are inbound in the AM peak hour and all outbound in the PM peak hour, based on Biosolids EIR assumptions.

[e] Conservatively assumes that shift changes occur during the AM and PM peak hours.

APPENDIX B
WAY OF TRAVEL

PG&E Acquisition Project
Way of Travel Allocation

Table B-1 Project/Variant Daily and Peak Hour Worker Trips

Project/Variant	Locations	Daily Worker Trips	AM Peak Hour Worker Trips	PM Peak Hour Worker Trips
Proposed Project	Martin Substation	20	10	10
	Distribution Express Feeders	24	12	12
	Local Distribution System Separation	24	12	12
	System Reinforcements	20	10	10
	Operations Control Center	40	20	20
	Modifications to retain PG&E access	12	6	6
	Operations and Maintenance Service Yards	12	6	6
	Total Project Construction Workers	**152**	**76**	**76**
	525 Golden Gate Ave	732	73	73
	Operations and maintenance service yards	732	183	183
	Operations Control Center (3 shifts)	70	24	24
	Total Project Operations Workers	**1,534**	**280**	**280**
Project Variant	New City Substation	20	10	10
	Distribution Express Feeders	24	12	12
	Local Distribution System Separation	24	12	12
	System Reinforcements	20	10	10
	Operations Control Center	40	20	20
	Modifications to retain PG&E access	12	6	6
	Operations and Maintenance Service Yards	12	6	6
	Total Variant Construction Workers	**152**	**76**	**76**
	525 Golden Gate Ave	732	73	73
	Operations and maintenance service yards	732	183	183
	Operations Control Center (3 shifts)	70	24	24
	Total Variant Operations Workers	**1,534**	**280**	**280**

Table B-2 Way of Travel Percentages

Project/Variant	Locations	Way of Travel Percentages [a]			
		Auto	Transit	Other [b]	Total
Proposed Project and Project Variant	Martin Substation/New City Substation	96%	4%	0%	100%
	Distribution Express Feeders	96%	4%	0%	100%
	Local Distribution System Separation	96%	4%	0%	100%
	System Reinforcements	96%	4%	0%	100%
	Operations Control Center	96%	4%	0%	100%
	Modifications to retain PG&E access	96%	4%	0%	100%
	Operations and Maintenance Service Yards	96%	4%	0%	100%
	525 Golden Gate Ave	25%	29%	46%	100%
	Operations and maintenance service yards	96%	4%	0%	100%
	Operations Control Center (3 shifts)	96%	4%	0%	100%

PG&E Acquisition Project
Way of Travel Allocation

Table B-3 Daily Person Trips by Way of Travel

Project/Variant	Locations	Person Trips by Way of Travel			
		Auto	Transit	Other [b]	Total
Proposed Project and Project Variant	Martin Substation/New City Substation	19	1	-	20
	Distribution Express Feeders	23	1	-	24
	Local Distribution System Separation	23	1	-	24
	System Reinforcements	19	1	-	20
	Operations Control Center	39	1	-	40
	Modifications to retain PG&E access	12	-	-	12
	Operations and Maintenance Service Yards	12	-	-	12
	Total Construction Workers	**147**	**5**	**-**	**152**
	525 Golden Gate Ave	180	215	337	732
	Operations and maintenance service yards	706	26	-	732
	Operations Control Center (3 shifts)	67	3	-	70
	Total Operations Workers	**953**	**244**	**337**	**1,534**

Table B-4 AM Peak Hour Person Trips by Way of Travel

Project/Variant	Locations	Person Trips by Way of Travel			
		Auto	Transit	Other [b]	Total
Proposed Project and Project Variant	Martin Substation/New City Substation	10	-	-	10
	Distribution Express Feeders	12	-	-	12
	Local Distribution System Separation	12	-	-	12
	System Reinforcements	10	-	-	10
	Operations Control Center	19	1	-	20
	Modifications to retain PG&E access	6	-	-	6
	Operations and Maintenance Service Yards	6	-	-	6
	Total Construction Workers	**75**	**1**	**-**	**76**
	525 Golden Gate Ave	18	21	34	73
	Operations and maintenance service yards	176	7	-	183
	Operations Control Center (3 shifts)	23	1	-	24
	Total Operations Workers	**217**	**29**	**34**	**280**

Table B-5 PM Peak Hour Person Trips by Way of Travel

Project/Variant	Locations	Person Trips by Way of Travel			
		Auto	Transit	Other [b]	Total
Proposed Project and Project Variant	Martin Substation/New City Substation	10	-	-	10
	Distribution Express Feeders	12	-	-	12
	Local Distribution System Separation	12	-	-	12
	System Reinforcements	10	-	-	10
	Operations Control Center	19	1	-	20
	Modifications to retain PG&E access	6	-	-	6
	Operations and Maintenance Service Yards	6	-	-	6
	Total Construction Workers	**75**	**1**	**-**	**76**
	525 Golden Gate Ave	18	21	34	73
	Operations and maintenance service yards	176	7	-	183
	Operations Control Center (3 shifts)	23	1	-	24
	Total Operations Workers	**217**	**29**	**34**	**280**

Notes:

[a] Way of travel percentages for all locations except 525 Golden Gate Avenue are based on SF Guidelines data for the Outer Mission/Mission Hills area; Similar to BDFP EIR methodology, walk, bicycle, and other ways of travel percentages (except public transit) have been added to auto travel. Way of travel assumptions for 525 Golden Gate Ave are based on SF Guidelines data for the Downtown, Civic Center, North Beach area.

[b] Walk, bicycle travel, etc.

APPENDIX C
VEHICLE TRIPS

PG&E Acquisition Project
Vehicle Trip Inbound/Outbound Distribution

Table C-1 Project/Variant Daily Vehicle Trips

Project/Variant	Locations	Worker Auto Trips	Avg. Vehicle Occupancy [a]	Worker Vehicle Trips	Truck Trips	All Vehicle Trips		
						In	Out	Trips
Proposed Project	Martin Substation	19	1.13	16	12	14	14	28
	Distribution Express Feeders	23	1.13	20	40	30	30	60
	Local Distribution System Separation	23	1.13	20	4	12	12	24
	System Reinforcements	19	1.13	16	12	14	14	28
	Operations Control Center	39	1.13	34	16	25	25	50
	Modifications to retain PG&E access	12	1.13	10	6	8	8	16
	Operations and Maintenance Service Yards	12	1.13	10	4	7	7	14
	Total Construction	**147**		**126**	**94**	**110**	**110**	**220**
	525 Golden Gate Ave	180	1.20	150		75	75	150
	Operations and maintenance service yards	706	1.13	624		312	312	624
	Operations Control Center	67	1.13	60		30	30	60
	Total Operations	**953**		**834**	**-**	**417**	**417**	**834**
Project Variant	New City Substation	19	1.13	16	54	35	35	70
	Distribution Express Feeders	23	1.13	20	40	30	30	60
	Local Distribution System Separation	23	1.13	20	4	12	12	24
	System Reinforcements	19	1.13	16	12	14	14	28
	Operations Control Center	39	1.13	34	16	25	25	50
	Modifications to retain PG&E access	12	1.13	10	6	8	8	16
	Operations and Maintenance Service Yards	12	1.13	10	4	7	7	14
	Total Construction	**147**		**126**	**136**	**131**	**131**	**262**
	525 Golden Gate Ave	180	1.20	150		75	75	150
	Operations and maintenance service yards	706	1.13	624		312	312	624
	Operations Control Center	67	1.13	60		30	30	60
	Total Operations	**953**		**834**	**-**	**417**	**417**	**834**

Note:

[a] Average vehicle occupancy rates for all locations except 525 Golden Gate Ave are based on SF Guidelines data for the Outer Mission/Mission Hills area
Average occupancy rates for 525 Golden Gate Ave are based on SF Guidelines data for the Downtown, Civic Center, North Beach area.

PG&E Acquisition Project
Vehicle Trip Inbound/Outbound Distribution

Table C-2 Project/Variant AM Peak Hour Vehicle Trips

Project/Variant	Locations	Worker Auto Trips	Avg. Vehicle Occupancy [a]	Worker Vehicle Trips	Truck Trips	Worker Veh. Trips %		Truck Trips %		Worker Vehicle Trips		Truck Trips		All Vehicle Trips		
						In	Out	In	Out	In	Out	In	Out	In	Out	Total
Proposed Project	Martin Substation	10	1.13	8	2	100% [b]	0%	50% [c]	50%	8	-	1	1	9	1	10
	Distribution Express Feeders	12	1.13	10	6	100% [b]	0%	50% [c]	50%	10	-	3	3	13	3	16
	Local Distribution System Separation	12	1.13	10	2	100% [b]	0%	50% [c]	50%	10	-	1	1	11	1	12
	System Reinforcements	10	1.13	8	2	100% [b]	0%	50% [c]	50%	8	-	1	1	9	1	10
	Operations Control Center	19	1.13	17	2	100% [b]	0%	50% [c]	50%	17	-	1	1	18	1	19
	Modifications to retain PG&E access	6	1.13	5	2	100% [b]	0%	50% [c]	50%	5	-	1	1	6	1	7
	Operations and Maintenance Service Yards	6	1.13	5	2	100% [b]	0%	50% [c]	50%	5	-	1	1	6	1	7
	Total Construction	**75**		**63**	**18**					**63**	**-**	**9**	**9**	**72**	**9**	**81**
	525 Golden Gate Ave	18	1.20	15		51% [d]	49%			8	7	-	-	8	7	15
	Operations and maintenance service yards	176	1.13	156		100% [e]	0%			156	-	-	-	156	-	156
	Operations Control Center	23	1.13	20		50% [f]	50%			10	10	-	-	10	10	20
	Total Operations	**217**		**191**	**-**					**174**	**17**	**-**	**-**	**174**	**17**	**191**
Project Variant	New City Substation	10	1.13	8	8	100% [b]	0%	50% [c]	50%	8	-	4	4	12	4	16
	Distribution Express Feeders	12	1.13	10	6	100% [b]	0%	50% [c]	50%	10	-	3	3	13	3	16
	Local Distribution System Separation	12	1.13	10	2	100% [b]	0%	50% [c]	50%	10	-	1	1	11	1	12
	System Reinforcements	10	1.13	8	2	100% [b]	0%	50% [c]	50%	8	-	1	1	9	1	10
	Operations Control Center	19	1.13	17	2	100% [b]	0%	50% [c]	50%	17	-	1	1	18	1	19
	Modifications to retain PG&E access	6	1.13	5	2	100% [b]	0%	50% [c]	50%	5	-	1	1	6	1	7
	Operations and Maintenance Service Yards	6	1.13	5	2	100% [b]	0%	50% [c]	50%	5	-	1	1	6	1	7
	Total Construction	**75**		**63**	**24**					**63**	**-**	**12**	**12**	**75**	**12**	**87**
	525 Golden Gate Ave	18	1.20	15		51% [d]	49%			8	7	-	-	8	7	15
	Operations and maintenance service yards	176	1.13	156		100% [e]	0%			156	-	-	-	156	-	156
	Operations Control Center	23	1.13	20		50% [f]	50%			10	10	-	-	10	10	20
	Total Operations	**217**		**191**	**-**					**174**	**17**	**-**	**-**	**174**	**17**	**191**

Notes:

[a] Average vehicle occupancy rates for all locations except 525 Golden Gate Ave are based on SF Guidelines data for the Outer Mission/Mission Hills area Average occupancy rates for 525 Golden Gate Ave are based on SF Guidelines data for the Downtown, Civic Center, North Beach area.

[b] Assumes all construction worker trips are all inbound in the AM peak hour and all outbound in the PM peak hour, based on Biosolids EIR assumptions.

[c] Truck s generate hlaf inbound trips and half outbound trips during the peak hour, based on Biosolids EIR assumptions.

[d] Assumes reverse value as during the PM peak hour, based on Biosolids EIR assumptions.

[e] Assumes service yard worker trips are all inbound in the AM peak hour and all outbound in the PM peak hour, based on Biosolids EIR assumptions.

[f] Conservatively assumes that shift changes occur during the AM and PM peak hours.

PG&E Acquisition Project
Vehicle Trip Inbound/Outbound Distribution

Table C-3 Project/Variant PM Peak Hour Vehicle Trips

Project/Variant	Locations	Worker Auto Trips	Avg. Vehicle Occupancy [a]	Worker Vehicle Trips	Truck Trips	Worker Veh. Trips %		Truck Trips %		Worker Vehicle Trips		Truck Trips		All Vehicle Trips		
						Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Total
Proposed Project	Martin Substation	10	1.13	8	2	0% [b]	100%	50% [c]	50%	-	8	1	1	1	9	10
	Distribution Express Feeders	12	1.13	10	6	0% [b]	100%	50% [c]	50%	-	10	3	3	3	13	16
	Local Distribution System Separation	12	1.13	10	2	0% [b]	100%	50% [c]	50%	-	10	1	1	1	11	12
	System Reinforcements	10	1.13	8	2	0% [b]	100%	50% [c]	50%	-	8	1	1	1	9	10
	Operations Control Center	19	1.13	17	2	0% [b]	100%	50% [c]	50%	-	17	1	1	1	18	19
	Modifications to retain PG&E access	6	1.13	5	2	0% [b]	100%	50% [c]	50%	-	5	1	1	1	6	7
	Operations and Maintenance Service Yards	6	1.13	5	2	0% [b]	100%	50% [c]	50%	-	5	1	1	1	6	7
	Total Construction	**75**		**63**	**18**					**-**	**63**	**9**	**9**	**9**	**72**	**81**
	525 Golden Gate Ave	18	1.20	15		49% [g]	51%			7	8	-	-	7	8	15
	Operations and maintenance service yards	176	1.13	156		0% [e]	100%			-	156	-	-	-	156	156
	Operations Control Center	23	1.13	20		50% [f]	50%			10	10	-	-	10	10	20
	Total Operations	**217**		**191**	**-**					**17**	**174**	**-**	**-**	**17**	**174**	**191**
Project Variant	New City Substation	10	1.13	8	8	0% [b]	100%	50% [c]	50%	-	8	4	4	4	12	16
	Distribution Express Feeders	12	1.13	10	6	0% [b]	100%	50% [c]	50%	-	10	3	3	3	13	16
	Local Distribution System Separation	12	1.13	10	2	0% [b]	100%	50% [c]	50%	-	10	1	1	1	11	12
	System Reinforcements	10	1.13	8	2	0% [b]	100%	50% [c]	50%	-	8	1	1	1	9	10
	Operations Control Center	19	1.13	17	2	0% [b]	100%	50% [c]	50%	-	17	1	1	1	18	19
	Modifications to retain PG&E access	6	1.13	5	2	0% [b]	100%	50% [c]	50%	-	5	1	1	1	6	7
	Operations and Maintenance Service Yards	6	1.13	5	2	0% [b]	100%	50% [c]	50%	-	5	1	1	1	6	7
	Total Construction	**75**		**63**	**24**					**-**	**63**	**12**	**12**	**12**	**75**	**87**
	525 Golden Gate Ave	18	1.20	15		49% [g]	51%			7	8	-	-	7	8	15
	Operations and maintenance service yards	176	1.13	156		0% [e]	100%			-	156	-	-	-	156	156
	Operations Control Center	23	1.13	20		50% [f]	50%			10	10	-	-	10	10	20
	Total Operations	**217**		**191**	**-**					**17**	**174**	**-**	**-**	**17**	**174**	**191**

Notes:

[a] Average vehicle occupancy rates for all locations except 525 Golden Gate Ave are based on SF Guidelines data for the Outer Mission/Mission Hills area
Average occupancy rates for 525 Golden Gate Ave are based on SF Guidelines data for the Downtown, Civic Center, North Beach area.
[b] Assumes all construction worker trips are all inbound in the AM peak hour and all outbound in the PM peak hour, based on Biosolids EIR assumptions.
[c] Truck s generate hlaf inbound trips and half outbound trips during the peak hour, based on Biosolids EIR assumptions.
[d] Assumes reverse value as during the PM peak hour, based on Biosolids EIR assumptions.
[e] Assumes service yard worker trips are all inbound in the AM peak hour and all outbound in the PM peak hour, based on Biosolids EIR assumptions.
[f] Conservatively assumes that shift changes occur during the AM and PM peak hours.
[g] Based on SF Guidelines data for office workers in the Downtown, Civic Center, North Beach area.

APPENDIX D
ORIGIN/DESTINATION DISTRIBUTION

PG&E Acquisition Project
Vehicle and Transit Trip Origin/Destination Distribution

Table D-1 Worker Trip Distribution Assumptions [a]

Place of Origin/Destination	SD 1 [b]	SD 3 [c]
San Francisco NE Quadrant (SD 1)	14.6%	8.3%
San Francisco NW Quadrant (SD 2)	14.1%	8.8%
San Francisco SE Quadrant (SD 3)	20.4%	26.8%
San Francisco SW Quadrant (SD 4)	2.5%	15.0%
East Bay	22.2%	11.7%
North Bay	9.9%	5.1%
South Bay	16.4%	24.4%
All Origins/Destinations	**100.0%**	**100.0%**

Notes:

[a] Based on SF Guidelines data.

[b] Downtown, North Beach, Civic Center area.

[c] Outer Mission/Hills area.

Table D-2 Project/Variant AM and PM Peak Hour Construction Worker Vehicle Trips

Project/Variant	Locations	Total Worker Vehicle Trips	Place of Origin/Destination (Based on % from Table 5-1)						
			SF NE Quad. SD 1	SF NW Quad. SD 2	SF SE Quad. SD 3	SF SW Quad. SD 4	East Bay	North Bay	South Bay
Proposed Project and Project Variant	Martin Substation/New City Substation	8.0	0.7	0.7	2.1	1.2	0.9	0.4	2.0
	Distribution Express Feeders	10.0	0.8	0.9	2.7	1.5	1.2	0.5	2.4
	Local Distribution System Separation	10.0	0.8	0.9	2.7	1.5	1.2	0.5	2.4
	System Reinforcements	8.0	0.7	0.7	2.1	1.2	0.9	0.4	2.0
	Operations Control Center	17.0	1.4	1.5	4.6	2.5	2.0	0.9	4.1
	Modifications to retain PG&E access	5.0	0.4	0.4	1.3	0.7	0.6	0.3	1.2
	Operations and Maintenance Service Yards	5.0	0.4	0.4	1.3	0.7	0.6	0.3	1.2
	Total Construction Workers	**63.0**	**5.2**	**5.5**	**16.9**	**9.4**	**7.4**	**3.2**	**15.4**

Table D-3 Project/Variant AM and PM Peak Hour Construction Worker Transit Trips

Project/Variant	Locations	Total Worker Transit Trips	Place of Origin/Destination (Based on % from Table 5-1)						
			SF NE Quad. SD 1	SF NW Quad. SD 2	SF SE Quad. SD 3	SF SW Quad. SD 4	East Bay	North Bay	South Bay
Proposed Project and Project Variant	Martin Substation/New City Substation	-	-	-	-	-	-	-	-
	Distribution Express Feeders	-	-	-	-	-	-	-	-
	Local Distribution System Separation	-	-	-	-	-	-	-	-
	System Reinforcements	-	-	-	-	-	-	-	-
	Operations Control Center	1.0	0.1	0.1	0.3	0.1	0.1	0.1	0.2
	Modifications to retain PG&E access	-	-	-	-	-	-	-	-
	Operations and Maintenance Service Yards	-	-	-	-	-	-	-	-
	Total Construction Workers	**1.0**	**0.1**	**0.1**	**0.3**	**0.1**	**0.1**	**0.1**	**0.2**

PG&E Acquisition Project
Vehicle and Transit Trip Origin/Destination Distribution

Table D-4 Project/Variant AM Peak Hour Operations Worker Vehicle Trips

Project/Variant	Locations	Total Worker Vehicle Trips	Place of Origin/Destination (Based on % from Table 5-1)						
			SF NE Quad. SD 1	SF NW Quad. SD 2	SF SE Quad. SD 3	SF SW Quad. SD 4	East Bay	North Bay	South Bay
Proposed Project and Project Variant	**INBOUND+OUTBOUND**								
	525 Golden Gate Ave	15.0	2.2	2.1	3.1	0.4	3.3	1.5	2.5
	Operations and maintenance service yards	156.0	13.0	13.7	41.8	23.4	18.2	7.9	38.0
	Operations Control Center (3 shifts)	20.0	1.7	1.8	5.4	3.0	2.3	1.0	4.9
	Total Operations Workers	**191.0**	**16.8**	**17.5**	**50.2**	**26.7**	**23.9**	**10.4**	**45.4**
	INBOUND								
	525 Golden Gate Ave	7.7	1.1	1.1	1.6	0.2	1.7	0.8	1.3
	Operations and maintenance service yards	156.0	13.0	13.7	41.8	23.4	18.2	7.9	38.0
	Operations Control Center (3 shifts)	10.0	0.8	0.9	2.7	1.5	1.2	0.5	2.4
	Total Operations Workers	**173.7**	**14.9**	**15.6**	**46.0**	**25.1**	**21.1**	**9.2**	**41.7**
	OUTBOUND								
	525 Golden Gate Ave	7.4	1.1	1.0	1.5	0.2	1.6	0.7	1.2
	Operations and maintenance service yards	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Operations Control Center (3 shifts)	10.0	0.8	0.9	2.7	1.5	1.2	0.5	2.4
	Total Operations Workers	**17.4**	**1.9**	**1.9**	**4.2**	**1.7**	**2.8**	**1.2**	**3.6**

Table D-5 Project/Variant PM Peak Hour Operations Worker Vehicle Trips

Project/Variant	Locations	Total Worker Vehicle Trips	Place of Origin/Destination (Based on % from Table 5-1)						
			SF NE Quad. SD 1	SF NW Quad. SD 2	SF SE Quad. SD 3	SF SW Quad. SD 4	East Bay	North Bay	South Bay
Proposed Project and Project Variant	**INBOUND+OUTBOUND**								
	525 Golden Gate Ave	15.0	2.2	2.1	3.1	0.4	3.3	1.5	2.5
	Operations and maintenance service yards	156.0	13.0	13.7	41.8	23.4	18.2	7.9	38.0
	Operations Control Center (3 shifts)	20.0	1.7	1.8	5.4	3.0	2.3	1.0	4.9
	Total Operations Workers	**191.0**	**16.8**	**17.5**	**50.2**	**26.7**	**23.9**	**10.4**	**45.4**
	INBOUND								
	525 Golden Gate Ave	7.4	1.1	1.0	1.5	0.2	1.6	0.7	1.2
	Operations and maintenance service yards	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Operations Control Center (3 shifts)	10.0	0.8	0.9	2.7	1.5	1.2	0.5	2.4
	Total Operations Workers	**17.4**	**1.9**	**1.9**	**4.2**	**1.7**	**2.8**	**1.2**	**3.6**
	OUTBOUND								
	525 Golden Gate Ave	7.7	1.1	1.1	1.6	0.2	1.7	0.8	1.3
	Operations and maintenance service yards	156.0	13.0	13.7	41.8	23.4	18.2	7.9	38.0
	Operations Control Center (3 shifts)	10.0	0.8	0.9	2.7	1.5	1.2	0.5	2.4
	Total Operations Workers	**173.7**	**14.9**	**15.6**	**46.0**	**25.1**	**21.1**	**9.2**	**41.7**

PG&E Acquisition Project
Vehicle and Transit Trip Origin/Destination Distribution

Table D-6 Project/Variant AM Peak Hour Operations Worker Transit Trips

Project/Variant	Locations	Total Worker Transit Trips	Place of Origin/Destination (Based on % from Table 5-1)						
			SF NE Quad. SD 1	SF NW Quad. SD 2	SF SE Quad. SD 3	SF SW Quad. SD 4	East Bay	North Bay	South Bay
Proposed Project and Project Variant	**INBOUND+OUTBOUND**								
	525 Golden Gate Ave	21	3	3	4	1	5	2	3
	Operations and maintenance service yards	7	1	1	2	1	1	0	2
	Operations Control Center (3 shifts)	1	0	0	0	0	0	0	0
	Total Operations Workers	**29**	**4**	**4**	**6**	**2**	**6**	**2**	**5**
	INBOUND								
	525 Golden Gate Ave	11	2	2	2	0	2	1	2
	Operations and maintenance service yards	7	1	1	2	1	1	0	2
	Operations Control Center (3 shifts)	1	0	0	0	0	0	0	0
	Total Operations Workers	**18**	**2**	**2**	**4**	**1**	**3**	**1**	**4**
	OUTBOUND								
	525 Golden Gate Ave	10	2	1	2	0	2	1	2
	Operations and maintenance service yards	-	-	-	-	-	-	-	-
	Operations Control Center (3 shifts)	1	0	0	0	0	0	0	0
	Total Operations Workers	**11**	**2**	**1**	**2**	**0**	**2**	**1**	**2**

Table D-7 Project/Variant PM Peak Hour Operations Worker Transit Trips

Project/Variant	Locations	Total Worker Transit Trips	Place of Origin/Destination (Based on % from Table 5-1)						
			SF NE Quad. SD 1	SF NW Quad. SD 2	SF SE Quad. SD 3	SF SW Quad. SD 4	East Bay	North Bay	South Bay
Proposed Project and Project Variant	**INBOUND+OUTBOUND**								
	525 Golden Gate Ave	21.0	3.1	3.0	4.3	0.5	4.7	2.1	3.4
	Operations and maintenance service yards	7.0	0.6	0.6	1.9	1.0	0.8	0.4	1.7
	Operations Control Center (3 shifts)	1.0	0.1	0.1	0.3	0.1	0.1	0.1	0.2
	Total Operations Workers	**29.0**	**3.7**	**3.7**	**6.4**	**1.7**	**5.6**	**2.5**	**5.4**
	INBOUND								
	525 Golden Gate Ave	10.3	1.5	1.4	2.1	0.3	2.3	1.0	1.7
	Operations and maintenance service yards	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Operations Control Center (3 shifts)	0.5	0.0	0.0	0.1	0.1	0.1	0.0	0.1
	Total Operations Workers	**10.8**	**1.5**	**1.5**	**2.2**	**0.3**	**2.3**	**1.0**	**1.8**
	OUTBOUND								
	525 Golden Gate Ave	10.7	1.6	1.5	2.2	0.3	2.4	1.1	1.8
	Operations and maintenance service yards	7.0	0.6	0.6	1.9	1.0	0.8	0.4	1.7
	Operations Control Center (3 shifts)	0.5	0.0	0.0	0.1	0.1	0.1	0.0	0.1
	Total Operations Workers	**18.2**	**2.2**	**2.2**	**4.2**	**1.4**	**3.3**	**1.4**	**3.6**

PG&E Acquisition Project
Vehicle and Transit Trip Origin/Destination Distribution

Table D-8 Project/Variant AM and PM Peak Hour Truck Trips

Project/Variant	Locations	Total Truck Trips	Max. Demand Truck Type [d]	Place of Origin/Destination		
				Amador St. San Francisco	Peninsula and South Bay	East Bay and beyond
Proposed Project	Martin Substation	2	Concrete	2		
	Distribution Express Feeders	6	All Combined		3	3
	Local Distribution System Separation	2	All Combined		1	1
	System Reinforcements	2	All Combined		1	1
	Operations Control Center	2	Haul (In+Out)		2	
	Modifications to retain PG&E access	2	All Combined		1	1
	Operations and Maintenance Service Yards	2	All Combined		1	1
	Total Construction Truck Trips	**18**		**2**	**9**	**7**
Project Variant	New City Substation	8	Concrete	8		
	Distribution Express Feeders	6	All Combined		3	3
	Local Distribution System Separation	2	All Combined		1	1
	System Reinforcements	2	All Combined		1	1
	Operations Control Center	2	Haul (In+Out)		2	
	Modifications to retain PG&E access	2	All Combined		1	1
	Operations and Maintenance Service Yards	2	All Combined		1	1
	Total Construction Truck Trips	**24**		**8**	**9**	**7**

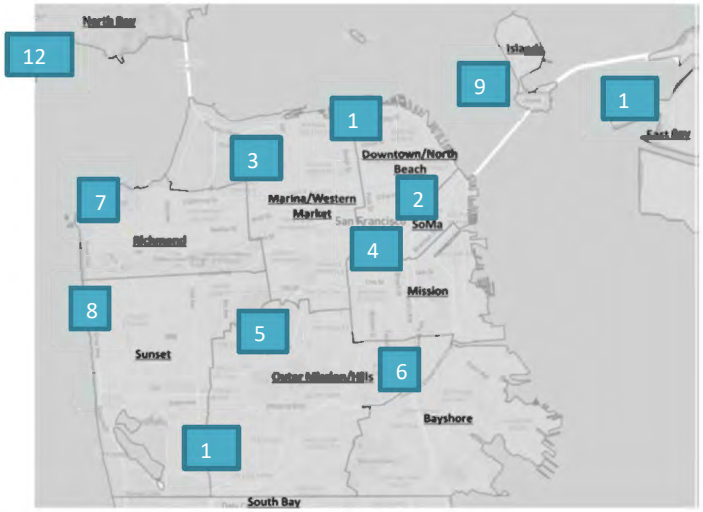
Note:

[d] Type of truck generating the maximum number of trips per day.

APPENDIX E
SF GUIDELINES ASSUMPTIONS

PG&E Acquisition Project
SF Guidelines Assumptions

DIST	DISTNAME	FULLNAME	Place Type	SD
1	Downtown	Downtown/NorthE	1	1
2	SoMa	SoMa	1	1
3	Marina/WesternMarket	Marina/WesternM	2	2
4	Mission/Potrero	Mission/Potrero	2	3
5	OuterMission/Hills	OuterMission/Hills	3	3
6	Bayshore	Bayshore	3	3
7	Richmond	Richmond	2	2
8	Sunset	Sunset	3	4
9	Islands	Islands	4	EB
10	South Bay	South Bay	4	SB
11	East Bay	East Bay	4	EB
12	North Bay	North Bay	4	NB



Office guidelines

Daily Person Trip Rate	15.7	per 1000 gsf
PM Person Trip Rate	1.4	per 1000 gsf
	8.9%	

Employment density SFCTA	270	gsf per job
SF Planning 2017	4.2	daily trips per person
	0.4	PM peak hour trips per person

Trip distribution by: Placetype Daily

DAILY TRIPS	OFFICE LAND USE FOR PLACETYPE 1 Downtown/NorthBeach								
	Auto Person Trips				Transit Trips				AVO
	Inbound		Outbound		Inbound		Outbound		Inbound +
To/From	Work	Other	Work	Other	Work	Other	Work	Other	Outbound
Downtown / NorthBeach	7.2%	0.5%	4.9%	0.5%	2.1%	0.2%	2.6%	0.2%	1.59
SoMa	1.1%	0.0%	0.9%	0.0%	0.4%	0.0%	0.2%	0.0%	1.16
Marina / WesternMarket	4.7%	0.2%	5.4%	0.1%	3.8%	0.0%	3.2%	0.0%	1.14
Mission / Potrero	0.9%	0.0%	1.0%	0.0%	3.2%	0.0%	3.9%	0.0%	1.06
Outer Mission / Mission Hills	4.3%	0.0%	7.0%	0.0%	3.8%	0.0%	2.5%	0.0%	1.12
Bayshore	4.2%	0.0%	2.2%	0.0%	0.6%	0.0%	1.3%	0.0%	1.08
Richmond	1.4%	0.0%	2.0%	0.0%	1.6%	0.0%	1.6%	0.0%	1.14
Sunset	1.4%	0.0%	1.0%	0.0%	4.2%	0.0%	3.7%	0.0%	1.33
Islands	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00
South Bay	7.9%	0.0%	7.8%	0.1%	5.4%	0.0%	7.5%	0.0%	1.04
East Bay	11.7%	0.5%	9.6%	1.7%	20.8%	0.9%	20.3%	0.0%	1.29
North Bay	4.5%	0.3%	5.0%	0.3%	3.3%	0.0%	2.7%	0.0%	1.19
All Origins/Destinations	**49.2%**	**1.4%**	**46.7%**	**2.7%**	**49.2%**	**1.1%**	**49.5%**	**0.2%**	**1.20**

	Auto Person Trips				Transit Trips				Auto Person Trips Inbound+Outbound	
	Inbound		Outbound		Inbound		Outbound			
To/From	Work	Other	Work	Other	Work	Other	Work	Other	Work	
SD1	8.2%	0.5%	5.8%	0.5%	2.5%	0.2%	2.8%	0.2%	14.0%	14.6%
SD2	6.1%	0.2%	7.4%	0.1%	5.4%	0.0%	4.8%	0.0%	13.5%	14.1%
SD3	9.3%	0.0%	10.2%	0.0%	7.6%	0.0%	7.8%	0.0%	19.5%	20.4%
SD4	1.4%	0.0%	1.0%	0.0%	4.2%	0.0%	3.7%	0.0%	2.4%	2.5%
EB	11.7%	0.5%	9.6%	1.7%	20.8%	0.9%	20.3%	0.0%	21.3%	22.2%
NB	4.5%	0.3%	5.0%	0.3%	3.3%	0.0%	2.7%	0.0%	9.5%	9.9%
SB	7.9%	0.0%	7.8%	0.1%	5.4%	0.0%	7.5%	0.0%	15.7%	16.4%
All Origins/Destinations	**49.2%**	**1.4%**	**46.7%**	**2.7%**	**49.2%**	**1.1%**	**49.5%**	**0.2%**	**95.9%**	**100.0%**
	100.0%				100.0%					

In	Out
50.6%	49.4%

Place Type:	Office 1	Office 2	Office 3
Auto	18.4%	37.4%	69.5%
Taxi / TNC	6.1%	11.1%	2.0%
Public Transit	28.8%	18.6%	3.6%
Walk	42.3%	17.1%	5.7%
Bike	3.7%	2.8%	0.6%
Shuttle	0.6%	12.9%	18.6%
Total	**100.0%**	**100.0%**	**100.0%**
HOV Driver+HOV Pax [a]	*6.2%*	*9.8%*	*13.3%*

[a] Included in Auto

	SFPUC Project (Admin)
Auto	24.5%
Transit	29.4%
Other	46.0%
	100.0%

Trip distribution by: Placetype Daily

DAILY TRIPS	OFFICE LAND USE FOR PLACETYPE 3 OuterMission/Hills								
	Auto Person Trips				Transit Trips				AVO
	Inbound		Outbound		Inbound		Outbound		Inbound +
To/From	Work	Other	Work	Other	Work	Other	Work	Other	Outbound
Downtown / NorthBeach	4.1%	0.0%	3.6%	0.0%	11.1%	0.5%	5.2%	0.5%	1.03
SoMa	0.1%	0.0%	0.2%	0.7%	0.0%	0.0%	0.0%	0.0%	1.82
Marina / WesternMarket	2.9%	0.0%	4.5%	0.0%	0.5%	0.0%	0.5%	0.0%	1.02
Mission / Potrero	3.4%	0.0%	4.6%	0.0%	8.6%	0.0%	8.6%	0.0%	1.01
Outer Mission / Mission Hills	7.7%	0.0%	6.5%	0.0%	4.7%	0.0%	4.2%	0.0%	1.02
Bayshore	1.4%	0.0%	2.2%	0.0%	6.1%	0.0%	1.8%	0.0%	1.22
Richmond	1.0%	0.0%	0.1%	0.0%	1.7%	0.0%	1.7%	0.0%	1.79
Sunset	7.2%	1.2%	7.2%	0.5%	4.8%	1.6%	2.4%	1.6%	1.15
Islands	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00
South Bay	12.5%	0.5%	11.1%	0.4%	9.6%	0.0%	0.8%	0.0%	1.09
East Bay	4.6%	0.0%	6.7%	0.0%	5.6%	0.0%	10.7%	0.0%	1.57
North Bay	2.3%	0.0%	2.6%	0.0%	0.9%	0.0%	6.8%	0.0%	1.11
All Origins/Destinations	**47.4%**	**1.7%**	**49.3%**	**1.6%**	**53.4%**	**2.1%**	**42.5%**	**2.1%**	**1.13**

	Auto Person Trips				Transit Trips				Auto Person Trips Inbound+Outbound	
	Inbound		Outbound		Inbound		Outbound			
To/From	Work	Other	Work	Other	Work	Other	Work	Other	Work	
SD1	4.3%	0.0%	3.8%	0.7%	11.1%	0.5%	5.2%	0.5%	8.1%	8.3%
SD2	3.9%	0.0%	4.6%	0.0%	2.2%	0.0%	2.2%	0.0%	8.5%	8.8%
SD3	12.6%	0.0%	13.4%	0.0%	19.4%	0.0%	14.5%	0.0%	25.9%	26.8%
SD4	7.2%	1.2%	7.2%	0.5%	4.8%	1.6%	2.4%	1.6%	14.5%	15.0%
EB	4.6%	0.0%	6.7%	0.0%	5.6%	0.0%	10.7%	0.0%	11.3%	11.7%
NB	2.3%	0.0%	2.6%	0.0%	0.9%	0.0%	6.8%	0.0%	4.9%	5.1%
SB	12.5%	0.5%	11.1%	0.4%	9.6%	0.0%	0.8%	0.0%	23.6%	24.4%
All Origins/Destinations	**47.4%**	**1.7%**	**49.3%**	**1.6%**	**53.4%**	**2.1%**	**42.5%**	**2.1%**	**96.7%**	**100.0%**
	100.0%				100.0%					
	In		**Out**							
	49.1%		50.9%							

	Office		
Place Type:	**1**	**2**	**3**
Auto	18.4%	37.4%	69.5%
Taxi / TNC	6.1%	11.1%	2.0%
Public Transit	28.8%	18.6%	3.6%
Walk	42.3%	17.1%	5.7%
Bike	3.7%	2.8%	0.6%
Other	0.6%	12.9%	18.6%
Total	**100.0%**	**100.0%**	**100.0%**
HOV Driver+HOV Pax [a]	*6.2%*	*9.8%*	*13.3%*

[a] Included in Auto

	SFPUC Project (Field) [b]
Auto	96.4%
Transit	3.6%
Other	
	100.0%

[b] Adapted from SF Guidelines; Walk and Other trip % moved to Auto.

PG&E Power Asset Acquisition EIR

Comparison of Peak Hour Volumes and Capacities during Construction of Distribution Express Feeders

Segment Location		Count Date	No. of lanes through per direction	If One Northbound or Eastbound Travel Lane is Closed								If One Southbound or Westbound Travel Lane is Closed							
				Northbound/Eastbound				Southbound/Westbound				Northbound/Eastbound				Southbound/Westbound			
				Vehicles		Capacity [d]	v/c [e]	Vehicles		Capacity [d]	v/c	Vehicles		Capacity [d]	v/c	Vehicles		Capacity [d]	v/c
Bayshore Blvd	South of Geneva Ave	Jun 2024	2	980	[a]	840	1.17	829	[a]	1,690	0.49	980	[a]	1,690	0.58	829	[a]	840	0.99
Geneva Ave	West of Bayshore Blvd	Jun 2024	2	843	[a]	840	1.00	947	[a]	1,690	0.56	843	[a]	1,690	0.50	947	[a]	840	1.13
	East of Schwerin St	Jun 2024	2	808	[a]	840	0.96	966	[a]	1,690	0.57	808	[a]	1,690	0.48	966	[a]	840	1.15
	West of Schwerin St	Jun 2024	2	558	[b]	840	0.66	458	[b]	1,690	0.27	558	[b]	1,690	0.33	458	[b]	840	0.55
	East of Alemany Blvd	Apr 2023	2	594	[b]	780	0.76	799	[b]	1,570	0.51	594	[b]	1,570	0.38	799	[b]	780	1.02
Alemany Blvd	South of Geneva Ave	Apr 2023	2	598	[b]	780	0.77	530	[b]	1,570	0.34	598	[b]	1,570	0.38	530	[b]	780	0.68
Sagamore St	Capitol Ave to Orizaba Ave	Oct 2023	1 EB, 2 WB	246	[a]	------	------	1,281	[a]	1,570	0.82	246	[a]	780	0.32	1,281	[a]	780	1.64
Brotherhood Wy	Alemany Blvd to Arch St	Oct 2023	2	1,102	[c]	780	1.41	932	[c]	1,600	0.58	1,102	[c]	1,600	0.69	932	[c]	780	1.19

Notes:

[a] Maximum of a.m. or p.m. peak hour traffic

[b] Minimum of a.m. or p.m. peak hour traffic

[c] Maximum hourly traffic between 9 a.m. and 3 p.m.

[d] Based on Exhibit 10-7 Examples Service Volumes for Urban Streets, Highway Capacity Manual, Transportation Research Board, Washington DC, June 2006

[e] v/c = volume to capacity ratio

assumes closure of one travel lane for construction

volume to capacity ratio exceeds 1.02

SF Blue Book Table 1: Streets of Major Importance Restrictions:

Geneva Avenue	Schwerin - Santos	4 p.m. - 7 p.m. eastbound/westbound
Geneva Avenue	Santos - Paris	4 p.m. - 7 p.m. eastbound/westbound
Geneva Avenue	Paris - Ocean	7 a.m. - 9 a.m. and 4 p.m. - 7 p.m. eastbound/westbound
Alemany Blvd	Ocean - Bayshore	4 p.m. - 7 p.m. eastbound/westbound
Brotherhood Way	Lake Merced - Alemany	7 a.m. - 9 a.m. and 3 p.m. - 7 p.m. eastbound/westbound

APPENDIX H
BIOLOGICAL RESOURCES TECHNICAL MEMORANDUM

PAGE INTENTIONALLY BLANK

BIOLOGICAL RESOURCES TECHNICAL MEMORANDUM

PG&E POWER ASSET ACQUISITION PROJECT, SAN MATEO AND SAN FRANCISCO COUNTY, CALIFORNIA

PREPARED FOR:
Environmental Science Associates
San Francisco Planning Department

PREPARED BY:

Coast Ridge Ecology
1410 31st Avenue
San Francisco, CA 94122

July 2024

TABLE OF CONTENTS

I. INTRODUCTION **2**
II. SUMMARY OF FINDINGS **2**
III. PROJECT DESCRIPTION **2**
IV. PROJECT SETTING **6**
EXISTING CONDITIONS 6
V. REGULATORY CONSIDERATIONS **7**
VI. METHODS **16**
VII. RESULTS **17**
SOILS 17
HABITAT TYPES 17
Urban/Suburban 17
Emergent Freshwater Wetlands, Lakes and Ponds 17
Salt Marsh Wetland 17
Grasslands 18
SENSITIVE NATURAL COMMUNITIES 18
Pickleweed Mats 18
CRITICAL HABITAT 18
SPECIAL STATUS SPECIES 19
VIII. WILDLIFE MOVEMENT AND MIGRATION CORRIDORS **26**
X. REFERENCES **26**
APPENDIX A: PHOTOS
APPENDIX B: SPECIAL STATUS SPECIES COMPREHENSIVE TABLE
APPENDIX C: FIGURES

I. INTRODUCTION

The City and County of San Francisco ("City") is proposing (1) the purchase ("acquisition") of Pacific Gas and Electric Company (PG&E)-owned electrical transmission and distribution assets ("Assets") located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco, and (2) other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco ("separation"). After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition to acquiring the necessary transmission and distribution system and electrical facilities, the City would physically separate PG&E's electrical system into two separate systems.

The purpose of this technical memorandum is to describe vegetation communities and wildlife habitat in the project area and surrounding area, shown in Figure 1, and assess potential occurrences of sensitive resources, including special status plant and wildlife species in the project area. To identify potential biological resources, occurrences of special status plant and wildlife species within a 3-mile buffer of the project area (collectively referred to as the "study area") were reviewed.

II. SUMMARY OF FINDINGS

Project components primarily occur within existing public roads, rights of way or on existing equipment. Most of the project area is within urban and suburban developed areas that are comprised of ornamental and ruderal vegetation and are devoid of native plant communities and provide minimal wildlife habitat. In a few areas, existing infrastructure passes through areas with potential to provide habitat for sensitive species.

III. PROJECT DESCRIPTION

The City is proposing (1) purchase ("acquisition") of PG&E-owned electrical transmission and distribution assets ("Assets") located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco, and (2) other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco ("separation"). The terms "PG&E Power Asset Acquisition Project" and "project" refer to the acquisition and separation, including construction and related work required for independent operation of the system.

The Assets include equipment, facilities, property, and records that the City would acquire, including the following:

- PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer serving distribution lines, and related facilities)
- PG&E's 115 *kilovolt*[1] (kV) and 230 kV transmission assets (substations, transmission lines, transformers, and related facilities needed for operations)

[1] Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

- Certain PG&E distribution lines in Brisbane emanating from the Martin Substation that serve customers in San Francisco[2]
- A portion of the Martin Substation facilities (located in Brisbane) or *interconnections*[3] needed to enable the San Francisco Public Utilities Commission (SFPUC) to control all power flows from Martin Substation into San Francisco
- Other systems and equipment, materials, records, operating and maintenance facilities, property, and other land-related agreements as necessary for safe and reliable operation, maintenance, repair, control, and protection of the acquired transmission and distribution system

After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition, the City would acquire property rights as needed to operate and maintain the Assets and new City equipment, as needed, on public and private lands. This transaction would not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.[4]

In addition to acquiring the necessary transmission and distribution system and electrical facilities, the City would physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco-San Mateo County border), to allow both systems to be safely, reliably, and independently operated by the SFPUC and PG&E. After the proposed separation of the system, the SFPUC would provide electricity service to customers in San Francisco currently served by PG&E; PG&E would continue to provide electricity service to its customers outside San Francisco.

The construction portion of the project is anticipated to take approximately 3 to 5 years after the acquisition of the Assets. It is anticipated that the City and PG&E would coordinate on the implementation of the project.

---

2 Existing distribution lines serving only San Francisco customers would be acquired by the City. Distribution lines serving only PG&E customers outside of San Francisco would remain with PG&E. Finally, some of the distribution lines serve both customers in San Francisco and customers outside of San Francisco. These feeders would be separated at the border and the City would construct new infrastructure to ensure that each utility would have its own system and that all customers would continue to be served.

3 Interconnection is defined as an electrical connection between multiple entities.

4 In addition, the interconnection between the transmission system in San Francisco and the Trans Bay Cable (TBC), and TBC operation, would not be physically changed as a result of the acquisition.

Project Component	Component Purpose	Component Description	Location
PROPOSED PROJECT			
Martin Substation Separation	Enable the City to transmit electricity to San Francisco customers from PG&E's transmission lines in San Mateo County. Once separated, the substation would also be used to step down transmission voltages to distribution service voltages to serve customers in San Francisco.	Reconfigure and partition the existing PG&E Martin Substation into two interconnected utility systems—one serving San Francisco and one serving PG&E's remaining customers in San Mateo County.	Existing PG&E Martin Substation, at the intersection of Geneva Avenue and Bayshore Boulevard in Brisbane.
Distribution Express Feeders[5]	Distribute electricity from the Martin Substation to areas in San Francisco that are currently supplied by distribution lines originating from PG&E's existing Daly City Substation, a substation located in San Mateo County. The existing distribution lines from Daly City would be disconnected at the border after completion.	Install approximately 3.8 miles of *duct banks*[6] for new underground distribution express feeders from the Martin Substation, consisting of approximately 0.3 mile of duct banks in Brisbane, approximately 0.5 mile in Daly City, and approximately 3 miles in San Francisco.	Geneva Avenue in Brisbane and Daly City. Geneva Avenue, Alemany Boulevard, Huron Avenue, Sickles Avenue, Sagamore Street, and Brotherhood Way in San Francisco.
Local Distribution System Separation	Connect San Francisco customers to the City's electrical system and San Mateo County customers to PG&E.	Reconfigure and separate overhead and underground distribution lines around the county border, including approximately 3.9 miles of underground work.	Approximately 70 work areas within the project area generally along the San Francisco-San Mateo County border.
System Reinforcements	Ensure for both the City and PG&E systems electrical system reliability and ability to restore power in the event of outages.	Install and replace overhead and underground equipment to maintain service reliability on existing lines, including approximately 4.2 miles of underground work.	Approximately 25 work areas within the project area on both sides of the San Francisco-San Mateo County border.
Modifications to Retain PG&E Access to Non-Electrical Facilities	Provide continued access for PG&E's operation of non-electrical facilities where such facilities would	Modify fencing and ingress/egress, at certain sites with non-electrical facilities.	Martin Substation (on Geneva Avenue between Schwerin Street and

[5] Generally, electrical distribution express feeders are lines that deliver electricity to electrical loads (i.e., customers). Distribution express feeders are lines used to serve loads further away from the substation by bypassing other customers.

[6] Duct bank is defined as an underground concrete trench designed to protect a series of conduits (PVC, HDPE or equivalent) housing electrical cables.

Project Component	Component Purpose	Component Description	Location
	be located adjacent to electric facilities to be acquired by the City.		Bayshore Boulevard in Brisbane). Potrero Substation (on Illinois Street between Humboldt and 23rd Street) and other substations in San Francisco.
Operations Control Center[7]	Provide an office facility needed for dispatchers and operators. Centralize data on transmission and distribution systems status and security.	Modify interior of an existing building, upgrade utilities, install fencing and new standby diesel generator.	An existing commercial or office building in the southeastern part of San Francisco.
Operations and Maintenance Service Yards; Materials and Equipment Storage	Securely store equipment, trucks, and other supplies for operations and maintenance of the power grid in San Francisco, including vehicle parking spaces and containment for hazardous materials, such as transformer oils. In addition, provide offices for workers.	Modify existing yards (e.g., fencing).	Existing maintenance and storage properties, vacant parcels, or space at acquired substations in southeastern San Francisco.
Telecommunications Equipment	Provide a network to enable prompt and reliable exchange of information for the safe and secure operation, control, and protection of power system equipment.	Install equipment at substations (e.g., remote terminal units) inside control room (no excavation). Install fiber optic cables between substations and other telecommunication aggregation points underground within existing or new duct banks. Install other telecommunications equipment (e.g., wireless mesh *SMART*[8] devices) mounted in underground in vaults or on existing poles (no excavation).	Existing or proposed substations, control centers, underground duct banks, and mounted on poles throughout San Francisco and south of the border within the project boundaries.

[7] In addition to staff at the new operations control center and operations and maintenance service yards, approximately 183 staff hired by the City would have offices in SFPUC's existing offices located at 525 Golden Gate Avenue in San Francisco.

[8] SMART is defined as Self-Monitoring, Analysis and Reporting Technology; it allows users to connect a device to the internet.

Project Component	Component Purpose	Component Description	Location
PROJECT VARIANT			
New City Substation	Interconnect the City's transmission system with PG&E's transmission system and maintain distribution service to San Francisco customers formerly served by PG&E from the Martin Substation.	Construct a new substation at the site adjacent to the existing Martin Substation (Daly City Yard), instead of implementing the Martin Substation separation. Install new incoming transmission lines from Martin Substation to the new substation and outgoing transmission and distribution lines from the new substation to the existing distribution system serving customers in San Francisco.	Daly City Yard, 731 Schwerin Street, Daly City.
All Other Components	The other components of the project variant would be the same as listed above for the proposed project.		

IV. PROJECT SETTING

The project is primarily located around the San Francisco/San Mateo County border. This encompasses the southern portions of the City and County of San Francisco and the northern portions of the cities of Brisbane and Daly City, and unincorporated San Mateo County. Work is proposed to be performed in various locations on both sides of the County border up to 1.7 miles north and 1.6 miles south of the border (Figure 1).

Existing Conditions

The project area is located within the San Francisco Bay and Lake Merced watersheds. The San Francisco Bay watershed encompasses 4,600 square miles and the tributary rivers that drain into the bay include the Petaluma, Napa, and Guadalupe Rivers and smaller creeks and streams. The San Francisco Bay Area is home to over 7 million people. The San Francisco Bay has reduced in size by approximately one-third since 1850 due to being filled in, diked, and sediment from upstream erosion and mining being washed into the bay (U.S. Environmental Protection Agency, 2012). Most of the project area is within the San Francisco Bay watershed, which includes several smaller sub-watersheds within northern San Mateo County and eastern San Francisco County. The Lake Merced watershed is 4.2 square miles in size and includes urban and suburban areas. Most of the runoff in the watershed is diverted around the lake to the Pacific Ocean.

The project area is located within a mixture of residential, commercial, industrial, and public use areas. Most of the project area is within urban and suburban developed areas where vegetation is primarily ornamental or ruderal, devoid of native plant communities, and provides minimal wildlife habitat. However, some portions of this project are located within public open space areas that contain sensitive habitats

including San Bruno Mountain State and County Park, Lake Merced, and a portion of Brisbane Lagoon.

V. REGULATORY CONSIDERATIONS

Federal

Federal Endangered Species Act

The federal Endangered Species Act (16 U.S. Code section 1531 et seq.), which is administered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service, protects fish, plants, and wildlife species identified by these agencies as threatened, endangered or candidate species, as well as the habitats of identified species. The term *endangered* refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range. The term *threatened* refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future.

The "*take*" of listed plant or wildlife species, defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct," is prohibited without first obtaining a federal permit. *Harm* includes any act that actually kills or injures fish or wildlife, including significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife. Activities that damage (i.e., harm) the habitat of listed wildlife species require approval from the U.S. Fish and Wildlife Service or National Marine Fisheries Service; collectively, these entities administer the act. Take of listed species can be authorized through either the section 7 consultation process (for actions by federal agencies)[9] or the section 10 permit process (for actions by non-federal agencies).

The federal Endangered Species Act also generally requires determination of critical habitat for listed species. The Secretary of the Interior (or the Secretary of Commerce, as appropriate) formally designates critical habitat for certain federally listed species and publishes these designations in the Federal Register. Critical habitat is defined as the specific areas that are essential to the conservation of a federally listed species and that may require special management consideration or protection.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (16 United States Code, section 703, Supp. I, 1989) generally prohibits the killing, possessing, or trading of migratory birds, bird parts, eggs, and nests, except as provided by the statute. This act authorizes the Secretary of the Interior to regulate the taking of migratory birds. It further provides that it is unlawful,

[9] Under section 7, the federal lead agency must consult with the U.S. Fish and Wildlife Service to ensure that the proposed action would not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. If a project "may affect" a listed species or designated critical habitat, the lead agency is required to prepare a biological assessment evaluating the nature and severity of the expected effect. The U.S. Fish and Wildlife Service then issues a biological opinion determining whether (1) the proposed action may either jeopardize the continued existence of one or more listed species or result in the destruction or adverse modification of critical habitat, or (2) the proposed action would not jeopardize the continued existence of any listed species or result in adverse modification of critical habitat.

except as permitted by regulations, "to pursue, hunt, take, capture, kill or attempt to take, capture, or kill any migratory bird, or any part, nest or egg of any such bird…".

Federal Regulation of Wetlands and Other Waters

Federal jurisdictional waters include wetlands and other waters. Wetlands are ecologically complex habitats that support a variety of both plant and animal life. Under normal circumstances, the federal definition of wetlands requires the presence of three identification parameters: wetland hydrology, hydric soils, and hydrophytic vegetation. Other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, drainages, ponds, and other surface water features, that exhibit an ordinary high-water mark but lack positive indicators for the three wetland parameters.

The regulations and policies of various federal agencies (e.g., U.S. Army Corps of Engineers [Corps], U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service) mandate that the filling of wetlands be avoided unless it can be demonstrated that there is no practicable alternative to filling. The Corps has primary federal responsibility for administering regulations that concern wetlands and other waters in the project area under the statutory authority of the Clean Water Act (section 404) and the Rivers and Harbors Act (sections 9 and 10).

Section 404 of the federal Clean Water Act (33 United States Code 1251–1376) prohibits the discharge of dredged or fill material into waters of the United States, including wetlands, without a permit from the Corps.[10] The jurisdiction of the Corps in tidal waters under section 404 extends to the high tide line or high tide mark, simply indicating a point on the shore where water reaches a peak height at some point each year. The discharge of dredged or fill material typically means adding into waters of the United States materials such as concrete, dirt, rock, pilings, or side-cast material for the purpose of replacing an aquatic area with dry land or raising the elevation of an aquatic area. Activities typically regulated under section 404 include the use of construction equipment such as bulldozers, and the leveling or grading of sites where jurisdictional waters occur.

Pursuant to section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 United States Code section 403), the Corps regulates the construction of structures in, over, or under, excavation of material from, or deposition of material into navigable waters. Navigable waters under the act are those "subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce" (33 Code of Federal Regulations section 3294). In tidal areas, the limit of navigable water under section 10 is the elevation of mean high water mark; in nontidal waters, it is the ordinary high-water mark. Larger streams, rivers, lakes, bays, and oceans are examples of navigable waters regulated. The act prohibits the unauthorized obstruction or alteration of any navigable water (33 United States Code section 403).

---

[10] The Clean Water Act prohibits the discharge of any pollutant without a permit. Implicit in the act definition of pollutant is the inclusion of dredged or fill material regulated by section 404 (22 United States Code 1362).

Coastal Zone Management Act

The California Coastal Commission is the state agency charged with administering the federal Coastal Zone Management Act section 307 (16 United States Code section 1456(c)) within the California Coastal Zone. Within the Commission's areas of concern, the Coastal Zone consists of all areas located within the Commission's jurisdiction, which extends 3 miles seaward and inland generally 1,000 yards (but can extend up to 5 miles) from the mean high tide line. Obligations under the act must be met through the federal consistency determination process that is outlined in the act's Federal Consistency Regulations, 71 Federal Regulation 787-831 at 15 Code of Federal Regulations 930. The commission and the California Coastal Act are further discussed in *State*, below.

State

California Endangered Species Act

Under the California Endangered Species Act, the California Department of Fish and Wildlife has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code section 2070). The California Department of Fish and Wildlife also maintains a list of candidate species, which are species formally under review for addition to either the list of endangered species or the list of threatened species.

The California Endangered Species Act prohibits the take of plant and animal species that the California Fish and Game Commission has designated as either threatened or endangered in California. *Take* in the context of this regulation means to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill a listed species (California Fish and Game Code section 86). The take prohibitions also apply to candidates for listing under the California Endangered Species Act. However, section 2081 of the act allows the California Department of Fish and Wildlife to issue permits for the minor and incidental take of species by an individual or permitted activity listed under the act.

In accordance with the requirements of the California Endangered Species Act, an agency reviewing a project within its jurisdiction must determine if any state-listed endangered or threatened species could be present in the project area. The agency also must determine if the project could have a potentially significant impact on such species. In addition, the California Department of Fish and Wildlife requires informal consultation on any project that could affect a candidate species.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (California Fish and Game Code sections 1900–1913), which directed the California Department of Fish and Wildlife to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this State." The act gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The California Endangered Species Act expanded on the original native plant protection act and enhanced legal protection for plants. The California Endangered Species Act established threatened and endangered species categories and

grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, three listing categories for plants are employed in California: rare, threatened, and endangered.

California Rare Plant Rankings

The California Department of Fish and Wildlife works in collaboration with the California Native Plant Society and botanical experts to maintain an Inventory of Rare and Endangered Plants, and the similar Special Vascular Plants, Bryophytes, and Lichens List. The plant species on these lists may meet the definition of rare or endangered under California Code of Regulations Title 14 Chapter 3 Section 15380. As the trustee agency for the plants and wildlife of California, ecological communities, and the habitat upon which they depend, the California Department of Fish and Wildlife advises public agencies during the California Environmental Quality Act (CEQA) process to help ensure that the actions they approve do not significantly affect such resources. The California Department of Fish and Wildlife often advises that plant species with an appropriate California Rare Plant Rank (CRPR; CNPS 2024) in the inventory be properly analyzed by the lead agency during project review to ensure compliance with CEQA. California Rare Plant Ranks are numbered 1 through 4. The City addresses plants with a CRPR 1 or 2 in its CEQA analyses, which encompasses plants which are presumed extirpated, or considered rare, threatened, or endangered in California and elsewhere (CRPR 1) and plants which are considered extirpated, rare, threatened, or endangered in California but may be more common elsewhere (CRPR 2). CRPR Rank 3 is a review list of plants that require more information before a rare, threatened, or endangered rank is assigned, and CRPR Rank 4 is a watch list of plants which have a limited or infrequent distribution in California but are not considered rare.

Sensitive Natural Communities

The California Department of Fish and Wildlife's Natural Heritage Division identifies sensitive natural communities, which are those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The California Natural Diversity Database tracks 135 such natural communities in the same way that it tracks occurrences of special status species: information is maintained on each site for the natural community's location, extent, habitat quality, level of disturbance, and current protection measures. The California Department of Fish and Wildlife is mandated to seek the long-term perpetuation of the areas in which these communities occur.

California Fish and Game Code

Fully Protected Species

Certain species are considered fully protected, meaning that the California Fish and Game Code explicitly prohibits all take of individuals of these species except for take permitted for scientific research or other projects or categories of project specified by statute.[11] CDFW may authorize take of fully protected species that is incidental to a maintenance, repair, or improvement project to critical regional or local water agency infrastructure. Fully protected amphibians and reptiles, fish, birds, and mammals are

[11] California Fish and Game Code Section 2081.15 (b).

listed in California Fish and Game Code sections 5050, 5515, 3511, and 4700, respectively.

Protection of Birds and their Nests
Under California Fish and Game Code section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.5 of the code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs. Migratory non-game birds are protected under section 3800, whereas other specified birds are protected under section 3505. California Fish and Game Code section 3513 adopts the federal definition of migratory bird take, which is defined by the Secretary of the Department of the Interior under provisions of the Migratory Bird Treaty Act. Section 3513 does not prohibit the incidental take of birds if the underlying purpose of the activity is not to take birds.

State Regulation of Wetlands and Other Waters

On April 2, 2019, the State Water Resources Control Board adopted the following definition of state wetlands, which became effective May 28, 2020:

> *An area is wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.*

The Water Code defines "water of the state" broadly to include "any surface water or groundwater, including saline waters, within the boundaries of the state." "Waters of the state" includes all "water of the U.S."

The State Water Resources Control Board and the Regional Water Quality Control Boards also have jurisdiction over waters of the state under the Porter-Cologne Water Quality Control Act. The Porter-Cologne Act authorizes the state board to enact state policies regarding the protection of waters of the state, broadly defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" including isolated, intrastate, and non-navigable waters and/or wetlands. The state and regional boards evaluate proposed actions for consistency with the regional board's Basin Plan and authorize the discharges of dredged or fill material to waters of the state by issuing waste discharge requirements or, in some cases, a waiver of discharge requirements. The San Francisco Bay Regional Water Quality Control Board has a policy of no net loss of wetlands and typically requires mitigation for all impacts on wetlands before it will issue a water quality certification. Dredging, filling, or excavation of isolated waters constitutes a discharge of waste to waters of the state, and prospective dischargers are required to submit a report of waste discharge to the Regional Water Quality Control Board.

California Department of Fish and Wildlife Section 1602

Under California Fish and Game Code section 1602 et seq., the California Department of Fish and Wildlife has jurisdictional authority over resources associated with rivers, streams, and lakes. The department can regulate all work under the jurisdiction of

California that would: substantially divert, obstruct, or change the natural flow of a river, stream, or lake; substantially change the bed, channel, or bank of a river, stream, or lake; or use material from a streambed. If the department determines a project would result in substantial adverse effects on an existing fish or wildlife resource within such areas, a "lake or streambed alteration agreement" would be required that includes reasonable measures to protect the resources. The lake or streambed alteration agreement is not a permit, but rather a mutual agreement between the department and the applicant.

California Coastal Zone

Within California's Coastal Zone, the California Coastal Commission has authority to regulate development according to the provisions of the California Coastal Act. The Coastal Zone extends 3 miles seaward (boundary of state jurisdiction) and generally from 1,000 yards to 5 miles inland from the mean high tide line of the sea.[12] In order to carry out the policies of the Coastal Act, each of the 73 cities and counties in the Coastal Zone is required to prepare a local coastal program for the portion of its jurisdiction within the Coastal Zone and to submit the program to the Commission for certification. Once the Commission certifies a local coastal program, the local government gains authority to issue most coastal development permits. The Commission generally retains permit authority over tidelands, submerged lands and public trust lands. Only the commission can grant a coastal development permit for development in areas of its retained jurisdiction.

California Coastal Act policies of primary relevance to biological resources and applicable to the project are:

- Section 30240 Environmentally sensitive habitat areas (ESHA); adjacent developments

California Coastal Act section 30107.5 defines an environmentally sensitive habitat as "any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments." For a resource to be determined an environmentally sensitive habitat area, it must retain three qualities: (1) the area contains rare species or habitat, which may include globally rare but locally abundant resources that have experienced historical decline; or (2) the species or habitat is especially valuable, such as being unusually pristine, supporting species at the edge of their range, or otherwise special nature; and (3) the species or habitat in question is vulnerable to human disturbance or degradation.

San Francisco's local coastal program, the Western Shoreline Area Plan, is discussed further below under *Local*. Portions of the project area located at the southern end of Lake Merced are within lands under retained jurisdiction of the California Coastal Commission.

---

[12] California Coastal Commission, Maps Coastal Zone Boundary, *https://www.coastal.ca.gov/maps/czb/,* accessed February 8, 2021.

Local

Western Shoreline Area Plan (Local Coastal Program)

The Western Shoreline Area Plan of the San Francisco General Plan is the land use plan portion of San Francisco's certified local coastal program and sets forth policies and objectives governing development in the city's coastal zone. The plan specifies objectives and policies for various locations where project components occur within the plan area, specifically for Lake Merced. With certification of the local coastal program in 1986, the city obtained authority for issuance of coastal development permits for development activities within its coastal zone boundary. Today, most coastal development permits are issued by the San Francisco Planning Commission pursuant to San Francisco Planning Code section 330 et seq.

The City and County of San Francisco's local coastal program briefly addresses ESHAs in the Western Shoreline Area Plan. The plan notes that ESHAs may be associated with coastal bluffs, dunes, beach, and intertidal areas, but does not identify specific locations or resources as ESHA.

San Francisco Public Works Code

The San Francisco's Urban Forestry Ordinance (San Francisco Public Works Code article 16) protects street trees, significant trees, and landmark trees under San Francisco Public Works jurisdiction, regardless of species. Permits are required for planting or removing street trees and significant trees, and protection measures are required for these trees if construction work would occur within the trees' *drip lines*.[13] Definitions of the types and levels of tree protection are as follows:[14]

1. PROTECTED TREES: The City and County of San Francisco currently considers "Protected Trees" as street trees, significant trees, and landmark trees. Removal of any of these requires a permit. If any activity is to occur within the dripline, prior to building permit issuance, a tree protection plan prepared by an International Society of Arboriculture (ISA) certified arborist is to be submitted to the Planning Department for review and approval.
2. LANDMARK TREES: Landmark Trees have the highest level of protection in the City. These trees are trees that meet criteria for age, size, shape, species, location, historical association, visual quality, or other contribution to the City's character and have been found worthy of Landmark status after public hearings at both the Urban Forestry Council and the Board of Supervisors. Temporary landmark status is also afforded to nominated trees currently undergoing the public hearing process. The Department of Public Works maintains the official "Landmark Tree Book" with all designated Landmark Trees in San Francisco.

[13] The drip line is the area defined by the outermost circumference of a tree canopy where water drips from and onto the ground.

[14] https://sfdbi.org/sites/default/files/migrated/ftp/uploadedfiles/dbi/Key_Information/TreeProtectionLegislation.pdf

3. SIGNIFICANT TREES: Trees within 10-feet of the property edge of the sidewalk that are above 20-feet in height, or with a canopy greater than 15-feet in diameter, or with a trunk diameter greater than 12-inches in diameter at breast height.
4. STREET TREES: Street trees are trees within the public right-of-way. Street trees may be maintained by either the adjacent property owner or the City.

San Mateo County Significant and Heritage Tree Ordinances

Section 12,012 of the San Mateo County Significant Tree Ordinance defines a "SIGNIFICANT TREE" to mean any live woody plant rising above the ground with a single stem or trunk of a circumference of thirty-eight inches (38") or more measured at four- and one-half feet (4 1/2') vertically above the ground or immediately below the lowest branch, whichever is lower, and having the inherent capacity of naturally producing one main axis continuing to grow more vigorously than the lateral axes.

Section 11,050 of the San Mateo County Heritage Tree Ordinance defines a "HERITAGE TREE" to mean any of the following:[15]

> Class 1 shall include any tree or grove of trees so designated after Board inspection, advertised public hearing, and resolution by the Board of Supervisors. The affected property owners shall be given proper written notice between 14 and 30 days prior to inspection and/or hearing by the Board.
>
> Class 2 shall include any of the following trees, healthy and generally free from disease, with diameter equal to or greater than the sizes listed:
>
> (1) Acer macrophyllum - Bigleaf Maple of more than 36 inches in d.b.h (diameter at breast height). west of Skyline Boulevard or 28 inches east of Skyline Boulevard.
>
> (2) Arbutus menziesii - Madrone with a single stem or multiple stems touching each other 4 1/2 feet above the ground of more than 48 inches in d.b.h., or clumps visibly connected above ground with a basal area greater than 20 square feet measured 4 1/2 feet above average ground level.
>
> (3) Chrysolepis chrysophylla - Golden Chinquapin of more than 20 inches in d.b.h.
>
> (4) Cupressus abramsiana - All Santa Cruz Cypress trees.
>
> (5) Fraxinus latifolia - Oregon Ash of more than 12 inches in d.b.h.
>
> (6) Lithocarpus densiflorus - Tan Oak of more than 48 inches in d.b.h.
>
> (7) Pseudotsuga menziesii - Douglas Fir of more than 60 inches in d.b.h. east of Skyline Boulevard and north of Highway 92.
>
> (8) Quercus agrifolia - Coast Live Oak of more than 48 inches in d.b.h.
>
> (9) Quercus chrysolepis - Canyon Live Oak of more than 40 inches in d.b.h.
>
> (10) Quercus garryana - All Oregon White Oak trees.

[15] San Mateo County Planning and Building Division, 1977. Regulation of the Removal and Trimming of Heritage Trees on Public and Private Property (Ordinance No. 2427 - April 5, 1977).

(11) Quercus kellogii - Black Oak of more than 32 inches in d.b.h.

(12) Quercus wislizenii - Interior Live Oak of more than 40 inches in d.b.h.

(13) Quercus lobata - Valley Oak of more than 48 inches in d.b.h.

(14) Quercus douglasii - Blue Oak of more than 30 inches in d.b.h.

(15) Umbellularia californica - California Bay or Laurel with a single stem or multiple stems touching each other 4 1/2 feet above the ground of more than 48 inches in d.b.h., or clumps visibly connected above ground with a basal area of 20 square feet measured 4 1/2 feet above average ground level.

(16) Torreya californica - California Nutmeg of more than 30 inches in d.b.h.

(17) Sequoia sempervirens - Redwood of more than 84 inches in d.b.h. west of Skyline Boulevard or 72 inches d.b.h. east of Skyline Boulevard.

City of Brisbane Tree Ordinances

Under Brisbane Municipal Code section 12.12.050 the City of Brisbane regulates severe trimming and tree removals. The City of Brisbane requires notification for non-protected trees at least 7 days notification prior to proposed actions; and requires an application for removal for protected trees. Protected trees include:

1. Any California Bay (Umbellularia californica), Coast Live Oak (Quercus agrifolia), or California Buckeye (Aesculus californica) that is a mature tree and is not otherwise defined as protected tree.
2. Resolution Protected: Any tree designated as a protected tree by resolution of the [Brisbane] city council.
3. Permit Protected: Any tree, regardless of size, originally required by the [City of Brisbane] to be planted as a condition for the granting of a permit, license, or other approval, or any tree that existed at the time of the granting of such permit, license, or other approval and required by the city to be preserved as part of such approval. This includes any tree protected by a maintenance agreement, whether on private or public land. This also includes any tree, regardless of size, required by the [City of Brisbane] to be planted as a replacement for an unlawfully removed tree. Juvenile trees that were planted as a replacement to a previously granted tree permit or other [City of Brisbane] permit are considered permit protected.
4. Multiple Non-invasive Species: Three (3) or more mature trees of any one or more non-invasive species that are proposed to be removed from the same property or from adjacent property under common ownership.[16]

City of Daly City Tree Ordinances

Under sections 12.40.010 – 12.40.160, the City of Daly City requires through its Urban Forestry program to manage and replace street trees and other vegetation within Daly City. Tree maintenance and/or removal of street trees requires a permit from the Daly City Department of Public Works.

[16] https://www.brisbaneca.org/cd/page/tree-removal-and-landscaping

Under section 15.32.260, Daly City enforces the Vegetation Management Program for the Southern Hills Area, which requires the removal of gorse and other highly flammable vegetation within areas designated by the Daly City Fire Chief, including areas on the north side of Daly City abutting San Bruno Mountain County Park.[17]

San Bruno Mountain Habitat Conservation Plan

The project area includes a narrow band of land within the San Bruno Mountain Habitat Conservation Plan (HCP) Area. Projects within the HCP area are required to comply with the site activity review process to ensure that the project would not conflict with the HCP. The site activity review is used to review projects that are minor in scale, yet have potential to impact sensitive habitat areas within the San Bruno Mountain HCP area. San Mateo County is the Plan Operator for the San Bruno Mountain HCP.[18]

VI. METHODS

Coast Ridge Ecology biologists Patrick Kobernus and Isa Rosario-Martinez conducted reconnaissance surveys of the project area for biological resources on January 11th and January 29th, 2024.The surveys involved both walking and driving in the project area where appropriate. Protocol surveys for special-status species were not conducted during the surveys. The California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDB) and the California Native Plant Society (CNPS) On-Line Inventory of Rare, Threatened, and Endangered Plants of California were consulted for known occurrences of sensitive plant, animal, and natural plant communities of concern reported within three miles of the project area. Data from the CNDDB, academic research publications, knowledge of regional biota, and observations made during the field surveys were used to evaluate habitat suitability for special status plant and wildlife species within the project area.

Although this memo is focused on biological resources of the project area, the CNDDB special status species occurrence records documented within three miles of the project area were reviewed ahead of reconnaissance surveys for a broader understanding of species' presence reported on the San Francisco peninsula (CNDDB, 2024a and CNDDB, 2024b). An evaluation of these records and potential for special status species presence in the study area is provided in Appendix B.

The National Wetlands Inventory online mapper (U.S. Fish and Wildlife Service, 2024c) was consulted for aquatic resources present within the project area. Wetlands and open waters of the project area include freshwater emergent marsh, freshwater pond, and estuarine wetlands (along San Francisco Bay). All aquatic resources identified during the reconnaissance surveys are documented in the National Wetlands Inventory, except for the small ephemeral pond within the northern area of San Bruno Mountain State and County Park near the project area (Figure 2).

---

[17] https://www.dalycity.org/454/Tree-Maintenance-Permitting

[18] The HCP Site Activity Form is available on the County's website at: https://www.smcgov.org/parks/webforms/scientific-permit-site-activity-review-application

VII. RESULTS

The project area is comprised of primarily urban and suburban developed areas, with discrete grasslands, freshwater wetlands, lakes, ephemeral ponds, and salt marsh (estuarine) wetlands (Figure 2). Each habitat type was assessed for the feasibility of supporting special status species. Figures 3 through 5 show CNDDB recorded occurrences of special status species within three miles of the project area.

Soils

Soils within the project area are largely defined as urban land/urban orthents cut and fill (NRCS, 2024). These soils are highly disturbed from urban land uses and have a very low potential to support special status plant species. Some native soils exist on San Bruno Mountain and possibly within other isolated open space areas of the project area. Some of these less disturbed areas containing native soils may have potential to support special status plants.

Habitat Types

Urban/Suburban

The majority of the project area lies within urban and suburban areas. These areas are characterized by man-made structures, roadways, ornamental vegetation, and highly disturbed ruderal vegetation along roadsides and between structures. Most special status species are not present in urban/suburban environments; however, birds and some bats can utilize urban/suburban habitats.

Emergent Freshwater Wetlands, Lakes and Ponds

Several freshwater wetlands and open water features are present within the project area (Figure 2). There are three emergent freshwater wetlands at the eastern end of the project area. A portion of Lake Merced (Impound Lake) overlaps the project area. and a small ephemeral freshwater pond on San Bruno Mountain is located immediately adjacent to the project area.

Freshwater wetlands and open water features in the project area serve as potential habitat for the federally threatened, California species of special concern California red-legged frog (*Rana draytonii*), the western pond turtle (*Actinemys marmorata*), a California species of special concern and federally proposed threatened species, and the federally and state endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia).* Because these wetland areas provide potential habitat for these species but local extirpation and urbanization barriers to movement/ recolonization may preclude these species from occurring in the project area, western pond turtle is considered to have a moderate potential to occur.

Salt Marsh Wetland

There are two areas of salt marsh (estuarine) wetland within the eastern-most section of the project area (Figure 2). Salt marsh wetland is located along the edge of San Francisco Bay, near U.S 101 along Harney Way, and at Brisbane Lagoon. Brisbane Lagoon is a manmade feature that is hydraulically connected to San Francisco Bay and consists of brackish conditions with both freshwater emergent wetland and salt marsh

vegetation. Most of the lagoon shoreline vegetation closely resembles a weedy saltwater marsh dominated by pickleweed (*Salicornia virginica*) and non-native species (Photo 1).

Wetlands in these areas are primarily mudflats with rocky shorelines and have a low potential to support the federally and state endangered California Ridgway's rail (*Rallus longirostris obsoletus).*

Grasslands

There are three distinct grassland areas within the southeastern quarter of the project area (Figure 2), two within San Bruno Mountain State and County Park and one within Icehouse Hill, an open space area east of Bayshore Boulevard. These grasslands are a combination of nonnative and native grasslands and have the potential to support two federally endangered butterfly species: mission blue butterfly (*Icaricia icarioides missionensis*) and Callippe silverspot butterfly (*Speyeria callippe callippe*). The documented and potential presence of these butterflies in the project area and surrounding vicinity is discussed below under *Special Status Species.*

Sensitive Natural Communities

Natural Communities are evaluated by the CDFW[19], and those communities with state ranks of S1-S3 are considered Sensitive Natural Communities[20]. Only one sensitive natural community is recorded in CNDDB within the project area, discussed below.

Pickleweed Mats

Pickleweed mats (*Sarcocornia pacifica [Salicornia depressa]* herbaceous alliance) are a sensitive natural community and a state vulnerable natural community (S3)[21]. This natural community is dominated or co-dominated by pickleweed (*Sarcocornia pacifica* or *Salicornia depressa*) with algae and other species such as *Spartina foliosa*, *Limonium californicum* and *Juncus* spp. This natural community occurs in coastal salt marshes or alkaline flats. There are small pickleweed mats present within the salt marsh wetlands and Brisbane Lagoon in the eastern portion of the project area (Figure 2).

Critical Habitat

The U.S. Fish and Wildlife Service has designated Critical Habitat for some federally listed species. Critical Habitat is defined as "specific areas within the geographic area, occupied by the species at the time it was listed, that contain the physical or biological features that are essential to the conservation of endangered and threatened species and that may need special management or protection."[22]

A small portion of the project area overlaps with designated Critical Habitat for the federally endangered Franciscan manzanita (*Arctostaphylos franciscana*), located in

---

19 https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities
20 https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153609&inline
21 https://help.natureserve.org/biotics/content/record_management/Element_Files/Element_Tracking/ETRACK_Definitions_of_Heritage_Conservation_Status_Ranks.htm. S3= At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
22 https://www.fws.gov/sites/default/files/documents/critical-habitat-fact-sheet.pdf

McLaren Park. This Critical Habitat unit does not currently support the species, but contains potential habitat that could support the future reintroduction of the species.[23] This species is not expected to occur in the project area.

Special Status Species

As noted in Section VI, Methods, the CNDDB and the CNPS On-Line Inventory of Rare, Threatened, and Endangered Plants of California were consulted for known occurrences of sensitive plant, animal, and natural plant communities of concern reported within three miles of the project area. Figures 3, 4, and 5 present occurrence maps for invertebrates, vertebrates, and plants, respectively. The following special status species are discussed due to their potential to occur in the study area, focused on species with high or moderate potential to occur. Some species, while having a low potential for occurrence, are discussed due to documented historical occurrences in the study area or due to the habitat types identified within the project area. Species that occupy niche habitats in the San Bruno Mountain Habitat Conservation Plan area are also discussed. Appendix B includes a full list of species evaluated for their potential to occur in the study area.

Invertebrates

Figure 3 depicts CNDDB records for special status invertebrates documented within three miles of the project area.

San Bruno Elfin Butterfly (Callophrys mossii bayensis)

San Bruno elfin butterfly is a federally endangered butterfly restricted to small, isolated populations in San Mateo County. Populations are known from San Bruno Mountain, Milagra Ridge, the Crystal Springs Watershed, Montara Mountain, and Pacifica; the closest population to the project area being San Bruno Mountain. The larvae of the San Bruno elfin butterfly feed exclusively on broadleaf stonecrop (*Sedum spathulifolium*). Broadleaf stonecrop is found on rocky outcrops in coastal scrub and coastal prairie habitats, mostly on north facing slopes above 900 feet elevation within San Mateo County. Populations of the San Bruno elfin butterfly are generally small, even in good reproductive years, and thus this species is highly sensitive to disturbance. Adult San Bruno elfin butterflies fly from February to April, with early March to mid-April being typical for San Bruno Mountain. The exact timing of adult emergence is highly dependent on local weather. The larvae are found in a variety of colors (i.e. red, yellow, orange) matching the colors of the stonecrop flowers, buds and leaves, and can be observed feeding on the flowers and buds of the plant during late spring (May-June). Adults nectar on a variety of plant species, and appear to favor lace parsnip (*Lomatium dasycarpum*) and California barberry (*Berberis pinnata*) when available. The flight period for this species occurs from late-February to mid-April and larval development may be completed in June. Once feeding is complete, larvae of this species pupate beneath their host plants and enter diapause and emerge as adults.

In 2022, 951 San Bruno elfin butterfly larvae were observed on San Bruno Mountain (Cole, 2022). All larvae were observed on or immediately around their host plant,

[23] https://www.federalregister.gov/documents/2013/06/28/2013-15487/endangered-and-threatened-wildlife-and-plants-designation-of-critical-habitat-for-arctostaphylos

broadleaf stonecrop. The San Bruno Mountain grasslands within the project area located within the Saddle area include a northern facing slope that has rocky outcrops which could support the host plant species (Photo 3). However, this slope is dominated by invasive plant species such as wild fennel (*Foeniculum vulgare*) and Cotoneaster (*Cotoneaster sp.)*. The San Bruno elfin butterfly and its host plant, *Sedum spathulifolium* have not been detected in the Saddle area of San Bruno Mountain, and San Mateo County Parks Department has conducted surveys for this species on an annual or biannual basis as part of the San Bruno Mountain Habitat Conservation Plan since 1982. The grassland areas along the eastern boundary of the park and located at Icehouse Hill have no potential to support the San Bruno elfin butterfly due to warmer and drier conditions which do not support the elfin's host plant, *Sedum spathulifolium*. Based on this information, it is very unlikely this species occurs within the project area.

Monarch Butterfly– California Overwintering Population (Danaus plexippus plexippus pop. 1)

The Monarch Butterfly – California overwintering population is a federal candidate for listing. Every winter monarch butterflies migrate from west of the Rocky Mountains to coastal California to overwinter, and this population is a federal candidate for listing. These overwintering monarchs roost in wind protected trees groves such as *Eucalyptus*, Monterey pine (*Pinus radiata*) and/or Monterey cypress (*Cupressus macrocarpa*). These roosts are commonly located near water sources or nectar plants. Monarchs overwinter in California from October to February.

Throughout the project area there are several groves of trees that provide potential roosting habitat for roosting monarchs, however there are no records of any overwintering sites within the project area. There are three recorded occurrences of overwintering monarchs within Golden Gate Park, the closest being approximately 2.4 miles from the project area (CNDDB 2024a; Figure 3). Most overwintering Monarch sites are well documented due to the large numbers of Monarchs observed flying around or roosting within the trees. Overwintering monarchs have a low potential to occur in the project area.

Mission Blue Butterfly (Icaricia icarioides missionensis)

The mission blue butterfly is a small federally endangered butterfly in the gossamer-winged family (*Lycaenidae*). It is blue with black-edged wings and distinctive off-white irregular spots on the underside of its wing. The mission blue butterfly has three host plants, all perennial lupines: *Lupinus albifrons, L. formosus*, and *L. littoralis variicolor*. L. albifrons and *L. formosus* are the preferred host plants, and L. littoralis variicolor is used less frequently. Mission blue butterflies have a complex lifecycle in which they will spend most of their lives in diapause as larvae during the summer, fall, and winter. Mission blue butterfly larvae awake from diapause in the early spring and begin feeding on the foliage of their host plant. After feeding for a few weeks, they pupate and then emerge as adults. After eggs are laid during the adult phase, new larvae hatch from the eggs and begin feeding in the late spring before going into diapause. The flight period for this species typically occurs from late March to early July, while post-diapause larvae emerge in early March and pre-diapause larvae are active into July.

Mission blue butterfly host plants *(Lupinus albifrons)* were observed within the project area in the San Bruno Mountain grasslands. These lupines were growing within highly disturbed non-native grasslands in what is known as the Saddle area of San Bruno Mountain (Photo 2), near the northern boundary of the park which overlaps the project area. This area is somewhat isolated from known occurrences of mission blue butterfly; however, because their host plant is present, potential presence of this species cannot be ruled out. In 2021, 180 mission blue butterflies were recorded during San Bruno Mountain surveys (Cole, 2022) and Figure 3 shows the proximity between CNDDB mission blue occurrences and the project area. The closest reported occurrence of mission blue butterfly is on San Bruno Mountain, approximately 0.2 mile from the project area and approximately 0.6 mile from the closest grassland area within the project. Due to the close proximity to past occurrences and the presence of *Lupinus albifrons* in the project area, there is a moderate potential for mission blue butterfly to occur within the grassland portions of the project area on San Bruno Mountain.

Callippe Silverspot (Speyeria callippe callippe)

The Callippe silverspot is a federally endangered medium-sized butterfly in the brush-footed family (*Nymphalidae*), with brown, orange, and black markings on the dorsal side and teardrop shaped silver spots on the underside. The Callippe silverspot is a non-migratory butterfly with four life stages including egg, larva, pupa, and adult. During the species' lifetime, it is dependent on its host plant, *Viola pedunculata.* The adults emerge in late spring to early summer from approximately mid-May to mid-July when male Callippes patrol hilltops searching for mates. Females oviposit eggs around the host plant, *V. pedunculata*, and average adult life span about two weeks. After approximately a week, the larvae emerge from the egg and go into diapause until the following spring. Post diapause larvae will then feed on *V. pedunculata* in the early spring, followed by pupation and finally adult emergence around mid-May.

In 2022, San Mateo County Parks documented 266 Callippe silverspot butterflies seen during their biannual survey of San Bruno Mountain (Cole, 2022). The San Bruno Mountain grasslands within the project area, located near the northern boundary of the park known as the Saddle area, and along the east boundary of the park are poor quality habitat for Callippe silverspot due to cooler, wetter conditions and/or dense patches of invasive species and brush. These areas are unlikely to support the Callippe butterfly; however there is some potential for *Viola pedunculata* to be present in these areas, and therefore presence of the Callippe silverspot butterfly cannot be completely ruled out. Icehouse Hill is separated from San Bruno Mountain by approximately 1,000 feet at its closest point and the grasslands at Icehouse Hill have some potential to support *Viola pedunculata* and the Callippe silverspot butterfly.

Vertebrates

Figure 4 depicts CNDDB records for special status vertebrate species, including amphibians, reptiles, birds, and mammals, documented within three miles of the project area.

Western Pond Turtle (Actinemys marmorata)

The western pond turtle is a federally proposed threatened species and State Species of Special Concern. This aquatic turtle's habitat consists of streams, ponds, lakes, and

permanent and ephemeral wetlands. These habitats must have basking areas for thermoregulation. These basking areas consist of raised vegetation, rocks, or slopes of various types that reach outside of the water for turtles to rest on. While the turtles spend the majority of their lives in the water, they still require terrestrial habitats for nesting. Nesting occurs from late May to July, when the female will generally dig a hole for the nest within a dry, sparsely vegetated area. Egg incubation can last between 90-130 days.[24]

Lake Merced has several recorded occurrences of western pond turtles (CNDDB 2024a; Figure 4). The closest recorded occurrence (from 2012) is located at Impound Lake approximately 900 feet from the project area. Lake Merced provides high quality habitat for the species as it is a large body of freshwater, with vegetated shorelines and multiple basking areas. This species has a moderate potential to occur within the project area overlapping Lake Merced.

There are no occurrences of western pond turtles in the emergent wetlands south of the Martin Substation (Visitacion Creek Marsh), Brisbane Lagoon, or the ephemeral pond on San Bruno Mountain adjacent to the project area. The freshwater emergent wetlands along Tunnel Avenue are highly degraded from previous disturbance from landfill and railroad operations and are not expected to support this species. Therefore, with the exception of Lake Merced, the species has a low potential to occur in the overall project area.

Townend's Big-Eared Bat (Corynorhinus townsendii)

Townsend's big-eared bat is a State Species of Special Concern found throughout California but is most abundant in mesic habitats and feeds along habitat edges. The Townsend's big-eared bat roosts and hibernates in cave, mines, tunnels, or other man-made structures. This species forms maternity colonies from approximately April to August. This species is extremely sensitive to human disturbance and will readily abandon roost sites after human visitation.

This species does not typically occur in urban/suburban areas, though it may utilize cavern-type structures for roosting near open space areas. There are no occurrences of this species in the project area; however, there is one recorded occurrence of Townsend's big-eared bat approximately 2.5 miles from the project area at Twin Peaks, San Francisco (CNDDB 2024a, Figure 4). This species has a low potential to occur in the project area.

Saltmarsh Common Yellowthroat (Geothlypis trichas sinuosa)

The saltmarsh common yellowthroat is a State Species of Special Concern. This bird inhabits salt, brackish, and freshwater marshes within the San Francisco Bay region year-round. The majority of saltmarsh common yellowthroats utilize brackish marshes (Gardali, 2008). The species requires dense, continuous vegetation cover to the water's surface. The saltmarsh common yellowthroat also utilizes tall grasses, tule patches and willows for nesting.

---

[24] https://www.fws.gov/species/western-pond-turtle-actinemys-marmorata

Lake Merced has dense continuous shoreline vegetation to the water's edge and willows for nesting, and this species has been documented to occur there (CNDDB 2024a, Figure 4). Saltmarsh common yellowthroat may also occur in other wetland habitats within the project area, including the ephemeral pond on San Bruno Mountain, Visitacion Creek Marsh, Brisbane Lagoon, and the freshwater wetlands along Tunnel Avenue. This species has a high potential to occur in the project area.

Western Red Bat (Lasiurus blossevillii)

The western red bat is a State Species of Special Concern. The western red bat roosts within tree foliage, often in trees at the edge of habitats adjacent to streams, fields, or urban areas. The species feeds in a variety of habitats including grasslands, open woodlands, forests, shrublands, and croplands. Maternity (breeding) season for this species is from May to August.

This species is not known to breed in the San Francisco Bay Area, and there are no recorded occurrences within the project area. Western red bats utilize a variety of tree species for roosting, and the project area has some potentially suitable trees that may provide nonbreeding roosting habitat for this species. There has been one recorded occurrence of western red bat within Golden Gate Park, approximately 2.7 miles from the project area (CNDDB 2024a, Figure 4). There is a low potential for western red bat occurrence within the project area.

California Ridgway's Rail (Rallus longirostris obsoletus)

California Ridgway's rail is a federally endangered species that lives exclusively in tidal marshes. These marshes usually are dominated by Pacific cordgrass (*Spartina foliosa)* and pickleweed, and have unrestricted tidal flow, well developed tidal channel networks, and adequate high tide habitat. California Ridgway's rails are known to be an elusive species and prefer to walk over other forms of movement. The species forages for most of the day through the marsh vegetation then retreats to higher elevations to roost. Nesting season is prolonged and is usually from February to July (U.S. Fish and Wildlife Service, 2024a).

The salt marsh in the eastern-most section of the project area provides low-quality habitat for the California Ridgway's rail. The salt marsh has a very small area of marsh vegetation that mainly consists of sparse low-growing vegetation (Photo 5). There is no developed channel network nor any high tide vegetated habitat as the small marsh is adjacent to a riprap shoreline. However, CNDDB records indicate there is one record of California Ridgway's rail within this salt marsh from 2011 (CNDDB 2024a, Figure 4). This area is unlikely to support breeding habitat for this species, but may provide temporary foraging habitat. Additional observations of Ridgway's rail include two observations, each greater than 2 miles from the project area along the San Francisco Bay shoreline; (one at Oyster Point from 1975; and one at Heron's head from 2011) (CNDDB 2024a). Therefore, there is a low potential for this species to be in the project area.

California Red Legged Frog (Rana draytonii)

The California red-legged frog is a federally threatened species and State Species of Special Concern. Habitat for this species consists of ponds, slow moving streams, with

emergent wetland and/or riparian vegetation for cover and adjacent upland habitats for dispersion. Some of the wetlands within the study area may be suitable habitat for California red-legged frogs.

Lake Merced provides permanent aquatic habitat with dense riparian shoreline vegetation (Photo 4). California red-legged frogs have been documented approximately 0.5 miles north of the boundary of the project area at Lake Merced (CNDDB 2024; Figure 4); however, this record is several decades old and the species is now thought to be extirpated from Lake Merced based on lack of recent sightings, protocol level survey results since 2000, and the presence of predators and competitors such as American bullfrog (*Lithobates catesbeianus*) and red-eared slider (*Trachemys scripta elegans*) (Jones and Stokes, 2007; SFPD, 2011).

Visitacion Creek Marsh has suitable habitat for the species, including open water, riparian and adjacent upland grassland habitat on San Bruno Mountain. There are no red-legged frog occurrence records in CNDDB for this marsh (CNDDB 2024; Figure 4). Although there is potentially suitable habitat at Lake Merced and Visitacion Creek Marsh for CRLF, there is a low potential for this species due to the lack of more recent observations.

The ephemeral pond on San Bruno Mountain likely does not provide open water long enough to be suitable habitat for the species; therefore, California red-legged frog is not expected within this ephemeral pond.

Brisbane Lagoon is tidally influenced and consists of brackish and salt marsh wetland dominated by pickleweed. Water salinities likely preclude the potential for California red-legged frog to occur in Brisbane Lagoon. The freshwater wetlands along Tunnel Avenue are highly degraded from previous disturbance from landfill and railroad operations and are also not expected to support this species. Therefore, the species has a low potential to occur in the project area.

Bank Swallow (Riparia riparia)

The bank swallow is a small state threatened migratory bird found in California from spring to fall. The bank swallow is primary a colonial nester, with colonies ranging from 10 to 1,500 nesting pairs. These colonies require vertical banks and cliffs with fine-textured or sandy soils to dig nesting holes. These nests are usually near water features. However, the species utilizes grassland, shrubland, riparian, and other terrestrial habitats for feeding. Breeding season for bank swallows is usually early April through July.

This species has been documented to nest along the cliffs near Ocean Beach, however there is no suitable sandy bank or cliff habitat within the project area that could support this species while nesting. There is one record of this species at Harding Park, along the western boundary of the project area (CNDDB 2024a, Figure 4). This is an old record that predates the golf course, constructed in 1925, and this area no longer provides nesting habitat for bank swallows. There is a moderate potential for this species to occur in the western-most section of the project area while foraging during breeding season.

San Francisco Garter Snake (Thamnophis sirtalis tetrataenia)

The San Francisco garter snake is a rare species of snake endemic to the northern San Francisco Peninsula. It is a federally and state endangered species and a state fully protected species. These snakes are highly aquatic, inhabiting freshwater wetlands and adjacent grasslands where they spend much of their time in the water hunting prey, primarily frogs.

San Francisco garter snakes have not been detected within the project area, or within a 3-mile radius of the project area, and all former populations of the species within 5 miles of the project area are believed to have been extirpated (CNDDB 2024a; CNDDB 2024b). This species, therefore, has a low potential to occur.

Non-special Status Bat Species

Non-special status bat species have some protection under California Department of Fish and Wildlife Code Section 4150 which prohibits the “take” of non-game mammals. Bats are most vulnerable to “take” when occupying maternity or hibernation roosts. Non-special status bat species that potentially occur in the project area include Mexican free-tailed bat (*Tadarida brasiliensis*), California myotis (*Myotis californicus*), and Yuma myotis (*Myotis yumanensis*), among others.

Bats utilize structures such as buildings and bridges as well as trees for roosting. Structures within the project area as well as trees with suitable cavities and exfoliating bark may provide suitable roosting habitat for bats. Non-special status bat species are likely to forage over open space areas and roost in structures and trees within the project area.

Nesting Birds

Many common bird species nest within urban and suburban areas, within trees, shrubs, low-lying vegetation, and man-made structures. Bird nesting season is typically defined as between February 1st and August 31st. The project area contains suitable nesting habitat for birds and there is a high likelihood that nesting birds could occur within the project area.

Plants

Figure 5 depicts CNDDB records for special status plants documented within three miles of the project area. Because the majority of the study area consists of developed habitat that does not support native plant communities, and based on results of the reconnaissance surveys, all special status plants were determined to have a low potential to occur or are not expected to occur. One species is discussed below due to its proximity to the project area.

San Francisco Lessingia (Lessingia germanorum)

San Francisco lessingia is a federally endangered annual herb that occurs in remnant dunes within coastal areas. The species prefers open areas with sandy soils free of competing plants. There is one occurrence of this species within Harding Park near Lake Merced approximately 0.5 miles from the project area and one occurrence on the west side of San Bruno Mountain approximately 0.2 miles from the project area (CNDDB 2024a; Figure 5). The occurrences recorded near Lake Merced are likely

extirpated; however the occurrence at San Bruno Mountain is likely still extant. There is low potential for this species to occur in grasslands within the project area due to the lack of sandy soils.

VIII. WILDLIFE MOVEMENT AND MIGRATION CORRIDORS

Wildlife corridors are areas of habitat which provide connectivity between larger habitat regions otherwise fractured by urban development. Summarized from Beier and Loe (1992), wildlife corridors serve the following functions:

1) Provide avenues along which wide-ranging animals can travel, migrate, and breed, allowing genetic interchange to occur.
2) Allow populations to move in response to environmental changes and natural disasters.

San Bruno Mountain State and County Park and adjacent undeveloped private property east of the park to the San Francisco Bay shoreline facilitate wildlife movement within the surrounding developed areas. A portion of San Bruno Mountain State and County Park and this undeveloped private property overlaps the project site.

X. REFERENCES

Baicich, P.J. and C.J.O. Harrison. 2005. Nests, Eggs, and Nestlings of North American Birds. Second Edition. Princeton University Press. Princeton, New Jersey. 347 pp.

Beier and Loe. (1992). A Checklist for Evaluating Impacts to Wildlife Movement Corridors, Wildlife Society Bulletin, Vol. 20, Issue 4, p 434-440.

California Department of Fish and Wildlife, Biogeographic Data Branch, 2021. California Wildlife Habitat Relationship System, Version 10.1.29. Sacramento, CA. access date: *02/28/2024*

California Native Plant Society (CNPS), Rare Plant Program. 2024. Rare Plant Inventory (online edition, v9.5). https://www.rareplants.cnps.org. Accessed 22 February 2024.

CNPS Alliance: *Sarcocornia pacifica* (*Salicornia depressa*), 2021. Accessed February 2023. https://vegetation.cnps.org/alliance/458.

CNPS Rare Plant Ranks. 2024.Website https://www.cnps.org/rare-plants/california-rare-plant-ranks. Accessed 12 June 2024.

California Natural Diversity Database (CNDDB), 2024a. RareFind5. [Internet]. California Department of Fish and Wildlife [Version 5.3.0]. Two quadrangle query: San Francisco North, San Francisco South. Accessed in February 2024.

CNDDB, 2024b. Suppressed records request and response for San Francisco garter snake (5-mile radius from the project area) provided through email correspondence with Brian Accord, CDFW, March 6, 2024. Suppressed records are records for which the precise geographic location data have been removed from CNDDB in order to protect the species. The presence of such records within a specified study area can be requested; CDFW will release such information depending on the intended use of the information.

Cole, E, 2022. San Bruno Mountain Habitat Conservation Plan Year 2022 Activities Report for Federally Listed Species; Endangered Species 10(a)(1)(B) Permit TE215574-6. San Mateo County Parks Department. https://www.smcgov.org/media/142950/download?inline=

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131 pp. Available online at

http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm

Federal Interagency Committee for Wetland Delineation, 1989. Federal manual for identifying and delineating jurisdictional wetlands. U.S. Army Corps of Engineers, U. S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington, D.C. Cooperative Technical Publication.

Gardali T, Evens J, 2008. Studies of Western Birds 1.

Gonzales M. Western Red Bat: UC SANTA CRUZ CAMPUS NATURAL RESERVE. Accessed February 2024. https://ucsccampusreserve.ucsc.edu/media1/western-red-bat.

Jones and Stokes, 2007. Probable Absence of California Red-Legged Frog from Lake Merced, Oakland, CA, February.

Koch, J., 2012. Bumble bees of the western United States. US Department of Agriculture, Forest Service.

Longcore, T., Lam, C.S., Kobernus, 2010. P. et al. Extracting useful data from imperfect monitoring schemes: endangered butterflies at San Bruno Mountain, San Mateo County, California (1982–2000) and implications for habitat management. J Insect Conserv **14**, 335–346 .https://doi.org/10.1007/s10841-010-9263-9

LSA Associates Inc, 2012. California Black Rail. Accessed February 2024. https://www.scwa2.com/documents/hcp/appendix/H-6.California%20Black%20Rail.pdf.

Monarch Butterflies. CA State Parks. Accessed February 2024. https://www.parks.ca.gov/?page_id=23795#:~:text=By%20November%2C%20most%20are%20sheltering.

National Park Service, 2016. Townsend's Big-eared Bat - Channel Islands National Park (U.S. National Park Service). Accessed February 2024. https://www.nps.gov/chis/learn/nature/townsends-bats.htm.

Natural Resources Conservation Service (NRCS), 2024. Web Soil Survey, National Cooperative Soil Survey. Website accessed 03/04/24.

https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

San Francisco Environment Department. Ecosystems. Accessed February 2024. https://www.sfenvironment.org/ecosystems.

San Francisco Planning Department , 2023. Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meetings: PG&E Power Assets Acquisition Project.

San Francisco Planning Department, 2011. Significant Natural Resource Areas Management Plan Draft Environmental Impact Report, Planning Department Case No. 2005.1912E, State Clearinghouse No. 2009042102, August.

San Mateo County Parks Department, 2007. San Bruno Mountain Habitat Management Plan 2007. https://www.smcgov.org/media/72416/download?inline=

Sims, S, 2017. Speyeria (Lepidoptera: Nymphalidae) Conservation. Insects, 8(2), 45. https://doi.org/10.3390/insects8020045

U.S. Environmental Protection Agency, 2012 Dec 4. About the Watershed. Accessed February 2024.https://www.epa.gov/sfbay-delta/about-watershed#sfb.

U.S. Fish and Wildlife Service (USFWS). Species. Accessed February 2024a. https://www.fws.gov/species.

USFWS, Critical Habitat for Threatened and Endangered Species, Online Mapper. Accessed February, 2024b. https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe0

USFWS, 2024c. National Wetlands Inventory, Online Mapper, Last updated October 1, 2023. https://www.fws.gov/wetlands/data/Mapper.html

Weiss, S.B., 1993. The San Bruno Elfin, *Incisalia mossii bayensis* (Brown). *Conservation biology of Lycaenidae (butterflies)*, pp.141-3.

Washington Department of Fish and Wildlife. Western bumble bee. Accessed February 2024. https://wdfw.wa.gov/species-habitats/species/bombus-occidentalis#desc-range.

Appendix A: Photos

Photo 1: Representative photo of Brisbane Lagoon saltmarsh habitat located on southeastern-most edge of project area.

Photo 2: Representative photo of San Bruno Mountain State and County Park, Saddle Area. Habitat is primarily coastal scrub and invasive gorse (*Ulex europaeus*) with isolated patches of disturbed grasslands in project area.

Photo 3: North facing cut slope above Alta Vista Way, within San Bruno Mountain State and County Park, Daly City. Area shown is on northwest side of Saddle area of the Mountain.

Photo 4: Representative photo of Lake Merced habitat. View is looking north from John Muir Drive, near Lake Merced Boulevard.

Photo 5: Photo of small sparsely vegetated salt marsh along shoreline of San Francisco Bay adjacent to Harney Way in the project area.

Photo 6: A Eucalyptus grove across Main Street from the Visitacion Creek Marsh (freshwater emergent wetlands) south of the Martin Substation.

Photo 7. View of project area (cities of Daly City and San Francisco) looking westward from San Bruno Mountain State and County Park.

Photo 8. View of project area (cities of Daly City and San Francisco) looking northward from San Bruno Mountain State and County Park.

Appendix B: Special Status Species Comprehensive Table

Criteria determinations for potential occurrence of special status species are divided into the five categories described below. These determination categories appear in the following table, which provides a summary of the status, habitat affinities, flowering phenology, habitat suitability and local distribution of each potentially occurring species.

- **Not Expected** denotes situations where suitable habitat or key habitat elements are either absent, or may be present but of poor quality or isolated from the nearest extant occurrences. Incompatible habitat suitability refers to elevation, geology, soil chemistry and type, vegetation communities, microhabitats, and degraded/significantly altered habitats. These factors create unsuitable ecological conditions for the consideration of even a low occurrence potential within the study area.
- **Low Potential** indicates species not observed during field investigations but have some (low) probability for occurrence based on habitats present on site.
- **Moderate Potential** indicates species not observed during field investigations but have some (medium) probability for occurrence based on habitats present on site. Some documented occurrences of species occur in the general region.
- **High Potential** indicates the presence of suitable habitat or key habitat elements that potentially support species, and documented presence of species in surrounding, contiguous area.
- **Present** indicates there are one or more documented occurrences of this species and the species is considered extant, or the species was either observed directly or its presence was confirmed by diagnostic sign (i.e. tracks, scat, burrows, carcasses, castings, prey remains, etc.) during field investigations.

Table B-1: Comprehensive special status species list with occurrences documented in CNDDB within 3 miles of the project area.

Species Name	Status	Habitat	Potential to Occur in Project Area
		MAMMALS	
American badger *Taxidea taxus*	SSC G5 S3	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Not expected. Suitable habitat not present.
Hoary bat *Lasiurus cinereus*	G2G4 S4	Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water. Not known to breed in SF Bay Area.	Low potential. Some potential roosting habitat present in large coniferous trees.
North American porcupine *Erethizon dorsatum*	G5 S3	Forested habitats in the Sierra Nevada, Cascade, and Coast ranges, with scattered observations from forested areas in the Transverse Ranges.	Not expected. Suitable habitat not present.
Townsend's big-eared bat *Corynorhinus townsendii*	SSC G4 S2	Cavern rooster found throughout California in a wide variety of habitats such as barns, caves and large tree cavities. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Extremely sensitive to human disturbance.	Low potential. Unlikely to use urban environments and limited roosting habitat present.
Western red bat *Lasiurus frantzii*	SSC G4 S3	Roosts primarily in trees, 2-40 ft above ground, from sea level up through mixed conifer and deciduous forests. Not known to breed in SF Bay Area.	Low potential. Limited roosting habitat present.
		AMPHIBIANS AND REPTILES	
California red-legged frog *Rana draytonii*	FT SSC G2G3 S2S3	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation.	Low potential. Suitable habitat present at the Visitacion Creek Marsh.
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	FE, CE, CFP G5T2Q S2	Vicinity of freshwater marshes, ponds and slow-moving streams in San Mateo County and extreme northern Santa Cruz County. Prefers dense cover and water depths of at least one foot. Upland areas near water are also very important. Requires presence of CA red-legged frog and/or bullfrog as prey species.	Low potential. Limited habitat is available; all CNDDB records within 5 miles of the project area are considered extirpated.

Species Name	Status	Habitat	Potential to Occur in Project Area
Western pond turtle *Emys marmorata*	FP SSC G3G4 S3	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	Moderate potential. Suitable habitat present at Lake Merced.
BIRDS			
Alameda song sparrow *Melospiza melodia pusillula*	SSC, BCC G5T2T3 S2	Resident of salt marshes bordering south arm of San Francisco Bay. Inhabits Salicornia marshes; nests low in *Grindelia* bushes (high enough to escape high tides) and in Salicornia.	Not expected. Suitable Salicornia marsh habitat not present. Salicornia stands in the project area are small and isolated and could not support the species. Species is not known to occur along shoreline of San Francisco, Brisbane or South San Francisco.
American peregrine falcon *Falco peregrinus anatum*	FD G4T4 S3S4	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures.	Not expected. No large cliffs or structures present in project area to provide suitable habitat.
Bank swallow *Riparia riparia*	CT G5 S3	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Inhabits Salicornia marshes; nests low in *Grindelia* bushes (high enough to escape high tides) and in *Salicornia*.	Moderate potential. Suitable nesting habitat not present; however, species may forage over project area.
California black rail *Laterallus jamaicensis coturniculus*	CT, CFP G3T1 S2	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays . Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Not expected. Suitable marsh habitat not present.
California Ridgway's rail *Rallus langirostris obsoletus*	FE, CE, CFP G3T1 S2	Saltwater and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	Low potential. Low quality habitat present.
Double-created cormorant *Nannopterum auritum*	CWL G5	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.	Low potential. Limited nesting habitat.

Species Name	Status	Habitat	Potential to Occur in Project Area
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	SSC, BCC G5T3 S3	Resident of the San Francisco Bay region, in fresh and saltwater marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	High potential. Suitable habitat present in emergent wetland habitats. Species has been documented at Lake Merced and is considered extant.
Western snowy plover *Charadrius alexandrinus nivosus*	FT, SSC G3T3 S2S3	Inhabits beaches, mud flats, estuaries, salt evaporation ponds and inland river channels with banks for foraging. Breeds on sandy beaches, dunes, levees, river banks and dry salt evaporation beds along the California coastline typically in areas with minimal human disturbance.	Not expected. Suitable habitat not present.
FISH			
Green sturgeon – southern DPS *Acipenser medirostris pop. 1*	FT, AFS-V G2T1 S1	Spawning site fidelity. Spawns in the Sacramento, Feather and Yuba Rivers. Presence in upper Stanislaus and San Joaquin Rivers may indicate spawning. Non-spawning adults occupy marine/estuarine waters. Delta Estuary is important for rearing juveniles.	Not expected. Suitable habitat not present.
Hardhead *Mylopharodon conocephalus*	SSC G3 S3	Low to mid-elevation streams in the Sacramento-San Joaquin drainage. Also present in the Russian River.	Not expected. Suitable habitat not present.
Longfin smelt *Spirinchus thaleichthys*	FP, CT G5, S1	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column.	Not expected. Suitable habitat not present.
Tidewater goby *Eucyclogobius newberryi*	FE, AFS-EN G3 S3	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River.	Not expected. Suitable habitat not present.
INSECTS AND ARACHNIDS			
Bay checkerspot butterfly *Euphydryas editha bayensis*	FT G5T1 S3	Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay. Plantago erecta is the primary host plant; *Orthocarpus densiflorus* and O. purpurscens are the secondary host plants.	Not expected. Suitable habitat not present.

Species Name	Status	Habitat	Potential to Occur in Project Area
Bumblebee scarab beetle *Lichnanthe ursina*	G2 S2	Inhabits coastal sand dunes from Sonoma County south to San Mateo County. Usually flies close to sand surface near the crest of the dunes.	Not expected. Suitable habitat not present.
Callippe silverspot butterfly *Speyeria callippe callippe*	FE G5T1 S1	Restricted to the northern coastal scrub of the San Francisco Peninsula. Hostplant is *Viola pedunculata*. Most adults found on east facing slopes; males congregate on hilltops in search of females	Moderate potential. Host plants present on Icehouse Hill. The closest reported occurrence of Callippe silverspot butterfly is on San Bruno Mountain, approximately 0.2 mile from the project area and approximately 0.6 mile from the closest grassland area within the project area.
Mission blue butterfly *Icaricia icarioides missionensis*	FE G5T2 S2	Inhabits grasslands of the San Francisco peninsula. Three larval host plants: *Lupinus albifrons, L. variicolar*, and *L. formasus*, of which *L. albifrons* is favored.	Moderate potential. Host plant present on San Bruno Mountain. The closest reported occurrence of mission blue butterfly on San Bruno Mountain is approximately 0.2 mile from the project area, and approximately 0.6 mile from the closest grassland habitat within the project area
Monarch – California overwintering population *Danaus plexippus plexippus pop. 1*	FC G4T1T2Q S2	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	Low potential. No documented roosting sites within study area. Potential roosting habitat present within trees within project area.
Obscure bumble bee *Bombus caliginosus*	G2G3 S1S2	Coastal areas from Santa Barbara County north to Washington state. Food plant genera include *Baccharis, Cirsium, Lupinus, Lotus, Grindelia* and *Phacelia.*	Low potential. Only one occurrence record within study area. Most occurrence records in region are over 50 years old.
Western bumble bee *Bombus accidentalis*	Fed: CC USFS:S G2G3 S1	Open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. Nests underground. Potential nectar plants include Ceanothus, Centaurea, Chrysothamnus, Cirsium, Geranium, Grindellia, Lupinus, Melilotus, Monardella, Rubus, Solidago, and Trifolium.	Low potential. Project area provides potential habitat in open space areas, however species has not been recorded within study area in several decades.
Opler's longhorn moth *Adela oplerella*	G2 S2	From Marin County and the Oakland area on the inner coast ranges south to Santa Clara County. One record from Santa Cruz County. All but Santa	Not expected. Serpentine habitat not present.

Species Name	Status	Habitat	Potential to Occur in Project Area
		Cruz site is within serpentine grassland. Larvae feed on *Platystemon californicus.*	
Pheres blue butterfly *Icaricia icarioides pheres*	G5TX	Coastal dunes of San Francisco. Used *Lupinus sp.* and *Lotus sp.* as host plants.	Not expected. Species is likely extirpated. Historically was observed on sand dunes, prior to development.
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE G4T2 S2	Coastal, mountainous areas with grassy ground cover, mainly in the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on steep, north-facing slopes within the fog belt. Larval host plant is *Sedum spathulifolium.*	Not expected. Suitable habitat for this species not present.
San Francisco Bay Area leaf-cutter bee *Trachusa gummifera*	G1 S1	Flight period from May to June. Documented visiting *Pickeringia* flowers but examination of pollen loads on females and pollen in brood cells indicate the species is polylectic.	Not expected. Last CNDDB recorded occurrence in 1957.
San Francisco forktail damselfly *Ischnura gemina*	G2 S2	Small, marshy ponds and ditches with emergent and floating aquatic vegetation.	Not expected. Habitat present with freshwater wetlands but last recorded CNDDB occurrence in 1978.
Sandy beach tiger beetle *Cicindela hirticollis gravida*	G5T2 S2	Inhabits areas adjacent to non-brackish water along the coast of California from San Francisco Bay to northern Mexico.	Not expected. CNDDB records indicate extirpated. Last recorded occurrence in 1922.
Stage's dufourine bee *Dufourea stagei*	G1G2 S1	Species is a ground-nesting bee. Coastal scrub.	Not expected Limited habitat within coastal scrub, last recorded CNDDB occurrence in 1962.
Incredible harvestman *Banksula incredula*	G1 S1	Known only from the type locality, San Bruno Mountain, San Mateo County. Found within a franciscan sandstone talus slope.	Not expected. Franciscan sandstone talus slope habitat not present.
PLANTS			
Adobe sanicle *Sanicula maritima*	CR CNPS 1B.1 G2 S2	Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie.	Not expected. CNDDB records indicate extirpated on site, last recorded occurrence was 1895.

Species Name	Status	Habitat	Potential to Occur in Project Area
Alkali milk-vetch *Astragalus tener var. tener*	CNPS 1B.2 G2T1 S1	Alkali playa, valley and foothill grassland, vernal pools.	Not expected. May have been extirpated from project area. Last recorded occurrence was 1868.
Beach layia *Layia carnoso*	FT, CE CNPS 1B.1 G2 S2	Coastal dunes, coastal scrub.	Not expected. May have been extirpated from project area.
Bent-flowered fiddleneck *Amsinckia lunaris*	CNPS 1B.2 G3 S3	Cismontane woodland, valley and foothill grassland, coastal bluff scrub.	Low potential. Potential habitat present grasslands in project area.
Blue coast gilia *Gilio capitata ssp. chamissonis*	CNPS 1B.1 G5T2 S2	Coastal dunes, coastal scrub.	Low potential. Potential habitat present in coastal scrub in project area.
California seablite *Suaeda californico*	FE CNPS 1B.1 G1 S1	Marshes and swamps.	Low potential. Suitable habitat present within freshwater wetlands.
Chaparral ragwort *Senecio aphanactis*	CNPS 2B.2 G3 S2	Chaparral, cismontane woodland, coastal scrub.	Low potential. Last recorded CNDDB occurrence from 1956.
Choris's popcornflower *Plagiobothrys chorisianus var. chorisionus*	CNPS 1B.2 G3T1Q S1	Chaparral, coastal scrub, coastal prairie.	Low potential. Suitable habitats present within grasslands.
Compact cobwebby thistle *Cirsium accidentale var. compactum*	CNPS 1B.2 G3G4T2 S2	Chaparral, coastal dunes, coastal prairie, coastal scrub.	Not expected. Species may have been extirpated from project area.
Congested-headed hayfield tarplant *Hemizonia congesta ssp. cangesta*	CNPS 1B.2 G5T2 S2	Valley and foothill grassland.	Low potential. Last recorded CNDDB occurrence from 1890s or 1900s. Suitable habitat present in grasslands.
Dark-eyed gilia *Gilia millefoliata*	CNPS 1B.2 G2 S2	Coastal dunes.	Not expected. Species may have been extirpated from project area. Last recorded occurrence 1903.
Diablo helianthella *Helianthella castanea*	CNPS 1B.2 G2 S2	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland.	Low potential. Suitable habitats present within grasslands.

Species Name	Status	Habitat	Potential to Occur in Project Area
Franciscan manzanita *Arctostaphylos franciscana*	FE CNPS 1B.1 S1	Occurs only on the San Francisco peninsula in areas with serpentine soils, bedrock outcrops, greenstone, and mixed Franciscan rock.	Not expected. No occurrence records from within study area. Designated Critical Habitat at McLaren Park does not currently support the species.
Franciscan thistle *Cirsium andrewsii*	CNPS 1N.2 G3 S3	Coastal bluff scrub, broadleaved upland forest, coastal scrub, coastal prairie.	Not expected. Species may have been extirpated from project area. Last recorded occurrence was 1892.
Kellogg's horkelia *Horkelia cuneata var. sericea*	CNPS 1B.1 G4T1? S1?	Closed-cone coniferous forest, coastal scrub, coastal dunes, chaparral.	Low potential. Potential habitat present in coastal scrub within project area.
Montara manzanita *Arctostaphylos montaraensis*	CNPS 1B.2 G1 S1	Chaparral, coastal scrub. Slopes and ridges.	Not expected. Suitable slopes and ridges not present in project area.
Northern curly-leaved monardella *Monardella sinuata ssp. nigrescens*	CNPS 1B.2 G3T2 S2	Coastal dunes, coastal scrub, chaparral, lower montane coniferous forest.	Not expected. Species may have been extirpated from project area. Last recorded occurrence was 1933.
Pacific manzanita *Arctostaphylos pacifica*	CE CNPS 1B.1 G1 S1	Coastal scrub, chaparral.	Not expected. Suitable habitat not present.
Point Reyes horkelia *Horkelia marinensis*	CNPS 1B.2 G2 S2	Coastal dunes, coastal prairie, coastal scrub. Sandy flats and dunes near coast; in grassland or scrub plant communities.	Low potential. Potential habitat in coastal scrub habitat in project area.
Presidio manzanita *Arctostaphylos montana ssp. ravenii*	FE CE CNPS 1B.1 G3T1 S1	Chaparral, coastal prairie, coastal scrub. Open, rocky serpentine slopes.	Not expected. Serpentine habitat not present in project area.
Robbins' broomrape *Aphyllon robbinsii*	CNPS 1B.1 G1 S1	Coastal bluff scrub, coastal dunes (possibly). Rocky or sandy soil on bluffs, cliffs, landslides, or shell mounds; possibly on sand dunes. Only confirmed host is *Eriophyllum staechadifolium.*	Not expected. Species may have been extirpated from project area. Last occurrence in 1922.
Robust spineflower *Chorizanthe robusta var. robusta*	FE CNPS 1B.1 C2T1 S1	Cismontane woodland, coastal dunes, coastal scrub, chaparral. Sandy terraces and bluffs or in loose sand	Not expected. Species may have been extirpated from project area. Last occurrence in 1913.

Species Name	Status	Habitat	Potential to Occur in Project Area
Rose leptosiphon *Leptosiphon rosoceus*	CNPS 1B.1 G1 S1	Coastal bluff scrub.	Not expected. Species may have been extirpated from project area. Last occurrence 1885.
Round-headed collinsia *Collinsia corymbosa*	CNPS 1B.2 G1 S1	Coastal dunes.	Not expected. Suitable habitat not present.
San Bruno Mountain manzanita *Arctostaphylos imbricata*	CE CNPS 1B.1 G1 S1	Chaparral, coastal scrub.	Not expected. Suitable habitat not present.
San Francisco Bay spineflower *Chorizanthe cuspidata var. cuspidate*	CNPS 1B.2 G2T1 S1	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub.	Low potential. Suitable habitat in coastal scrub present.
San Francisco campion *Silene verecunda ssp. verecunda*	CNPS 1B.2 G5T1 S1	Coastal scrub, valley and foothill grassland, coastal bluff scrub, chaparral, coastal prairie.	Low potential. Suitable habitat in coastal scrub present.
San Francisco collinsia *Collinsia multicolor*	CNPS 1B.2 G2 S2	Closed-cone coniferous forest, coastal scrub.	Low potential. Potential habitat within project area.
San Francisco gumplant *Grindelia hirsutula var. maritima*	CNPS 3.2 G5T1Q S1	Coastal scrub, coastal bluff scrub, valley and foothill grassland.	Low potential. Potential habitat within grasslands and in project area.
San Francisco lessingia *Lessingia germanorum*	FE, CE CNPS 1B.1 G1 S1	Coastal scrub. On remnant dunes. Open sandy soils relatively free of competing plants.	Low potential. Limited habitat within coastal scrub present.
San Francisco owl's-clover *Triphysaria floribunda*	CNPS 1B.2 G2? S2?	Coastal prairie, coastal scrub, valley and foothill grassland.	Low potential. Potential habitat within grasslands in project area.
Scouler's catchfly *Silene scouleri ssp. scouleri*	CNPS 2B.2 G5T4T5 S2S3	Coastal bluff scrub, coastal prairie, valley and foothill grassland.	Low Potential. Potential habitat within grasslands in project area.
Short-leaved evax *Hesperevax sparsiflora var. brevifolia*	CNPS 1B.2 G4T3 S3	Coastal bluff scrub, coastal dunes, coastal prairie.	Not expected. Species may have been extirpated from project area. Last recorded occurrence in 1956.

Species Name	Status	Habitat	Potential to Occur in Project Area
Two-fork clover *Trifolium amoenum*	FE CNPS 1B.1 G1 S1	Valley and foothill grassland, coastal bluff scrub. Sometimes on serpentine soil, open sunny sites, swales. Most recently cited on roadside and eroding cliff face.	Not expected. Serpentine habitat not present in project area.
White-rayed pentachaeta *Pentachaeta bellidiflora*	FE CE CNPS 1B.1 G1 S1	Valley and foothill grassland, cismontane woodland. Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock.	Not expected. Serpentine habitat not present in project area.
Bristly sedge *Carex comoso*	CNPS 2B.1 G5 S2	Marshes and swamps, coastal prairie, valley and foothill grassland. Lake margins, wet places; site below sea level is on a Delta island.	Not expected. Species may have been extirpated from project area.
Fragrant fritillary *Fritillaria liliocea*	CNPS 1B.2 G2 S2	Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland. Often on serpentine, various soils reported though usually on clay, in grassland.	Not expected. Serpentine habitat not present in project area.
Water star-grass *Heteranthera dubia*	CNPS 2B.2 G5 S2	Marshes and swamps. Alkaline, still or slow-moving water. Requires a pH of 7 or higher, usually in slightly eutrophic waters.	Low potential. Potential habitat within freshwater wetland habitats in project area.
Coastal triquetrella *Triquetrella californica*	CNPS 1B.2 G2 S2	Grows within 30m from the coast in coastal scrub, grasslands and in open gravels on roadsides, hillsides, rocky slopes, and fields. On gravel or thin soil over outcrops. 20-1175 m.	Low potential. Potential habitat within coastal scrub and grasslands in project area.
MOLLUSKS AND CRUSTACEANS			
Pacific walker *Pomatiopsis californica*	G1 S1	Freshwater.	Not expected. Species may have been extirpated from project area. Last recorded occurrence in late 1800s.
Tomales isopod *Caecidotea tomalensis*	G1 S2S3	Inhabits localized freshwater ponds or streams with still or near-still water from San Mateo to Del Norte County.	Low potential. Potential habitat within wetland habitats in project area.

State and Federal Listing Codes
(FE) Endangered = Federally listed as Endangered.
(FT) Threatened = Federal list, likely to become endangered in the foreseeable future.
(FP) Proposed = Species or Critical Habitat proposed for official Federal listing.

(FC) Candidate = Federal candidate to become a Proposed species.
(FD) Delisted from Federal List. Status to be monitored for 5 years.
(FSC) Federal Species of Concern = May be endangered or threatened, but not enough biological information to list.
(CE, CT, CR, SCT) State Listed = Listed as endangered, threatened, rare or candidate by California.
(CSC) California Species of Concern = CDFW concern for population trends.
(CFP) California Fully Protected = Fish and Wildlife Code prohibits take of individuals.
(CFGC) = California Department of Fish and Wildlife Code: §3503 prohibits the taking, possession or needless destruction of the nest or eggs of any bird; §3503.5 prohibits the taking, possession or destruction of any bird in the order Falconiformes or Strigiformes (birds-of-prey) or the taking, possession or destruction of the nest or eggs of any such bird; §3511 outlines protection for fully protected birds; and §3513 prohibits the taking or possession of any migratory non-game bird as designated in the Migratory Bird Treaty Act.
(CWL) = California Department of Fish and Wildlife Watch List
(AFS) = American Fisheries Society identifies marine, estuarine and diadromous fish species that are at risk of extinction in North America. The AFS has designated the following four classifications in order of conservation importance E – Endangered, T – Threatened, V – Vulnerable, and CD – Conservation Dependent.
(BCC) U.S. Fish and Wildlife Service Birds of Conservation Concern.

(CNPS 1B) = California Native Plant Society: rare or endangered in CA or elsewhere.
0.1: Seriously endangered in California
0.2: Fairly endangered in California
(CNPS 2) = California Native Plant Society: rare or endangered in CA but more common elsewhere.
(CNPS 3) = California Native Plant Society: more information is needed to determine degree of sensitivity.
(CNPS 4) = California Native Plant Society: plant of limited distribution.
CNPS Threat Ranks
0.1 = Seriously threatened in California
0.2 = Fairly threatened in California
0.3 = Not very threatened in California
(MBTA) = Migratory Bird Treaty Act. Species of migratory birds protected by the Migratory Bird Treaty Act (16 U.S.C. 703-711) and subject to the regulations on migratory birds contained in this subchapter B of title 50 CFR.
(Sensitive) = CA Dept. of Forestry classification; deserves special consideration during timber harvest operations.
(WBWG:M) = Western Bat Working Group: Medium Priority
(WBWG:H) = Western Bat Working Group: High Priority
(WL) Watch List California Department of Fish and Wildlife
(Xerces) = Xerces Society for Invertebrate Conservation. Red List identifies endangered, threatened or at-risk pollinator species. PE – Possibly Extinct indicates species only known from historical occurrences; CI – Critically Imperiled indicates species at very high risk of extinction; I – Imperiled indicates species at high risk of extinction; V – Vulnerable indicates species at moderate risk of extinction; DD – Data Deficient indicates lack of information to sufficiently assess status.

<u>NatureServe Conservation Status Rankings</u>
(G1) = Globally Critically Imperiled. At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
(G2) = Globally Imperiled. At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
(G3) = Globally Vulnerable. At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
(G4) = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
(G5) = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.
(S1) = State Critically Imperiled. At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
(S2) = State Imperiled. At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
(S3) = State Vulnerable. At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

Appendix C: Figures

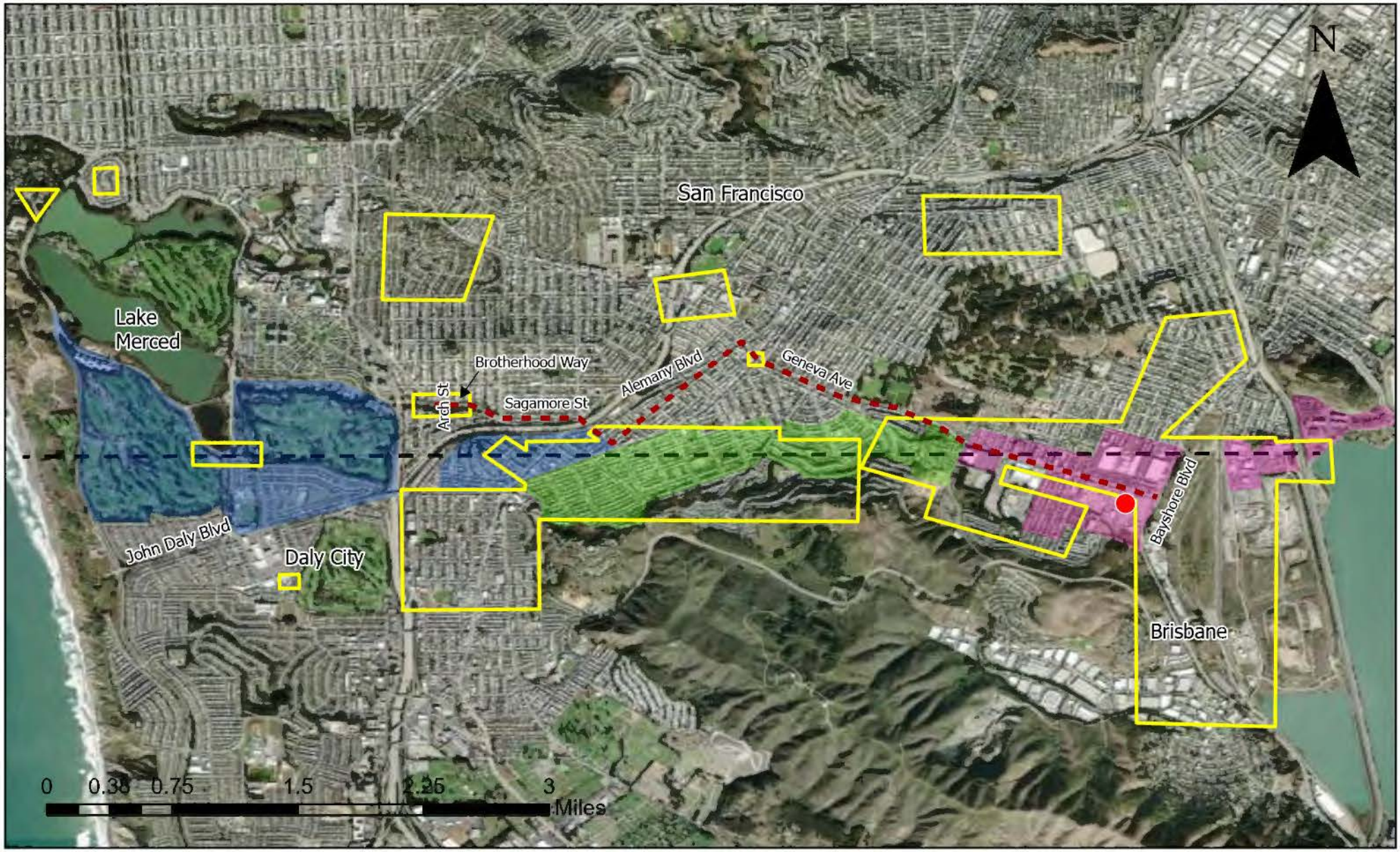


Figure 1: Project Area With Components

PG&E Power Asset Acquisition Project, San Mateo and San Francisco County, CA

Service Layer Credits: Maxar

Legend

Local Distribution System Separation

- Southwest Area
- Central Area
- Southeast Area

- Reinforcement Boundary
- San Francisco/ San Mateo County Border
- Distribution Express Feeders
- Martin Substation Separation

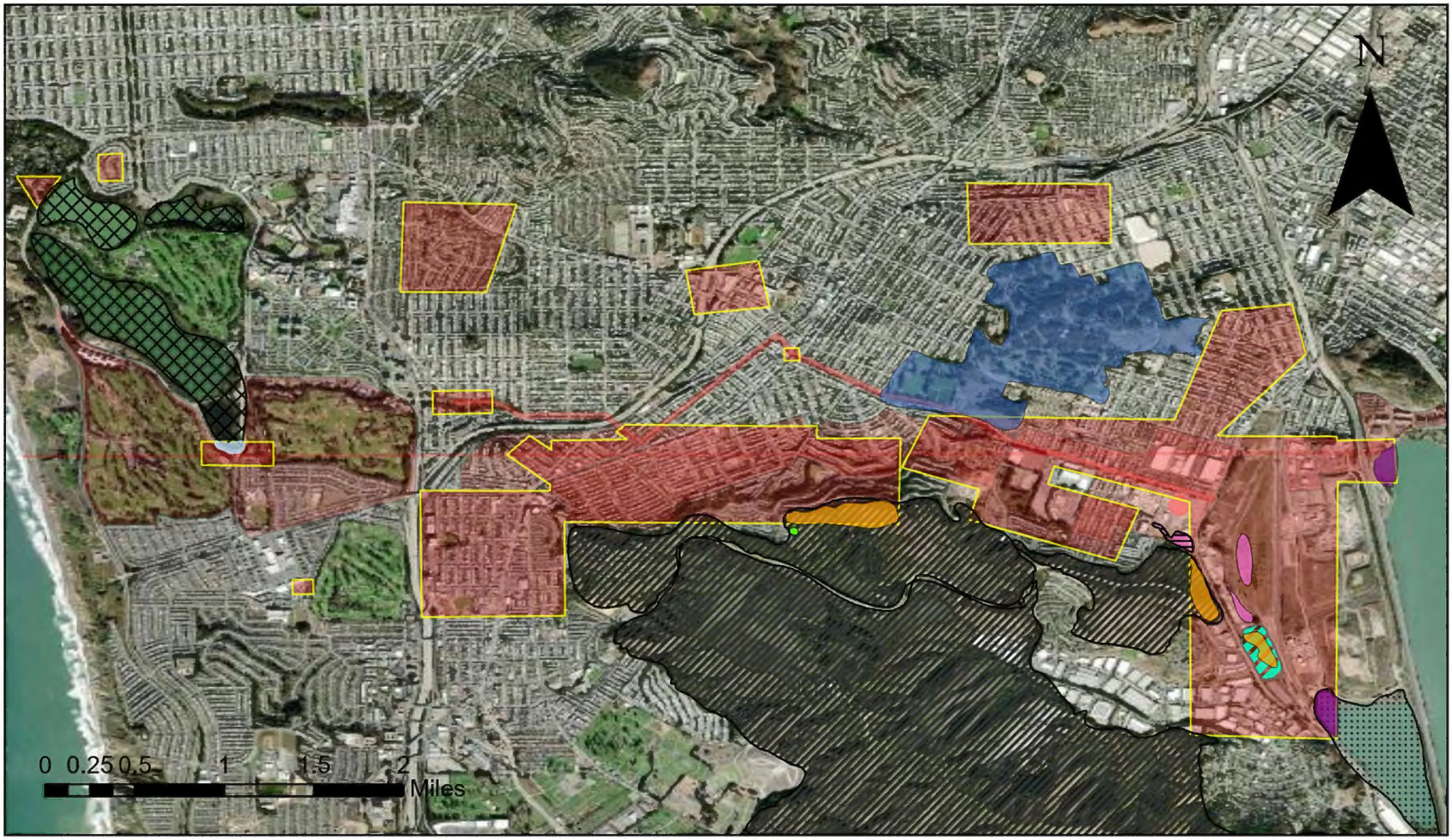


Figure 2: Habitats with Sensitive Resources

PG&E Power Asset Acquisition Project, San Mateo and San Francisco County, CA

Service Layer Credit:Maxar

Legend

- Project Area
- Icehouse Hill
- Brisbane Lagoon
- Lake Merced
- McLaren Park
- Visitation Creek Marsh
- San Bruno Mountain Habitat Conservation Plan, Undeveloped
- Reinforcement Boundary

Habitats Within Project Area

- Grasslands & Scrub
- Emergent Freshwater Wetlands
- Ephemeral Freshwater Pond
- Freshwater Lake
- Salt Marsh Wetlands

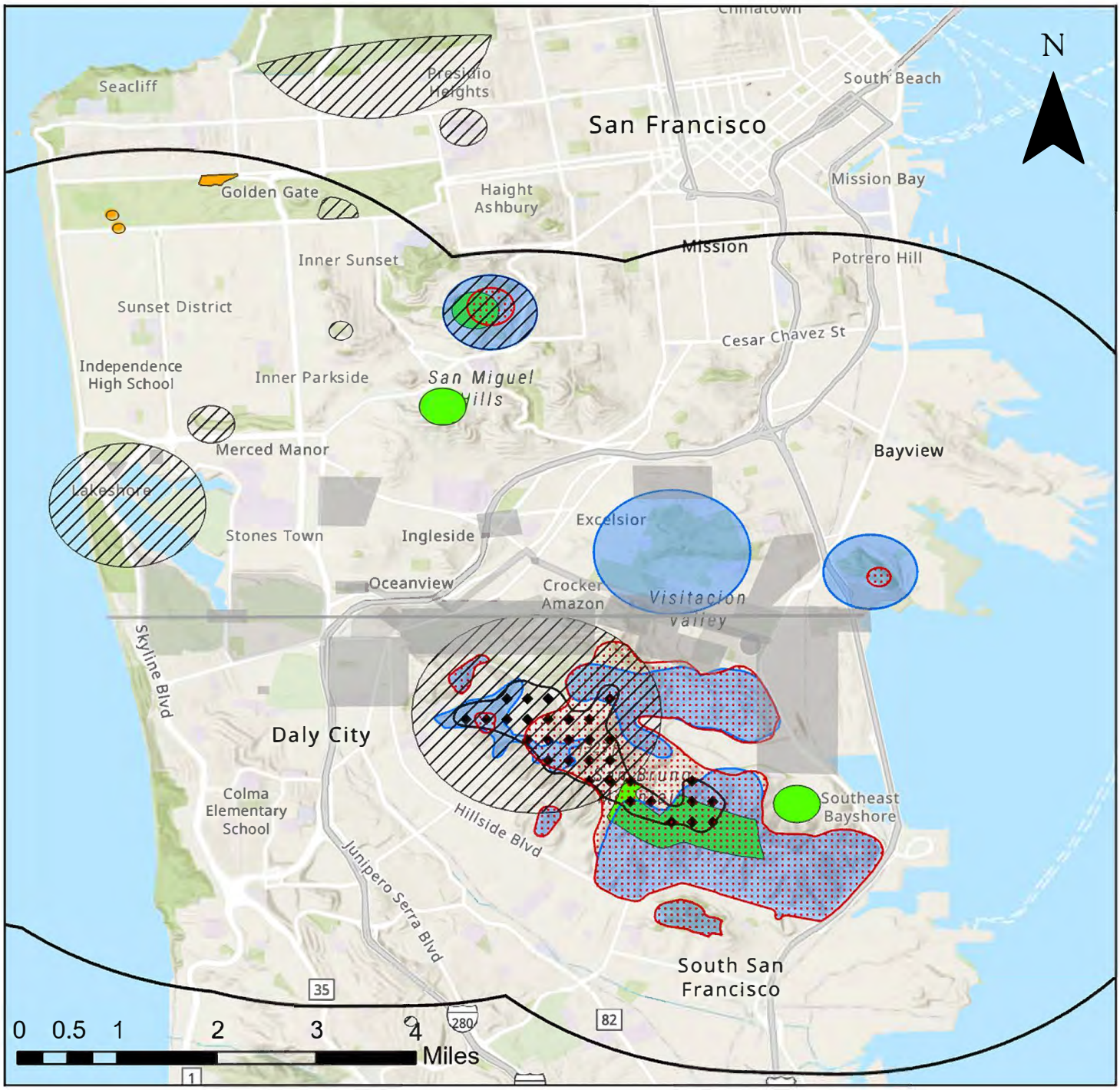


Figure 3: CNDDB Occurrence Map (Invertebrates)

Source: CNDDB 2/24

Service Layer Credits: California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, NASA, NGA, USGS, FEMA

Legend

- Study Area (3 Mile Buffer)
- Project Area
- Bay Checkerspot Butterfly
- Mission Blue Butterfly
- San Bruno Elfin Butterfly
- Callippe Silverspot Butterfly
- Western Bumble Bee
- Monarch Butterfly - California Overwintering Population

Figure 4: CNDDB Occurrence Map (Vertebrates)

Source: CNDDB 2/24

Service Layer Credits: California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, NASA, NGA, USGS, FEMA

Legend

- Project Area
- Study Area (3 Mile Buffer)
- California Red-legged Frog
- Western Pond Turtle
- Alameda Song Sparrow
- American Badger
- California Ridgway's Rail
- Western Red Bat
- American Peregrine Falcon*
- Bank Swallow
- Double-crested Cormorant
- Green Sturgeon - Southern DPS
- Townsend's Big-Eared Bat
- Longfin Smelt
- California Black Rail & Tidewater Goby
- Hardhead & Saltmarsh Common Yellowthroat

*Species with protected occurrence records not shown.

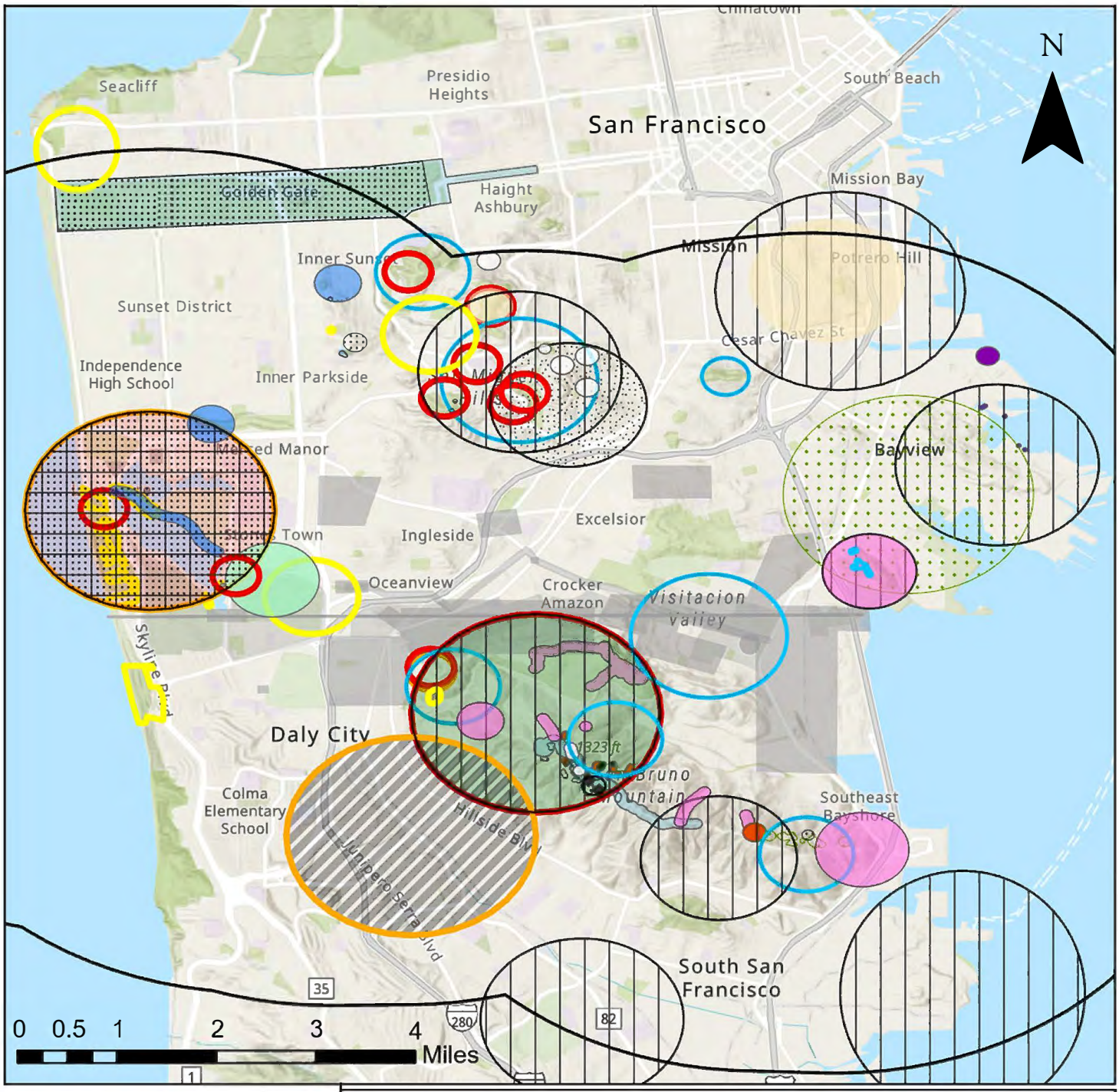


Figure 5: CNDDB Occurrence Map (Plants)

Source: CNDDB 2/24

Service Layer Credits: California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, NASA, NGA, USGS, FEMA

Legend

- Study Area (3 Mile Buffer)
- Project Area
- Bent-flowered Fiddleneck
- Blue Coast Gilia
- California Seablite
- Point Reyes Horkelia
- Round-headed Collinsia
- San Bruno Mountain Manzanita
- Chaparral Ragwort
- Choris' Popcornflower
- Coastal Triquetrella
- Compact Cobwebby Thistle
- Diablo Helianthella
- Fragrant Fritillary
- Kellogg's Horkelia
- Montara Manzanita
- Pacific Manzanita
- San Francisco Bay Spineflower
- San Francisco Campion
- San Francisco Collinsia
- San Francisco Gumplant
- San Francisco Lessingia
- San Francisco Owl's-clover
- Scouler's Catchfly
- Congested-Headed Hayfield Tarplant*
- Beach Layia*

*Exact location unknown, mapped by CNDDB to cover entire city of San Francisco

APPENDIX I
PALEONTOLOGICAL RESOURCES TECHNICAL MEMORANDUM

PAGE INTENTIONALLY BLANK

ESA

575 Market Street
Suite 3700
San Francisco, CA 94105
415.896.5900 phone
415.896.0332 fax

esassoc.com

memorandum

date	May 3, 2024
to	Julie Moore, San Francisco Environmental Planning
cc	Sue Chau, San Francisco Public Utilities Commission
from	Karen Lancelle, ESA
subject	PG&E Power Asset Acquisition – Paleontological Resources Technical Memorandum

Introduction and Project Description

The City and County of San Francisco (the "City") is proposing (1) purchase ("acquisition") of Pacific Gas and Electric Company (PG&E)-owned electrical transmission and distribution assets ("Assets") located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco, and (2) other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco ("separation"). In this environmental impact report (EIR), the terms "PG&E Power Asset Acquisition Project" and "project" refer to the acquisition and separation, including construction and related work required for independent operation of the system.

The Assets include equipment, facilities, property, and records that the City would acquire, including the following:

- PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer serving distribution lines, and related facilities)
- PG&E's 115 *kilovolt*[1] (kV) and 230 kV transmission assets (substations, transmission lines, transformers, and related facilities needed for operations)
- Certain PG&E distribution lines in Brisbane emanating from the Martin Substation that serve customers in San Francisco[2]

1 Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

2 Existing distribution lines serving only San Francisco customers would be acquired by the City. Distribution lines serving only PG&E customers outside of San Francisco would remain with PG&E. Finally, some of the distribution lines serve both customers in San Francisco and customers outside of San Francisco. These feeders would be separated at the border and the City would construct new infrastructure to ensure that each utility would have its own system and that all customers would continue to be served.

- A portion of the Martin Substation facilities (located in Brisbane) or *interconnections*[3] needed to enable the San Francisco Public Utilities Commission (SFPUC) to control all power flows from Martin Substation into San Francisco
- Other systems and equipment, materials, records, operating and maintenance facilities, property, and other land-related agreements as necessary for safe and reliable operation, maintenance, repair, control, and protection of the acquired transmission and distribution system

After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition, the City would acquire property rights as needed to operate and maintain the Assets and new City equipment, as needed, on public and private lands. This transaction would not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.[4]

In addition to acquiring the necessary transmission and distribution system and electrical facilities, the City would physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco-San Mateo County border), as shown on **Figure 1**, to allow both systems to be safely, reliably, and independently operated by SFPUC and PG&E. After system separation, the SFPUC would provide electricity service to customers in San Francisco currently served by PG&E; PG&E would continue to provide electricity service to its customers outside San Francisco. The construction portion of the project is anticipated to take approximately 3 to 5 years after the purchase and transfer of the Assets. It is anticipated that the City and PG&E would coordinate on the implementation of the project.

Definition of Paleontological Resources

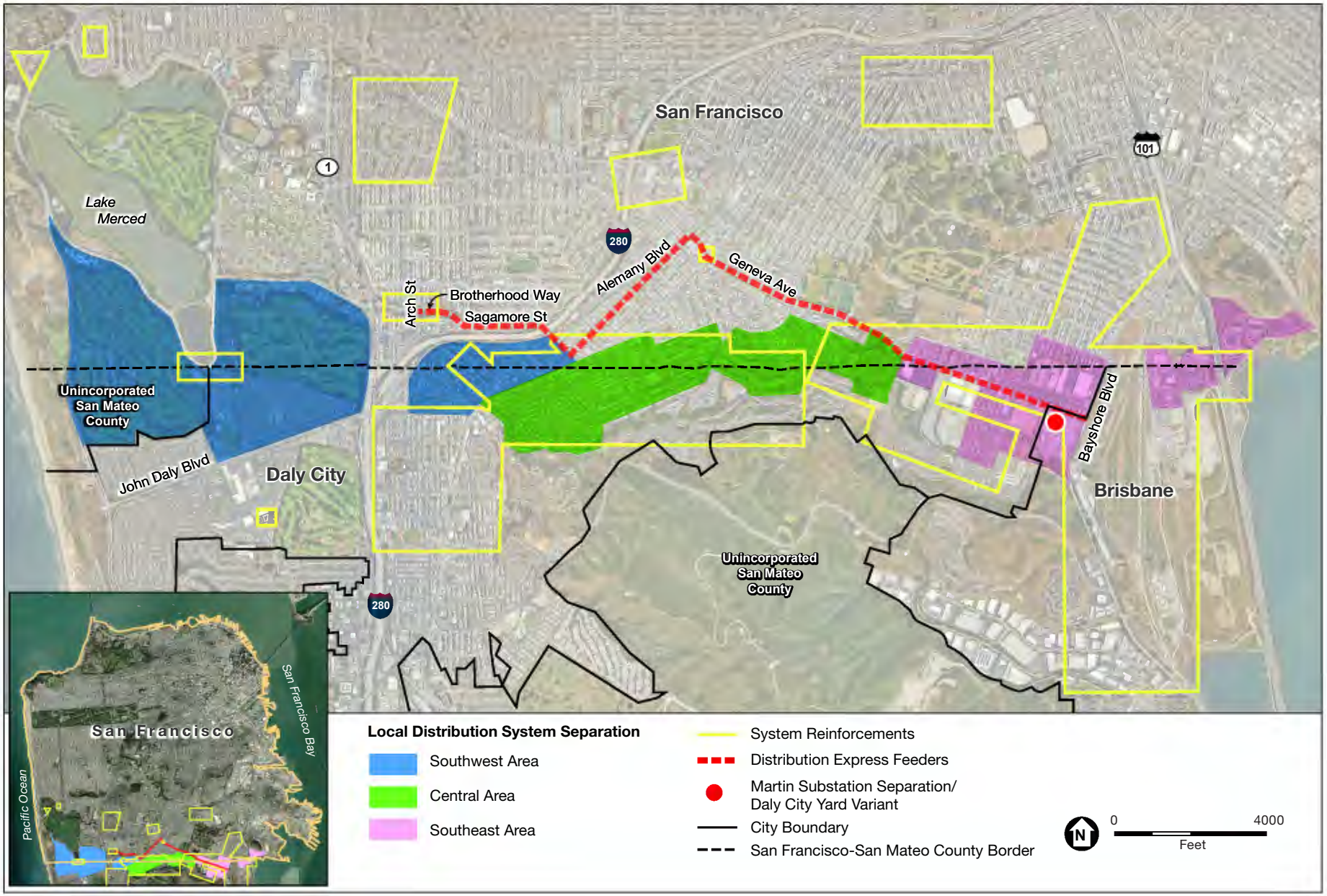
Paleontological resources are the fossilized evidence of past life found in the geologic record. Fossils are preserved in sedimentary rocks and may include bones, teeth, shells, leaves, and wood. Despite the abundance of these rocks, and the vast number of organisms that have lived through time, preservation of plant or animal remains as fossils can be a rare occurrence. Paleontological resources are considered nonrenewable resources because the organisms they represent no longer exist, thus, once destroyed, these resources can never be replaced. Not all paleontological discoveries are considered of scientific importance, as such there are several criteria to determine the scientific importance of fossils. These criteria include if fossils provide data on the following: evolutionary relationships and developmental trends among organisms, both living and extinct; the age of rock units, sedimentary stratum, or depositional history of the region; development of biological communities; or, unusual or spectacular circumstances in the history of life.[5,6] These data are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes. For a fossil to form, an organism generally must be rapidly buried in an environment that cannot be penetrated by air or other organisms and must remain buried for sufficiently long periods.

3 Interconnection is defined as an electrical connection between multiple entities.

4 In addition, the interconnection between the transmission system in San Francisco and the Trans Bay Cable (TBC), and TBC operation, would not be physically changed with the acquisition.

5 Murphey, P.C., Knauss, G.E., Fisk, L.H., Deméré, T.A., and Reynolds, R.E. 2019. Best practices in mitigation paleontology: Proceedings of the San Diego Society of Natural History, No. 47.

6 Society of Vertebrate Paleontology (SVP), 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology, Impact Mitigation Guidelines Revision Committee.



SOURCE: ESA, 2022

Note: The project includes purchase of PG&E's transmission and distribution assets needed for the city to provide reliable electricity service to customers in San Francisco. Only major project components involving physical changes to the environment are shown. The project also includes work within existing substations, PG&E properties and storage and maintenance yards.

PG&E Asset Acquisition Project

Figure 1
Project Area Overview

The probability of finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping classifications of soil units can be used for assessing the potential for the occurrence of paleontological resources.

Methodology

The potential for areas affected by the project to yield paleontological findings was assessed by reviewing scientific literature, querying online databases including the University of California at Berkeley Museum of Paleontology, and reviewing the City's San Francisco Paleontological Sensitivity Map. In addition, geologic maps, U.S. Geological Survey topographic maps, and aerial imagery were reviewed.

Results

Setting

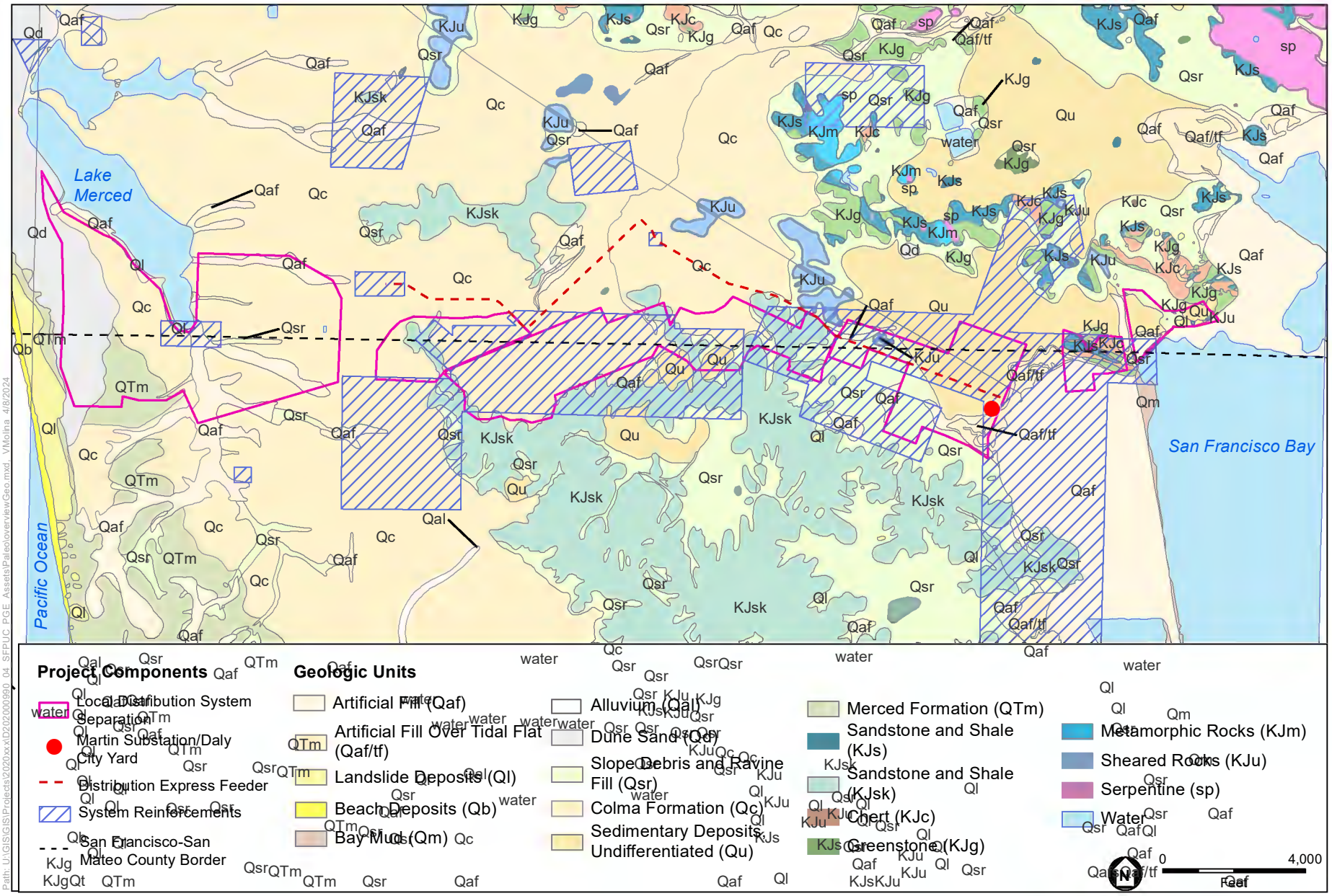
The project is located on the San Francisco Peninsula and crosses the boundaries of the cities of San Francisco (San Francisco County), Daly City, Brisbane (San Mateo County), and unincorporated San Mateo County. Land use in the study area is mostly urbanized.

The project is located within the geologically complex region of California referred to as the Coast Ranges Geomorphic Province (California Geological Survey [CGS], 2002).[7] The Coast Ranges province lies between the Pacific Ocean and the Great Valley Geomorphic Province (Sacramento and San Joaquin Valleys) and stretches from the Oregon border to the Santa Ynez Mountains near Santa Barbara. This province is marked by northwest-trending elongated ranges and narrow valleys that roughly parallel the coast and the San Andreas Fault Zone. Much of the Coast Ranges province is composed of marine sedimentary deposits, metamorphic rocks, and volcanic rocks. The tectonics of the San Andreas Fault Zone and other major faults in the western part of California have played a major role in the geology of the area.

Geologic Units within the Project Vicinity

Excavation during project construction could encounter multiple geologic units. **Table 1** presents the geologic units that occur at the ground surface, or are likely to occur within 10 feet below ground surface, in the study area. **Figure 2** shows geologic units and areas of construction activity for the project.

7 A geomorphic province is a regional area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces.



SOURCE: Bonilla, 1998

PG&E Asset Acquisition Project

Figure 2
Geologic Units in the Project Vicinity

ESA

TABLE 1
GEOLOGIC UNITS IN THE STUDY AREA

Map Label	Geologic Unit	Description and Depositional Environment (if applicable)
Quaternary – Holocene (< 11,500 years old)		
Qaf, Qaf/tf	Artificial Fill	Loose to very well consolidated gravel, sand, silt, clay, rock fragments, organic matter, and man−made debris in various combinations
Ql	Landslide Deposits	Composition and structure depend on the geologic formation involved and type of landslide; generally subaerial
Qb	Beach Deposits	Predominantly well sorted medium grained loose gray sand, locally consists of sand, gravel and cobbles; subaerial
Qd	Dune Sand	Well sorted fine grained sand, gray and loose in most places; aeolian
Qm	Bay Mud	Soft to firm clay and silt; locally contains shell fragments, plant remains, and thin beds of sand
Qal	Alluvium	Mostly sand and silt but locally contains clay, gravel, or boulders
Quaternary – Pleistocene (11,600 years before present – 1.6 million years ago [Ma])		
Qsr	Slope Debris and Ravine Fill	Stony silty to sandy clay, locally silty to clayey sand or gravel; subaerial
Qc	Colma Formation	Friable well sorted fine to medium sand containing a few beds of sandy silt, clay, and gravel; poorly consolidated; shallow marine
Qu	Sedimentary Deposits, undifferentiated	Various sedimentary deposits
Tertiary and Quaternary - Pleistocene and Pliocene (1.6 Ma - 16 Ma)		
QTm (Merced)	Merced Formation	Sand, silt, and clay, minor amounts of gravel, lignite, and volcanic ash; poorly consolidated; marine and terrestrial
Cretaceous and Jurassic – Franciscan Complex and Associated Rocks (> 66 Ma)		
KJs, KJsk	Sandstone and shale	Interbedded sandstone and shale; marine, deposited in turbidity flows
KJc	Chert	Hard chert interbedded with firm shale; marine
KJg	Greenstone	Altered volcanic rocks, fine grained, mostly basalt
KJu	Sheared Rocks	Small to large fragments of hard rock in matrix of sheared rock; derived mostly from shale and sandstone of Franciscan Complex and serpentine
KJm	Metamorphic Rocks	Fine- to coarse-grained metamorphic rocks.
sp	Serpentinite	Serpentinite, contains small bodies of gabbro and diabase.

SOURCE: Bonilla. M.G., Preliminary Geologic Map of the San Francisco South 7.5' Quadrangle and Part of the Hunters Point 7.5' Quadrangle, San Francisco Bay Area, California,1998; Sloan, D., Geology of the San Francisco Bay Region, 2006.

Locality Search Results

The online University of California Museum of Paleontology (UCMP) database was reviewed for macrofossil (plant, vertebrate, and invertebrate fossil) localities for San Francisco and San Mateo counties.

A search of UCMP localities within San Francisco County returned 228 results, as shown in **Attachment A**. The results are predominantly Quaternary age, although four results are early Cretaceous. Location information is provided for 183 of the records. Of the Holocene and Pleistocene records for which a locality is named, a majority of records are located in northern and western San Francisco. Of the localities in western San Francisco, most are either in formations along the coast (i.e., Merced Formation) or the Farallon Islands. The nearest named locality to the study area is in the vicinity of Fort Funston, within the Merced Formation, which underlies portions of the study area. The UCMP database identifies the fossil remains of nine vertebrate mammals collected at Fort

Funston Beach located in the southwest area of San Francisco from the Merced Formation.[8] While not specifically identified in the UCMP database search of localities, the Pleistocene-age Colma Formation has previously produced vertebrate fossils.[9]

In San Mateo County, there are 305 records for "Recent" fossil localities, also shown in Attachment A. Of the 290 records for which locality information is available, the nearest record is a locality for invertebrates at San Bruno Point, over two miles south of the study area. There is a single record for this locality. Most "Recent" localities occur along the San Mateo County coastline south of Pacifica. San Mateo County has 32 records of Pleistocene epoch localities. Vertebrate fossils in Pleistocene sediments were found at one locality in South San Francisco, approximately 1.5 miles south of the study area.

One Cretaceous age fossil has been found in San Francisco near the Golden Gate Bridge; the two other records in the UCMP database for fossils of Cretaceous or Jurassic age do not identify localities more specific than San Francisco County. Cretaceous age fossil occurrences in San Mateo County are almost entirely within the Pigeon Point or Calera formations, which do not occur in the study area.

Paleontological Significance and Sensitivity

Significance and Sensitivity Criteria

The city uses the modified Potential Fossil Yield Classification system developed by the federal Bureau of Land Management as the basis for its paleontological potential designations.[10] The classification system is a predictive resource-management tool founded on two basic facts of paleontology: that occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them, and that the likelihood of the presence of fossils can be broadly predicted from the distribution of geologic units at or near the surface. The paleontological potential designations classify geologic unit potential from very low potential to very high potential, as detailed in **Table 2**. Although significant localities may occasionally occur in a geologic unit that has been assigned a lower PFYC classification, widely scattered important fossils or localities do not necessarily indicate a higher class assignment. Instead, the overall abundance of scientifically important localities is intended to be the major determinant for the assigned classification.

8 UCMP, 2024. UCMP Localities Search, online database; vertebrate fossils of the Merced Formation within San Francisco County. Online: ucmpdb.berkeley.edu/loc.html. See Attachment A.

9 Clites, Erika. Golden Gate National Recreation Area. No date.; Rodda, Peter U., and Nina Baghai. Late Pleistocene Vertebrates from Downtown San Francisco, Journal of Paleontology, 67(6), November 1993.

10 United States Department of the Interior, Bureau of Land Management (BLM). Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. IM 2016-124. Instruction Memorandum https://www.blm.gov/sites/blm.gov/files/uploads/IM2016-124_att1.pdf

TABLE 2
POTENTIAL FOSSIL YIELD CLASSIFICATION

Classification	Geologic Unit Description	Remarks
Class 1 – Very Low	Igneous or metamorphic, excluding air-fall and reworked volcanic ash Precambrian age	Geologic units that are not likely to contain recognizable paleontological resources
Class 2 – Low	Younger than 10,000 years before present Recent aeolian deposits Sediments exhibiting substantial physical and chemical changes that make fossil preservation unlikely Field surveys have verified that significant resources are not present or are very rare	Geologic units that are not likely to contain paleontological resources.
Class 3 – Moderate	Marine in origin with sporadic known occurrences of paleontological resources Paleontological resources may occur intermittently, but abundance is known to be low Units may contain significant paleontological resources, but these occurrences are widely scattered The potential for an authorized land use to impact a significant paleontological resource is known to be low-to-moderate.	Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.
Class 4 – High	Significant paleontological resources have been documented, but may vary in occurrence and predictability Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present Surface disturbing activities may adversely affect paleontological resources. Illegal collecting activities may impact some areas	Geologic units that are known to contain a high occurrence of paleontological resources.
Class 5 – Very High	Significant paleontological resources have been documented and occur consistently Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities Unit is frequently the focus of illegal collecting activities	Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources.
Class U – Unknown	Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known Geological units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail Scientific literature does not exist or does not reveal the nature of paleontological resources. Reports of paleontological resources are anecdotal or have not been verified Area or geologic unit is poorly or under-studied.	Geologic units that cannot receive an informed PFYC assignment

SOURCE: United States Department of the Interior, Bureau of Land Management (BLM). Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. IM 2016-124. Instruction Memorandum https://www.blm.gov/sites/blm.gov/files/uploads/IM2016-124_att1.pdf

Determination of Sensitivity for Geologic Units within Study Area

The PFYC criteria in Table 2 were applied to the geologic units within the study area. **Table 3** lists relevant information about the geologic units, their sensitivity classification, and the basis for the sensitivity classification.

Holocene units in the study area are determined to be of very low to low sensitivity. Holocene sediment in the eastern portion of the study area is artificial fill (Qaf and Qaf/tf), which is generally considered to have very low or no paleontological sensitivity due to lack of scientific value for the study of paleontology. Dune sands in the western portion of the study area (Qd) have low paleontological sensitivity because the dune sand is unconsolidated, dry, and the sand has high porosity. The Holocene landslide deposits (Ql) within the study area have low paleontological sensitivity because they are adjacent to and derived from mapped dune sands, which have low sensitivity. Holocene bay mud (Qm) is relatively young and therefore has low sensitivity.

TABLE 3
PALEONTOLOGICAL SENSITIVITY OF GEOLOGIC UNITS WITHIN THE STUDY AREA

Geologic Age	Geologic Unit	Paleontological Sensitivity – PFYC Classification	Basis for Sensitivity Classification
Holocene	Artificial Fill	1 - Very Low	Consists of artificial fill
	Landslide Deposits Beach Deposits Dune Sand	2 – Low	Beach deposits and dune sand are recent aeolian; landslide deposits are adjacent to dune sand
	Bay Mud	2 – Low	Younger than 10,000 years before present
	Alluvium	2 – Low	Younger than 10,000 years before present
Pleistocene	Slope Debris and Ravine Fill	2 – Low	Subaerial (not under water) deposition, physical changes that make fossil preservation unlikely
	Colma Formation	3 – Moderate	Units may contain significant paleontological resources, but these occurrences are widely scattered; presence of vertebrate fossils
	Sedimentary Deposits, undifferentiated	U – Unknown	Geological units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail; however, nearby units of similar age have moderate potential (Colma formation)
Pliocene and Pleistocene	Merced Formation	3 – Moderate	Units may contain significant paleontological resources, but these occurrences are widely scattered; presence of vertebrate fossils
Cretaceous and Jurassic	Sandstone and shale	2 – Low	Fossils are rare
	Chert	2 – Low	Fossils are rare
	Greenstone	1 – Very Low	Metamorphic
	Sheared Rocks	1 – Very Low	Highly sheared
	Metamorphic Rocks	1 – Very Low	Metamorphic
	Serpentinite	1 – Very Low	Metamorphic

SOURCE: Bonilla. M.G., Preliminary Geologic Map of the San Francisco South 7.5' Quadrangle and Part of the Hunters Point 7.5' Quadrangle, San Francisco Bay Area, California,1998; Sloan, D., Geology of the San Francisco Bay Region, 2006.

United States Department of the Interior, Bureau of Land Management (BLM). Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. IM 2016-124. Instruction Memorandum https://www.blm.gov/sites/blm.gov/files/uploads/IM2016-124_att1.pdf.

Fossils have been found in Pleistocene age sediments in San Francisco and San Mateo County, as discussed above. Vertebrate fossils have been found in both the Colma and Merced formations, although fossil content of these units varies in terms of fossil significance and predictable occurrence, which supports the classification of moderate sensitivity. The slope debris and ravine fill, while of Pleistocene age, is classified as low sensitivity due to the low probability of fossil formation within loosely consolidated subaerial units. Undifferentiated Pleistocene sedimentary units do not appear frequently in the database search and, given the proximity and similar age and lithology, could have similar paleontological sensitivity as the Colma and Merced formations (moderate).

Fossils have been found in the Franciscan Complex in other bay area locations but are not very common. The Franciscan Complex units in the study area are determined to be of very low to low sensitivity due to the rarity of fossils (for sandstone, shale, and chert) and other physical considerations that reduce the likelihood of fossil formation (extensive shearing and metamorphism).

Attachment A

University of California Museum of Paleontology Database Search Results

loc_ID_num	loc_name	county_std	state_prov_std	country_std	cont_ocean	period	epoch	formation	formation_marine	member	storage_age	flora_fauna	ucmp_coll
IP2358	12 Mile Creek	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
V2018001	706 Mission Street	San Francisco County	California	United States	North America	Quaternary	Pleistocene	San Antonio			Rancholabrean		V
D9859	Alcatraz Island	San Francisco County	California	United States	North America	Cretaceous	Early Cretaceous						I
A1434	Alcatraz Island	San Francisco County	California	United States	North America	Cretaceous							I
MF3770	Ano Nuevo Island	San Francisco County	California	United States	North America								M
V3411	Bay Bridge 1	San Francisco County	California	United States	North America	Quaternary	Pleistocene				Rancholabrean		V
V69186	Bay Bridge 2	San Francisco County	California	United States	North America	Quaternary	Pleistocene				Rancholabrean		V
R1301	Black Hills	San Francisco County	California	United States	North America	Quaternary	Recent						I
IP2349	Bonilla's Unit 19	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2353	Bonilla's Unit 3	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2347	Bonilla's Unit 5	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2352	Bonilla's Unit 5	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2354	Bonilla's Unit 73	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2348	Bonilla's Unit 77	San Francisco County	California	United States	North America	Quaternary?	Pleistocene?	Merced	Marine				I
R1267	Cliff House	San Francisco County	California	United States	North America	Quaternary	Recent						I
R2523	Crab House Rock	San Francisco County	California	United States	North America	Quaternary	Recent						I
2397-	Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
E5088	Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
E5089	Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
E5090	Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
E5091	Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
E6759	Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
B8630	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						IM
B8631	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						IM
B8643	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						IM
B8646	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						IM
B8648	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						I
B8652	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						IM
B8653	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						I
B8661	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						I
B8662	Farallon Islands	San Francisco County	California	United States	North America	Quaternary	Recent						I
D196	Fleishackers Beach	San Francisco County	California	United States	North America	Quaternary	Recent						I
V3901	Fleishhacker Beach	San Francisco County	California	United States	North America	Quaternary	Pleistocene				Rancholabrean		V
PA238	Fort Funston	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Westlake			Pleistocene		P
IP2355	Fort Funston	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
A4484	Fort Funston	San Francisco County	California	United States	North America	Quaternary	Recent						I
V6344	Fort Funston 6	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V6423	Fort Funston Beach 1	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V6424	Fort Funston Beach 2	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V6425	Fort Funston Beach 3	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V6441	Fort Funston Beach 4	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V6444	Fort Funston Beach 5	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V75047	Fort Funston Beach 6	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V75048	Fort Funston Beach 7	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
2898-	Fort Point	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1270	Fort Point	San Francisco County	California	United States	North America	Quaternary	Recent						I
2436-	Golden Gate	San Francisco County	California	United States	North America	Quaternary	Recent						I
D8933	Golden Gate	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1685	Golden Gate	San Francisco County	California	United States	North America	Quaternary	Recent						I
A6583	Golden Gate Bridge	San Francisco County	California	United States	North America	Cretaceous		Marin					I
CL33	Golden Gate Park	San Francisco County	California	United States	North America								P
MF3771	Hunters Point	San Francisco County	California	United States	North America	Quaternary	Holocene						M
R1033	Hunters Point	San Francisco County	California	United States	North America	Quaternary	Recent						I
R5046	Hunter's Point	San Francisco County	California	United States	North America	Quaternary	Recent						I
V3410	Islais	San Francisco County	California	United States	North America	Quaternary	Pleistocene				Rancholabrean		V
D6255	Islais Creek	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1053	Jewish cemetary, San Francisco	San Francisco County	California	United States	North America	Quaternary	Recent						I
2465-	Lake Merced	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1003	Lobos Creek	San Francisco County	California	United States	North America	Quaternary	Recent						I
R584	Marine Lake	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1294	McAllister Street	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1298	Mission	San Francisco County	California	United States	North America	Quaternary	Recent						I
2393-	Mission Creek	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1285	Mission Creek	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1295	Mission Hills	San Francisco County	California	United States	North America	Quaternary	Recent						I
2447-	Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Recent						I
A3275	Mudflat S of Hunter's Pt	San Francisco County	California	United States	North America	Quaternary	Holocene		Marine & Non-Marine				M
IP2356	Mussel Rock	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2357	Mussel Rock	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
R1018	Mussel Rock	San Francisco County	California	United States	North America	Quaternary	Recent						I
287	Mussel Rock	San Francisco County	California	United States	North America								P

loc_ID_num	loc_name	county_std	state_prov_std	country_std	cont_ocean	period	epoch	formation	formation_marine	member	storage_age	flora_fauna	ucmp_coll
D36	Ocean Beach	San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine				I
P364	Peir E3	San Francisco County	California	United States	North America								P
R1022	Presidio	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1204	Presidio Lake	San Francisco County	California	United States	North America	Quaternary	Recent						I
PA1259	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.01	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.02	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.03	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.04	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.05	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.06	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.07	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.08	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.09	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.10	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.11	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.12	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.13	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.14	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.15	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.16	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.17	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.18	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.19	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.20	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.21	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.22	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.23	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.24	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.25	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.26	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.27	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.28	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.29	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.30	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.31	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.32	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.33	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.34	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.35	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.36	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.37	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.38	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.39	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.40	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.41	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.42	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.43	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.44	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.45	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.46	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.47	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.48	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.49	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.50	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.51	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.52	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.53	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA1259.54	RB-Mountain Lake	San Francisco County	California	United States	North America	Quaternary	Holocene						MP
PA36	S Francis H	San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine		Pliocene		P
D9386	San Francisco	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1051	San Francisco	San Francisco County	California	United States	North America	Quaternary	Recent						I
R1209	San Francisco	San Francisco County	California	United States	North America	Quaternary	Recent						I
MF9401	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Informal: Yerba Buena mud or Old Bay mud					M
MF9402	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Pleistocene						M
MF9403	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Pleistocene						M
MF9404	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Pleistocene						M
2394-	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Recent						I
7215-	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Recent						I
E6365	San Francisco Bay	San Francisco County	California	United States	North America	Quaternary	Recent						I
290	San Francisco Cone	San Francisco County	California	United States	North America	Tertiary	Pliocene				Pliocene		P

loc_ID_num	loc_name	county_std	state_prov_std	country_std	cont_ocean	period	epoch	formation	formation_marine	member	storage_age	flora_fauna	ucmp_coll
R514	San Francisco Market	San Francisco County	California	United States	North America	Quaternary	Recent						I
IP6835	San Francisco S. Quad.	San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine				I
IP6820	San Francisco South Quad.	San Francisco County	California	United States	North America	Neogene	Pliocene	Merced	Marine				I
IP7949	San Francisco South Quad.	San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine				I
D5436	Seven Mile Beach	San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
5004-	Seven-Mile Beach	San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine				I
MF9405	SFB BTC 224	San Francisco County	California	United States	North America	Quaternary	Pleistocene						M
MF9400	SFB BTC 23 to 203	San Francisco County	California	United States	North America	Quaternary	Pleistocene	Informal: Yerba Buena mud or Old Bay mud					M
MF9406	SFB BTC 50	San Francisco County	California	United States	North America								M
D9340	Southeast Farallon Island	San Francisco County	California	United States	North America	Quaternary	Recent						I
IP2473	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2489	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2490	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2491	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2493	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2495	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2499	SWOOP cores	San Francisco County	California	United States	North America	Neogene	Pliocene						I
IP2474	SWOOP cores	San Francisco County	California	United States	North America								I
IP2475	SWOOP cores	San Francisco County	California	United States	North America								I
IP2476	SWOOP cores	San Francisco County	California	United States	North America								I
IP2477	SWOOP cores	San Francisco County	California	United States	North America								I
IP2478	SWOOP cores	San Francisco County	California	United States	North America								I
IP2479	SWOOP cores	San Francisco County	California	United States	North America								I
IP2480	SWOOP cores	San Francisco County	California	United States	North America								I
IP2481	SWOOP cores	San Francisco County	California	United States	North America								I
IP2482	SWOOP cores	San Francisco County	California	United States	North America								I
IP2483	SWOOP cores	San Francisco County	California	United States	North America								I
IP2484	SWOOP cores	San Francisco County	California	United States	North America								I
IP2485	SWOOP cores	San Francisco County	California	United States	North America								I
IP2486	SWOOP cores	San Francisco County	California	United States	North America								I
IP2487	SWOOP cores	San Francisco County	California	United States	North America								I
IP2488	SWOOP cores	San Francisco County	California	United States	North America								I
IP2492	SWOOP cores	San Francisco County	California	United States	North America								I
IP2494	SWOOP cores	San Francisco County	California	United States	North America								I
IP2496	SWOOP cores	San Francisco County	California	United States	North America								I
IP2497	SWOOP cores	San Francisco County	California	United States	North America								I
IP2498	SWOOP cores	San Francisco County	California	United States	North America								I
IP2500	SWOOP cores	San Francisco County	California	United States	North America								I
IP2501	SWOOP cores	San Francisco County	California	United States	North America								I
D8111	Thornton State Park Beach	San Francisco County	California	United States	North America	Quaternary,Neogene	Pleistocene,Pliocene	Merced	Marine				I
V65243	Twin Peaks Tunnel	San Francisco County	California	United States	North America	Quaternary	Pleistocene				Rancholabrean		V
45-		San Francisco County	California	United States	North America	Tertiary	Miocene	Monterey	Marine				I
46-		San Francisco County	California	United States	North America	Tertiary	Miocene	Monterey	Marine				I
47-		San Francisco County	California	United States	North America	Tertiary	Miocene	Monterey	Marine				I
D1619		San Francisco County	California	United States	North America	Quaternary	Pleistocene	Thornton Beach					I
D7285		San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene	Merced	Marine				I
IP2350		San Francisco County	California	United States	North America	Quaternary,Tertiary	Pleistocene,Pliocene						I
A7716		San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine				I
B6331		San Francisco County	California	United States	North America	Tertiary	Pliocene	Merced	Marine				I
A7606		San Francisco County	California	United States	North America	Quaternary	Recent						I
B1698		San Francisco County	California	United States	North America	Quaternary	Recent						M
B3508		San Francisco County	California	United States	North America	Quaternary	Recent						I
B6886		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8628		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8629		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8632		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8633		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8634		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8635		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8636		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8637		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8638		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8639		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8640		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8641		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8642		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8644		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8645		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8647		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8649		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8650		San Francisco County	California	United States	North America	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov_std	country_std	cont_ocean	period	epoch	formation	formation_marine	member	storage_age	flora_fauna	ucmp_coll
B8651		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8654		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8655		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8656		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8657		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8658		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8659		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8660		San Francisco County	California	United States	North America	Quaternary	Recent						I
B8663		San Francisco County	California	United States	North America	Quaternary	Recent						I
D6011		San Francisco County	California	United States	North America	Quaternary	Recent						I
D6266		San Francisco County	California	United States	North America	Quaternary	Recent						I
R7215		San Francisco County	California	United States	North America	Quaternary	Recent						I
D9890		San Francisco County	California	United States	North America	Cretaceous		Chico	Marine				I
B2633		San Francisco County	California	United States	North America	Jurassic		Franciscan	Marine				I
B5552		San Francisco County	California	United States	North America			Merced	Marine				I

spec_id	specno	ucmp_coll	class	genus	species	subspecies	other_id	type_statu	period	epoch	loc_ID_nur	loc_name	county_st	state_prov	country_st	cont_ocea	pic	access
V67775	67775	V	Mammalia	Megalonyx					Quaternary	Pleistocene	V6425	Fort Funston Beach 3	San Francis	California	United Stat	North America		yes
V68129	68129	V	Mammalia	Equus					Quaternary	Pleistocene	V6423	Fort Funston Beach 1	San Francis	California	United Stat	North America		yes
V69002	69002	V	Mammalia	Hemiauchenia					Quaternary	Pleistocene	V6441	Fort Funston Beach 4	San Francis	California	United Stat	North America		yes
V69124	69124	V	Mammalia						Quaternary	Pleistocene	V6444	Fort Funston Beach 5	San Francis	California	United Stat	North America		yes
V113698	113698	V	Mammalia	Mammut	americanum				Quaternary	Pleistocene	V75047	Fort Funston Beach 6	San Francis	California	United Stat	North America		yes
V113699	113699	V	Mammalia	Glossotherium					Quaternary	Pleistocene	V75048	Fort Funston Beach 7	San Francis	California	United Stat	North America		yes
V219523	219523	V	Mammalia						Quaternary	Pleistocene	V6423	Fort Funston Beach 1	San Francis	California	United Stat	North America		yes

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
E5404	Ano Nuevo Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
IP508	Arroyo de los Frijoles State Park	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8110	Coyote Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1052	Crystal Spring	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E4812	Dumbarton Bridge Approach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E4817	Dumbarton Bridge Approach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E10	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E11	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E12	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E13	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E14	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E15	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E16	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E17	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E18	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E19	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E20	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E21	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E22	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E35	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E606	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1095	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1096	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2044	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2045	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2046	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2628	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2721	Frenchman's Reef	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R998	Green Canyon	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6627	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6638	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6699	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6800	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7021	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7174	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7573	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7778	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8084	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8085	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8097	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8111	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8123	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8142	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8147	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8195	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
E8197	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8214	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8218	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8380	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8381	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8388	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8401	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8405	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent				Pleistocene		I
E8473	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8484	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8506	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8576	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8666	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8765	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8776	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8953	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8956	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9066	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9134	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9140	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9182	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9183	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9464	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9466	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9467	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9813	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9815	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
MF7339	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						M
R1044	Half Moon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9803	Halfmoon Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1057	La Honda	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2396-	Lobitos	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9874	Martins Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1058	Milbrae	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2419-	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A3884	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A8203	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
B3236	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
D728	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
D9232	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E34	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E95	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E96	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E97	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E98	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E99	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
E100	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E101	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E102	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E103	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E104	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E105	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E106	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E107	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E108	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E109	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E110	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E111	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E112	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E113	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E114	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E115	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E116	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E117	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E118	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E119	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E120	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E121	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E122	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E123	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E124	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E125	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E126	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E127	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E128	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E129	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E130	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E131	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E132	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E133	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E134	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E135	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E136	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E137	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E631	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E632	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E633	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E908	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E909	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E910	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E3009	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6204	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
E6206	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6209	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6573	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6579	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6608	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6644	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6703	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6718	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6744	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6760	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6788	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6854	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6885	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6889	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6982	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent	Palos Verdes Sa	Marine				I
E7001	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7025	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7028	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7092	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7096	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7109	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7177	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7236	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7271	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7435	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7507	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7592	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7602	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7839	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7991	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8120	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8444	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8459	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8520	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8544	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8578	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8913	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9149	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9197	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9611	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9683	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9873	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1734	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1756	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
RS6707	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
RS7152	Moss Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
12532	Moss Beach Gromia	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						M
2908-	Mussel Rock	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1777	Mussel Rock	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7574	Palo Alto	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8226	Palo Alto	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2485-	Pescadero	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1027	Pescadero	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2411-	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
D7928	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent	Gaviota	Marine				I
E658	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E659	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E660	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E661	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E662	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E663	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E664	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E891	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E892	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E893	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E894	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E895	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E896	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1149	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1150	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1151	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1152	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1239	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1240	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1241	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1242	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1243	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1244	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1245	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1246	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1247	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1248	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1249	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1250	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1251	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1252	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1253	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1254	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1492	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E5387	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6129	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6632	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
E6816	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E6888	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7268	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
IP570	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
L186	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1746	Pigeon Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2725	Pigeon Point Lighthouse	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2726	Pigeon Point Lighthouse	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2727	Pigeon Point Lighthouse	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E2767	Pigeon Point Lighthouse	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
B6867	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
B7815	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
D2313	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						IM
D4017	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						M
D9501	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E647	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E648	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E649	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E650	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E651	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E652	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E653	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E654	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E655	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E1145	Pillar Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
D3675I	Point Ano Nuevo	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2410-	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A4219	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8220	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8221	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8932	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9203	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9205	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9207	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9210	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9236	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9308	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9312	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9327	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9348	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9361	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9366	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9784	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1750	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R2528	Princeton	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8233	Princeton Harbor	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll
R7211	Redwood City	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1041	San Bruno Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E7976	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8129	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8219	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8242	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8390	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8454	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8488	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8743	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9522	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E9533	San Francisco Bay	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R995	San Mateo	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
E8502	San Mateo Point	San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2423-		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
2427-		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A6601		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A6887		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A7168		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A7169		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A7170		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A7180		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
A7764		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
B600		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
D2021		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						M
D2527		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						M
R971		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R1670		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I
R7160		San Mateo County	California	United Stat	North Ame	Quaternary	Recent						I

loc_ID_num	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_marine	member	storage_age	flora_faun	ucmp_coll
V98258	1180 Main	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene		Non-Marine		Rancholabrean		V
IP9625	Ano Nuevo terrace	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						I
V99892	Bivalve Point	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
V92009	El Granada Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V83054	Ely's San Mateo County loc	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						V
V81094	Franklin Point S	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene	Merced	Marine		Irvingtonian		V
IP7120	Green Oaks Creek	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Late Pleistocene		I
A3408	Mateo Siding	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						I
V74164	Middlefield Road	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V83098	Miramontes Bird	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V3505	Mussel Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V4018	Mussel Rock 2	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene		Non-Marine		Rancholabrean		V
IP6848	Point Ano Nuevo	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Late Pleistocene		I
165A	San Bruno I	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Pleistocene		P
165B	San Bruno II	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Pleistocene		P
V92100	San Mateo (Mountain View) Dump	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
IP8983	San Mateo County	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						I
V3606	Seven Mile Beach	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V6203	Skyline Drive	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V6319	South San Francisco	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene				Rancholabrean		V
V6422	Thornton Beach 1	San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene	Merced	Marine & Non-Marine		Irvingtonian		V
1781-		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						I
B366		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						I
D1617		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene	Thornton Beach					I
D1618		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene	Thornton Beach					I
D2103		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M
D2104		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M
D2105		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M
D2107		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M
D2108		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M
D2109		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M
D2110		San Mateo County	California	United Stat	North Ame	Quaternary	Pleistocene						M

spec_id	specno	ucmp_coll	class	genus	species	subspecies	other_id	type_statu	period	epoch	loc_ID_nur	loc_name	county_std	state_prov	country_st	cont_ocea	pic	access
V64829	64829	V	Mammalia	Equus					Quaternary	Pleistocene	V6319	South San Francisco	San Mateo Co	California	United Sta	North America		yes

loc_ID_nur	loc_name	county_std	state_prov	country_st	cont_ocea	period	epoch	formation	formation_	member	storage_ag	flora_faun	ucmp_coll		
A4687		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
A6463		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
A6881		San Mateo Cour	California	United Stat	North Ame	Cretaceous							I		
A7601	Butano Creek	San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
B2607		San Mateo Cour	California	United Stat	North Ame	Cretaceous		Calera					I		
B2635		San Mateo Cour	California	United Stat	North Ame	Jurassic		Franciscan	Marine				I		
B3252		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
B5787		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
B6358		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP2795	Bolsa Point	San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2302	
IP4009		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4010		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4011		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4012		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4013		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2314	
IP4014		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2203	
IP4015		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4016		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4017		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4018		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4019		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4020		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4021		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4022		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4023		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4024		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4025		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4026		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4027		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4028		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4029		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4030		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4031		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2182	
IP4032		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4033		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2179	
IP4034		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2319	
IP4035		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2316	
IP4036		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2251	
IP4037		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4038		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4039		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4040		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4041		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4042		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4043		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4046		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4047		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4048		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4050		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I		
IP4095		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2184	
IP4097		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2200	
IP4100		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2186	

IP4101		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous	Pigeon Point	Marine				I	0000 0000 1113 2172	
IP5727		San Mateo Cour	California	United Stat	North Ame	Cretaceous	Late Cretaceous						I		
IP12508		San Mateo Cour	California	United Stat	North Ame	Cretaceous		Pigeon Point?					I		
IP12509		San Mateo Cour	California	United Stat	North Ame	Cretaceous		Pigeon Point	Marine				I		

APPENDIX J
HAZARDS AND HAZARDOUS MATERIALS SUPPORTING DOCUMENTATION

J.1 Hazardous Materials Study, Pacific Gas and Electric Company Power Asset Acquisition Project

J.2 Technical Memorandum, Site Management Requirements, PG&E Martin Service Center, PG&E Power Asset Acquisition Project, Brisbane and Daly City, California

PAGE INTENTIONALLY BLANK

Environmental Science & Engineering
Construction • Development • Industrial • Municipal
45 Polk Street, 3rd Floor • San Francisco, California 94102 • 415.498.0535 • cdimengineering.com

HAZARDOUS MATERIALS STUDY

Pacific Gas and Electric Company Power Asset Acquisition Project
San Francisco and San Mateo Counties, California

August 21, 2024
Rev. 0

prepared for:

Environmental Science Associates
575 Market Street, Suite 3700
San Francisco, CA 94105

San Francsico Public Utilities Commission
525 Golden Gate Ave.
San Francisco, CA 94102

San Francisco Planning Department
49 S Van Ness Ave Suite 1400
San Francisco, CA 94103

prepared by:

CDIM Engineering, Inc.
45 Polk Street, 3rd Floor
San Francisco, California 94102

CDIM's work for Environmental Science Associates, San Francisco Public Utilities Commission and San Francisco Planning Department was conducted under our supervision. To the best of our knowledge, the data contained herein are true and accurate, are based on what can be reasonably understood as a result of this project, and satisfy the scope of work prescribed by the client for this project. The data, findings, recommendations, specifications, or professional opinions were prepared solely for the use of Environmental Science Associates, San Francisco Public Utilities Commission and San Francisco Planning Department in accordance with generally accepted professional engineering and geologic practice. We make no other warranty, either expressed or implied, and are not responsible for the interpretation by others of the contents herein.

Kylie Cush

August 21, 2024

Kylie Cush, PG #9963 Date
Project Geologist

Scott Bourne

August 21, 2024

Scott Bourne, PE #C72817 Date
Principal Engineer

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Purpose 1

1.2 Scope of Study 2

2 PROJECT DESCRIPTION 3

3 ENVIRONMENTAL SETTING 5

3.1 Geology 5

3.2 Surface Waters 5

3.3 Groundwater 5

3.4 Land Use 5

4 ONLINE ENVIRONMENTAL DATABASE SEARCH 7

4.1 SWRCB GeoTracker 7

4.2 DTSC EnviroStor 8

5 FINDINGS 9

5.1 SWRCB Leaking Underground Storage Tank Sites 10

5.1.1 Shell Station #4003 10

5.2 SWRCB Cleanup Sites 11

5.2.1 Westlake French Cleaners 11

5.2.2 Former Crocker Cleaners 11

5.2.3 Agbayani Construction 11

5.2.4 Brisbane Baylands/Southern Pacific Brisbane 12

5.2.5 Brisbane Class II Landfill 13

5.2.6 SFPP Kinder Morgan 13

5.2.7 Heidelburg West 14

5.2.8 Potrero Power Station Development Area 14

5.3 SWRCB NPDES Sites 14

5.4 DTSC State Response Sites 15

5.4.1 Schlage Lock Co. 15

5.4.2 Former Martin Service Center 15

5.4.3 Former Midway Village 16

5.5 DTSC Evaluation Sites 16
5.6 DTSC School Cleanup 16

6 OTHER ENVIRONMENTAL CONDITIONS 18
6.1 Historical Fill, Aerially-Deposited Lead, and the Maher Ordinance 18
6.2 Naturally-Occurring Asbestos 18
6.3 Lead-Based Paint and Asbestos in Structures 19
6.4 PCB-Containing Transformers 19

7 CONCLUSIONS 21

8 REFERENCES 22

TABLES

Table 1 Environmental Sites Summary

FIGURES

Figure 1 Project Location and Layout

Figure 2 Environmental Site Locations Key Map with Figure Numbers

Figure 3-1 Environmental Sites – Map 1 of 9

Figure 3-2 Environmental Sites – Map 2 of 9

Figure 3-3 Environmental Sites – Map 3 of 9

Figure 3-4 Environmental Sites – Map 4 of 9

Figure 3-5 Environmental Sites – Map 5 of 9

Figure 3-6 Environmental Sites – Map 6 of 9

Figure 3-7 Environmental Sites – Map 7 of 9

Figure 3-8 Environmental Sites – Map 8 of 9

Figure 3-9 Environmental Sites – Map 9 of 9

Figure 4 Maher Ordinance Areas in Project Vicinity

Figure 5 Serpentinite Mapped in Project Vicinity

ACRONYMS AND ABBREVIATIONS

AEG	Association of Environmental and Engineering Geologists
BAAQMD	Bay Area Air Quality Management District
BTEX	benzene, toluene, ethylbenzene, xylenes
CalEPA	California Environmental Protection Agency
Cal/OSHA	California Division of Occupational Safety and Health
CEQA	California Environmental Quality Act
City	City and County of San Francisco
COCs	chemicals of concern
COPCs	chemicals of potential concern
Cortese	Hazardous Waste and Substances Sites
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
ESA	Environmental Science Associates
ft-bgs	feet below ground surface
GPP	San Mateo County Groundwater Protection Program
HMS	Hazardous Materials Study
LOP	Local Oversight Program
LUST	Leaking Underground Storage Tank
Maher Ordinance	Article 22A of the San Francisco Health Code
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance

OU	Operable Unit
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SFPUC	San Francisco Public Utilities Commission
SFRWQCB	San Francisco Regional Water Quality Control Board
SPTC	Southern Pacific Transportation Company
SWRCB	State Water Resources Control Board
TCE	trichloroethene
USGS	United States Geological Survey
UST	underground storage tank
VOCs	volatile organic compounds

1 INTRODUCTION

CDIM Engineering (CDIM) prepared this Hazardous Materials Study (HMS) on behalf of Environmental Science Associates (ESA) and the San Francisco Public Utilities Commission (SFPUC) to support the City and County of San Francisco's (City) proposal to (1) purchase ("acquisition") Pacific Gas and Electric Company-(PG&E-) owned electrical transmission and distribution assets ("Assets") located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco, and (2) other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco ("separation"). In this HMS, the terms "PG&E Power Asset Acquisition Project" and "project" refer to the acquisition and separation, including construction and related work required for independent operation of the system. The PG&E Power Asset Acquisition Project location and known areas where ground disturbance may occur are presented in Figure 1. The project area includes the Martin Substation, the Daly City Yard, the distribution express feeder alignment, the Potrero Substation, and various locations within the areas outlined for local distribution system separation and system reinforcements, that are mostly within public right-of-way (the specific work locations of the latter two components are unknown).[1]

1.1 Purpose

The purpose of this HMS is to document sites with releases of hazardous materials and wastes in or within 500 feet[2] of the project area (project vicinity) to support evaluation under the California Environmental Quality Act (CEQA). The goal is to assess:

- Whether the project vicinity contains a site which is included on the Hazardous Waste and Substances Sites (Cortese) List compiled pursuant to Government Code Section 65962.5;
- The presence or suspected presence of hazardous materials in the project vicinity that may not be identified on the Cortese List but may be documented by state agencies; and
- The significance of hazardous materials impacts identified in the project vicinity.

State of California, Health and Safety Code, Chapter 6.95, Section 25501(o) defines a hazardous material as a material that "poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment" because of its quantity, concentration, or physical or chemical

[1] The project would also modify an existing building within southeastern San Francisco to house a centralized operations control center, modify fencing and access at an acquired commercial or industrial property within southeastern San Francisco for use as a service yard, and modify fencing and driveways at existing sites where PG&E-owned natural gas and electrical equipment are located on the same site. The exact locations of the operations control center and the service yard have not yet been determined, and therefore, hazardous materials sites near these project components are not discussed in this study. Modification of fencing and driveways to separate natural gas and electrical equipment would occur at the Martin Substation and Potrero Substation.

[2] A search distance of 500 feet was selected to reasonably encompass sites with releases of hazardous materials and wastes close enough to the project area that impacts may be encountered during project implementation.

characteristics. Specific hazardous materials are also listed in Title 49 of the Code of Federal Regulations and Section 339 of Title 8 of the California Code of Regulations.

1.2 Scope of Study

CDIM performed the following tasks to complete this HMS:

- Reviewed the California Environmental Protection Agency (CalEPA) Cortese List Data Resources;
- Reviewed the EnviroStor database maintained by California Department of Toxic Substances Control (DTSC) for sites located in the project vicinity;
- Reviewed the GeoTracker database maintained by State Water Resources Control Board (SWRCB) for sites located in the project vicinity;
- Prepared maps showing all hazardous substances sites (labeled with HMS identification numbers [HMS ID] 1 through 155) identified in the project vicinity (Figures 2 through 3-9);
- Prepared a table that lists each hazardous materials site by HMS ID and provides a brief description of the site type, regulatory ID number, case type, the project or business name, site coordinates, and the site status (Table 1); and
- Prepared this report to summarize findings.

2 PROJECT DESCRIPTION

The City is proposing (1) the acquisition of PG&E-owned electrical transmission and distribution assets located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco, and (2) the separation necessary for the City to own, operate, and maintain the electricity grid in San Francisco. The Assets include equipment, facilities, property, and records that the City would acquire, including the following (ESA, 2024):

- PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer serving distribution lines, and related facilities);
- PG&E's 115 kilovolt[3] and 230 kilovolt transmission assets (substations, transmission lines, transformers, and related facilities needed for operations);
- Certain PG&E distribution lines in Brisbane emanating from the Martin Substation that serve customers in San Francisco[4];
- A portion of the Martin Substation facilities (located in Brisbane) or interconnections[5] needed to enable the SFPUC to control all power flows from Martin Substation into San Francisco; and
- Other systems and equipment, materials, records, operating and maintenance facilities, property, and other land-related agreements as necessary for safe and reliable operation, maintenance, repair, control, and protection of the acquired transmission and distribution system.

After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition, the City would acquire property rights as needed to operate and maintain the Assets and new City equipment, as needed, on public and private lands. This transaction would not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.[6]

In addition to acquiring the necessary transmission and distribution system and electrical facilities, the City would physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco-San Mateo County border), to allow both systems to be safely, reliably, and independently

[3] Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

[4] Existing distribution lines serving only San Francisco customers would be acquired by the City. Distribution lines serving only PG&E customers outside of San Francisco would remain with PG&E. Finally, for some of the distribution lines that serve both customers in San Francisco and customers outside of San Francisco, the feeders would be separated at the border and the City would construct new infrastructure to ensure that each utility would have its own system and that all customers would continue to be served.

[5] Interconnection is defined as an electrical connection between multiple entities.

[6] In addition, the interconnection between the transmission system in San Francisco and the Trans Bay Cable, and the Trans Bay Cable operation, would not be physically changed as a result of the acquisition.

operated by the SFPUC and PG&E ("local distribution system separation"). After the proposed separation of the system, the SFPUC would provide electricity service to customers in San Francisco currently served by PG&E; PG&E would continue to provide electricity service to its customers outside of San Francisco. Three major areas are part of the local distribution system separation: the Southwest, Central, and Southeast border areas (Figure 1).

The project area includes the Martin Substation, the Daly City Yard, the distribution express feeder alignment, the Potrero Substation, and at and near various locations within the areas outlined for local distribution system separation and system reinforcements, that are mostly within public right-of-way (the specific work locations of the latter two components are unknown). The work includes construction of a new approximately 3.8-mile-long underground distribution express feeder ("distribution express feeder") along City streets (including Geneva Avenue and Alemany Boulevard) as shown on Figure 1. The construction portion of the project is anticipated to take approximately 3 to 5 years after the acquisition of the Assets. It is anticipated that the City and PG&E would coordinate the implementation of the project.

3 ENVIRONMENTAL SETTING

The project area spans approximately 7.6 miles across the San Francisco-San Mateo County border, from the Pacific Ocean on the western boundary to the San Francisco Bay on the eastern boundary.

3.1 Geology

Beneath the project area, geologic formations generally include (from west to east): Holocene alluvial deposits; Quaternary Merced formation of marine sandstone, siltstone, shale, and conglomerate; Holocene dune and eolian sand (Dune sand); continental and marine sand, silt, clay, and gravel deposits (including Colma formation); Franciscan complex marine sandstone, shale, and conglomerate; and artificial fill (California Department of Conservation Division of Mines and Geology, 1991). Some portions of the project area may also lie on Franciscan Complex greenstone or ultramafic Coast Range ophiolite, including serpentinite (Association of Environmental and Engineering Geologists [AEG], 2018). The eastern portion of the project area in Brisbane is located on artificial fill and was previously a part of the San Francisco Bay.

3.2 Surface Waters

Surface waters present in the project vicinity include Lake Merced, which is comprised of four interconnected lakes, and the Brisbane Lagoon (Figure 1). Many historical creeks, lakes, and wetlands in San Francsico no longer exist due to development of drainage systems and filling (AEG, 2018). The Pacific Ocean lies just west of the project area, and the San Francisco Bay bounds eastern portions of the project area.

3.3 Groundwater

The project area spans three groundwater basins (from west to east): the Westside, Islais Valley, and Visitacion Valley Basins. Due to the large receiving water bodies located on opposite sides of the project area, groundwater flow direction varies. Groundwater at the project area in both the shallow water-bearing zone and deeper aquifers is expected to be of poor quality due to urban activities, the presence of historical Leaking Underground Storage Tank (LUST) sites, historical dry cleaners, historical Cortese sites, former manufactured gas plants (MGP) sites, and infilling. Per the Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin, deeper aquifers in the three groundwater basins have potential or existing (portions of Westside Basin only) municipal beneficial use, including but not limited to drinking water supply (SWRCB, 2023). Groundwater elevations across the project area vary. Depth to groundwater can range from approximately a few feet to 70 feet below ground surface (ft-bgs).

3.4 Land Use

Debris from the 1906 San Francisco Earthquake and Fire was used to fill shorelines of the San Francisco Bay to create space for industrial activities. Additionally, the municipal landfill for San Francisco operated on and filled a portion of Brisbane Lagoon on the eastern portion of the project vicinity. Current land use in the project vicinity (from west to east, generally) includes Fort Funston (southwest of Lake Merced), a historic military defense base and now an area protected within the Golden Gate National Recreation Area; public outdoor recreation areas

(e.g. sports courts, golf courses); residential neighborhoods; expressways and highways; commercial areas; schools; gas stations; laundry facilities; electrical substations; industrial facilities and fuel storage; and a recycling facility.

4 ONLINE ENVIRONMENTAL DATABASE SEARCH

The Cortese List is a critical planning tool mandated by CEQA to provide information on hazardous materials release sites for state, local agencies, and developers. According to Government Code section 65962.5, the CalEPA must update the list annually. The following are data resources from various state and local agencies included in the Cortese List:

- Leaking Underground Storage Tank (LUST) sites in SWRCB's GeoTracker database.
- Hazardous waste and substances sites in DTSC's EnviroStor database.
- Solid waste disposal sites identified by SWRCB with constituents exceeding hazardous waste levels outside of the waste management unit.[7]
- List of active cease and desist orders and cleanup and abatement orders from SWRCB that do not concern the discharge of wastes that are hazardous materials.[8]
- List of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code, identified by DTSC.[9]

In addition to the resources listed above, a search and review of available public records from state environmental regulatory agency databases was conducted to assess the extent of hazardous material releases at sites with documented hazardous waste impacts or storage within the project vicinity. The following databases were searched for this HMS.

4.1 SWRCB GeoTracker

SWRCB and the nine Regional Water Quality Control Boards are collectively referred to as the Water Boards and are responsible for protecting water quality in California. CDIM reviewed the GeoTracker[10] website, which is the Water Boards' data management system for sites that impact, or have the potential to impact, water quality in California. LUST sites, Department of Defense, groundwater cleanup sites, land disposal sites, operating permitted underground storage tanks (USTs) and other unregulated projects are recorded in GeoTracker.

[7] https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/SiteCleanup-CorteseList-CurrentList.pdf. Accessed June 26, 2024.

[8] List of "active" cease and desist and cleanup and abatement orders from SWRCB, available for download at https://calepa.ca.gov/SiteCleanup/CorteseList/. Accessed June 26, 2024.

[9] https://calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/ accessed on June 26, 2024.

[10] https://geotracker.waterboards.ca.gov/ accessed on March 15, 2024.

4.2 DTSC EnviroStor

DTSC is the state regulatory agency with oversight responsible for many overseeing hazardous waste management and cleanup cases in California. CDIM reviewed the EnviroStor[11] website, which is DTSC's public data management system for tracking cleanup, permitting, enforcement, and investigation efforts at hazardous waste sites or sites requiring further investigation.

[11] https://www.envirostor.dtsc.ca.gov/public/ accessed on March 15, 2024.

5 FINDINGS

All 155 sites identified in the GeoTracker and EnviroStor databases located in the project vicinity were considered and reviewed. Each site was assigned a unique HMS ID (1 through 155). Figure 2 shows all environmental sites in the project vicinity on a small-scale map, and Figures 3-1 through 3-9 show the HMS ID, location, type, and status of environmental sites at a larger scale across the project vicinity. The following types of cases were identified:

- One closed, historical United States Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) site;
- Eight DTSC State response sites;
- One DTSC corrective action site;
- Three DTSC voluntary cleanup sites;
- Two DTSC military evaluation sites;
- One DTSC school cleanup site;
- One DTSC evaluation site;
- Three DTSC tiered permit sites[12];
- One DTSC historical site;
- One active National Pollutant Discharge Elimination System (NPDES) site under SWRCB oversight;
- Ninety-one SWRCB LUST cleanup sites;
- Fourteen SWRCB cleanup sites;
- One SWRCB military cleanup site;
- Six sites with non-case information provided by SWRCB;

[12] Sites with HMS IDs 41 and 142 are described below in further detail. Super Excavators, Inc. (HMS ID 50; EnviroStor ID 60001756) is a tiered permit site located at Harney Way and Alana Way in San Francisco. DTSC indicates that the site is inactive and needs evaluation as of 2010. No additional information is available on EnviroStor.

- One public sampling point site[13] overseen by SWRCB; and
- Nineteen permitted UST sites (45 USTs total).

Except for one site[14], no sites on the following lists are located within the project vicinity: the list of solid waste disposal sites identified by SWRCB with constituents exceeding hazardous waste levels outside of the waste management unit; the list of active cease and desist orders and cleanup and abatement orders from SWRCB that do not concern the discharge of wastes that are hazardous materials; and the list of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code, identified by DTSC.

Table 1 lists site details including HMS ID, regulatory agency oversight, associated ID numbers, case type, project or business name, coordinates, and status of each site, if available. Many of these sites are closed cases that require no further action or sites included in the databases for informational purposes and are therefore excluded from the discussion of significant findings below. Sites that are closed or have received a no further action determination from a regulatory agency still may contain hazardous materials or wastes that were not discovered or were determined acceptable to remain in place for a specific land use; it should be noted that sites are never removed from the Cortese List or GeoTracker and EnviroStor databases even after case closure because change in land use may require reevaluation of protectiveness for the new land use.

Only open or active cases are discussed below, as discussion of all closed sites is impracticable. Further, contaminants at closed sites have been remediated to levels acceptable to SWRCB for current land uses at those sites, thus the potential risk from releasing contaminants from closed sites is low.

5.1 SWRCB Leaking Underground Storage Tank Sites

Ninety closed LUST cases were identified in the project vicinity; one case remains open and is described below.

5.1.1 Shell Station #4003

Shell Station #4003 (HMS ID 60; GeoTracker ID T0607500304) is an open LUST case under San Francisco Regional Water Quality Control Board (SFRWQCB) oversight. The property is located at 5897 Mission Street in San Francisco, in the project area where system reinforcements and local system separation activities are proposed (Figure 3-5). Formerly, a Shell Service Station operated on the site, and Mission Auto Repair is the current site occupant. Three petroleum USTs, two dispenser islands, and associated piping were removed from the site after it was decommissioned in 1986 (Wayne Perry, 2024). An unauthorized petroleum release was

[13] Doelger Senior Center (HMS ID 88; GeoTracker ID T10000020267) is listed as an open and active public sampling point as of 1996, and a 1996 monitoring well permit used to install a well for the San Francisco Water Department is available for review; no other information is available on GeoTracker. Public sampling points are sampling points that may contain various environmental data pertinent to characterization of an area and are not necessarily associated with a particular site of any kind.

[14] One SWRCB cleanup program site, HMS ID 21, Pacific Rod & Gun Club, is also identified on the list of active cease and desist orders and cleanup and abatement orders from SWRCB for a cleanup and abatement order effective in 1994.

reported in 1988 after a site investigation, and over 1,300 gallons of free product (gasoline) have been removed from monitoring wells at the property. Groundwater extraction and soil vapor extraction systems operated intermittently between 1995 and 2019. Groundwater monitoring started in 2005 and continues. In 2020, SWRCB issued a directive requesting a restart of the dual-phase extraction system, as the site is not eligible for closure under the Low-Threat Closure Policy (SWRCB, 2012). Groundwater, soil, and soil vapor at the property remain impacted by petroleum and petroleum-related compounds including benzene.

5.2 SWRCB Cleanup Sites

Eight closed SWRCB cleanup cases and six active cleanup cases were identified in the project vicinity.

5.2.1 Westlake French Cleaners

Westlake French Cleaners (HMS ID 113; GeoTracker ID SL0608106505) is located in a commercial shopping center at 247 Westlake Center in Daly City in the western portion of the project area (Figure 3-3). The site is an open cleanup program site with ongoing assessment as of June 4, 2008. This cleanup is under San Mateo County Local Oversight Program (LOP) oversight with the San Mateo County Groundwater Protection Program (GPP), and the chemical of concern (COC) is tetrachloroethene (PCE) in soil vapor. Various dry cleaners operated on the site from 1995 to the present day. In 2014, a soil vapor extraction system was installed and operated for one year. Seasonal paired sub-slab and indoor air sampling is being conducted at the site and neighboring properties to determine if PCE in soil vapor presents a significant risk to human health (Northgate, 2024).

5.2.2 Former Crocker Cleaners

Former Crocker Cleaners (HMS ID 76; GeoTracker ID T10000017029) is located at 6215 Mission Street in Daly City in the western half of the project area where system reinforcements and local distribution system separation activities are proposed (Figure 3-4). Environmental assessment at the site is active as of April 27, 2021. This cleanup is under San Mateo County LOP oversight with the GPP, and the COC is PCE in groundwater. From the 1940s through 2000, numerous dry cleaners operated on the property (EKI, 2024). Investigations identified volatile organic compounds (VOCs) including PCE and degradation products in soil vapor, soil, and groundwater. A new commercial building is proposed on the Site, and GPP conditionally approved a vapor intrusion mitigation work plan on March 27, 2024. GPP indicates that a deed restriction and long-term site management may be required for case closure.

5.2.3 Agbayani Construction

Agbayani Construction (HMS ID 138 and 139; GeoTracker IDs T0608119056 and T10000002674), a site with two commercial buildings, is also located in the western half of the project vicinity at 88 Dixon Court in Daly City (Figure 3-4). Historical use at the site includes drying cleaning, printing, and auto body repair, all operations that used chemicals such as solvents and petroleum hydrocarbons. Between 1999 and 2002, six USTs containing solvents, kerosene, and gasoline and affected soils were removed from the property, and the site was listed as a LUST case by GPP (SCS Engineers, 2024). The LUST case was closed in 2011, and a new cleanup case was opened to assess VOCs in the subsurface. The owner entered a Voluntary Cleanup Agreement with the GPP in 2010. After a dual-phase extraction system was operated to target petroleum hydrocarbons and VOCs including PCE in soil vapor and groundwater between 2007 and 2016, the SFRWQCB became the lead regulatory agency

to oversee the implementation of institutional controls at the site including a forthcoming Deed Restriction and Land Use Covenant for site redevelopment. Currently, the main medium of concern is soil vapor at the site, which is managed under a Risk Management Plan (SCS Engineers, 2024).

5.2.4 Brisbane Baylands/Southern Pacific Brisbane

Brisbane Baylands, also known as Southern Pacific Brisbane, (HMS ID 111; GeoTracker ID T10000000103) is located on Bayshore Boulevard in Brisbane in the eastern portion of the project area (Figure 3-7). The site is a former Southern Pacific Transportation Company (SPTC) railroad-switching yard and encompasses about 130 acres south of Geneva Avenue, east of Bayshore Boulevard, and west of the Caltrain railroad tracks.

From roughly 1914 to 1960, the property was used by SPTC for railcar rehabilitation and locomotive maintenance. The site was discovered by the predecessor of DTSC, the Department of Health Services, in 1980, and was divided into two Operable Units[15] (OUs). SPTC conducted three major investigations prior to DTSC's 1988 Remedial Action Order. A 2-million-gallon above ground storage tank filled with Bunker C fuel oil was removed from the property, and 11,500 gallons of oil-contaminated water and sediments were removed from a drainage ditch in 1988 and 1989.

A 1992 Remedial Investigation/Feasibility Study determined four areas of contamination:

- Halogenated VOC groundwater contamination in the northern portion of the property (OU-1);
- Heavy bunker oil (Bunker C oil) in soil and groundwater contamination at an oil sump area; petroleum hydrocarbons in the turntable area; and chromium, copper, zinc, lead, and arsenic soil contamination in a metal slag area (collectively OU-2 in the southern portion of the property).

OU-1 in the northern portion (EnviroStor ID 41490037) is an active state response site, and OU-2 in the southern portion (EnviroStor ID 41490054) was referred to SFRWQCB as of November 7, 1996[16]. Additional remedial actions include petroleum-impacted soil excavation (1993), VOC-contaminated groundwater extraction and treatment primarily for PCE and trichloroethene (TCE; 1995 to 2008), and ongoing in-situ enhanced reductive dichlorination injections and monitoring (Geosyntec, 2021).

A Feasibility Study/Remedial Action Plan for OU-1 was approved by DSTC in 2021, and the developer is preparing a Remedial Design Implementation Plan. The planned remedy for OU-1 is a 5-foot-thick, clean soil or hardscape cap, limited soil excavation, in-situ biological or abiotic groundwater treatment, land use restrictions including a requirement for vapor intrusion mitigation systems for future buildings, and operation and maintenance[17] (O&M) of the remedy (Geosyntec, 2021).

---

[15] During cleanup, a site can be divided into a number of distinct areas depending on the complexity of the problems associated with the site. These areas called operable units may address geographic areas of a site, specific site problems, or areas where a specific action is required.

[16] See discussion of Brisbane Baylands (HMS ID 152; GeoTracker ID T10000000103) in Section 5.2.3.

[17] Operation and maintenance (O&M) may include annual cap and vapor mitigation system inspections, and requirements will be detailed in a future O&M Plan and agreement with DTSC.

The Pre-Design Investigation Work Plan for Bunker C non-aqueous phase liquid mobility and treatment in shallow soil in OU-2 (Geosyntec, 2023) shows residual petroleum products (soil with greater than 50,000 milligrams per kilogram [mg/kg] total petroleum hydrocarbons as diesel) near the former oil tank area, with total petroleum hydrocarbons as diesel in shallow soil exceeding 260 mg/kg throughout the majority of OU-2. Additional work to determine petroleum hydrocarbon mobility in OU-2 is ongoing.

5.2.5 Brisbane Class II Landfill

Brisbane Class II Landfill (HMS ID 129; GeoTracker ID L10001853784) is a Title 27 municipal solid waste landfill located in the eastern portion of the project area where system reinforcements are proposed. GeoTracker lists the site as open with ongoing remediation as of January 5, 2010. SPTC purchased the site and filled the land and constructed a railroad along the western perimeter of the site by 1914. Brisbane Landfill lies on what was once a low-lying tidal marshland. Landfill operators leased the property from Southern Pacific and used the property for disposal of domestic, industrial, shipyard, sewage, and rubble solid wastes from 1932 to 1967, when waste disposal at the site ceased. Sunquest, now UPC, acquired the landfill along with most of the railyard in 1989 (Geosyntec, 2012). No liner or leachate collection systems were installed at the landfill prior to waste placement. Numerous investigations and removal efforts have occurred at the site, and groundwater monitoring wells were installed and monitored starting in 1995. Chemicals of potential concern (COPCs) for shallow and deep groundwater at the site are inorganics (ammonia, nitrate, sulfate, total dissolved solids, and total organic carbon), metals (arsenic, barium, lead, nickel, and selenium), VOCs, semi-volatile organic compounds, organochlorine pesticides, and polychlorinated biphenyls (PCBs) (Geosyntec, 2012). Surface water impacts have been identified, including landfill leachate seeps that have been observed along the Guadalupe Lagoon. Semi-annual discharge monitoring events are conducted at the site.

5.2.6 SFPP Kinder Morgan

SFPP (Kinder Morgan) Brisbane Terminal (HMS IDs 142 and 143; GeoTracker ID SL372271174; EnviroStor ID 71003515) is a bulk petroleum storage and distribution terminal located at 950 Tunnel Avenue in Brisbane and within the eastern portion of the project area where system reinforcements are proposed (Figure 3-9). The facility was developed in the 1960s. Twenty-one above ground storage tanks are present on the western portion of the facility, which is built on a bedrock outcrop. The eastern portion of the facility is on the closed Brisbane Municipal Landfill. Gasoline, diesel, and aviation fuels are stored at the site. Soils and groundwater have been investigated at the site since the 1990s, and a network of groundwater monitoring wells was installed for a groundwater assessment. Soil and water contamination is documented at the site. Allegedly, free product removal was performed in 1998 and 2001; in situ groundwater treatment was conducted in 2000; and soil excavation was completed in 2005. Aviation fuel, diesel, gasoline, benzene, methyl tert-butyl ether, tertiary butyl alcohol, and other fuel oxygenates are COPCs in groundwater. Monitoring wells are gauged quarterly, and some wells are sampled annually or semi-annually. Monitored natural attenuation[18] is the current remedial alternative. Toluene and free product thickness continue to exceed site trigger levels in one or more monitoring well at the site (Arcadis, 2024).

[18] Monitored natural attenuation is an in situ remediation method that depends on natural and verifiable processes in soil and groundwater to decrease the mass and concentration of contaminants.

5.2.7 Heidelburg West

Heidelburg West (HMS IDs 150 and 151; GeoTracker IDs T0608133889 and T0608100254) is located at 355 Valley Drive in Brisbane just outside of the proposed reinforcements in the eastern portion of the project area (Figure 3-9). GeoTracker ID T0608100254 is a closed LUST site, and GeoTracker ID T0608133889 is an open Cleanup Program site undergoing site assessment. A large commercial/industrial building with landscaped and hardscaped areas currently occupies the site. Former waste solvent and gasoline USTs were present on the site, and elevated concentrations of halogenated VOCs were discovered in groundwater in 1989. COCs are VOCs including PCE, TCE, and associated degradation products in soil, groundwater, and soil vapor. Groundwater monitoring continued from 1993 to 2020, and indoor air and sub-slab monitoring has been conducted since 2023. A Remedial Action Plan dated March 19, 2024, proposes soil, groundwater, and soil vapor remediation via a dual-phase extraction system, monitored natural attenuation and engineering controls (Path Forward, 2024).

5.2.8 Potrero Power Station Development Area

While outside of the radius of the environmental database search, a complex SWRCB cleanup site is ongoing at the property surrounding the Potrero Substation, where the project proposes modifications to fencing and driveways (Figure 1). The Potrero Power Station environmental site (GeoTracker ID T10000016561) located at 420 23rd Street in San Francisco encompasses 34 acres and includes twenty separate SWRCB cases between four sub-areas: development blocks, parks, street rights-of-way, and one site-wide area. A former PG&E electric power generating plant and MGP operated on the property. MGP operations ceased around 1930, and the power plant was permanently retired in 2011. COPCs in soil, soil vapor, and/or groundwater include metals, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (active remediation for dense non-aqueous phase liquid in soil and groundwater is ongoing), VOCs, semi-volatile organic compounds, PCBs, cyanide, pesticides, and naturally-occurring asbestos.

California Barrel Company, LLC purchased 21 acres of the property and plans to redevelop the property into a mixed-use development. This property is subject to a Site-Wide Risk Management Plan (Geosyntec and Terra Pacific Group, 2020). Soil, groundwater, and soil vapor contamination at the site is managed in seven operational areas. Each operational area is managed under a Land Use Covenant and requires compliance with a Risk Management Plan and an O&M plan to maintain durable cover (streets, asphalt, building foundations, concrete paving, etc.). Certain blocks require vapor intrusion mitigation as an engineering control. Depending on the location and intrusive nature of the work proposed for the project at Potrero substation, compliance with the Site-Wide Risk Management Plan may be required.

5.3 SWRCB NPDES Sites

The North San Mateo County Sanitation District wastewater treatment plant (HMS ID 104; GeoTracker ID NPD100051565) at 153 Lake Merced Boulevard in Daly City is located in the western portion of the project vicinity (Figure 3-3). The wastewater treatment plant is an NPDES site, meaning that the property operates under a NPDES permit issued by the Water Boards. The NPDES program is designed to regulate point sources that discharge pollutants into waters of the United States. No other information is available in Geotracker about the NPDES site.

5.4 DTSC State Response Sites

Eight[19] total DTSC state response sites were identified: one active site, six DTSC-certified[20] sites with O&M and/or land use restrictions, and one site that was referred to SWRCB.

5.4.1 Schlage Lock Co.

Schlage Lock Co. (HMS IDs 41 and 42; EnviroStor IDs 71002252 and 38340157) is located at 2401 Bayshore Boulevard in San Francisco on the western edge of the project vicinity (Figure 3-7). GeoTracker ID 71002252 lists the property as an inactive tiered permit site[21] requiring evaluation; no other information is available. GeoTracker ID 38340157 lists the property as a certified state response site with O&M requirements and land use restrictions as of May 4, 2021. Schlage Lock Company operated on the property from 1926 to 1999, manufacturing door hardware and lock parts. Processes included stamping and machining metal alloys, cleaning parts with a petroleum naptha solvent, and electroplating. Pacific Lithograph operated on a portion of the site starting in 1980 and used products containing TCE and Stoddard solvent. All operations stopped in 1999 after bankruptcy. Starting in 1994, soil removal and cleanup actions were completed. Between 1994 and 2009, a groundwater extraction and treatment system operated. The current owner, United Paragon Corporation implemented remedial actions including the removal of about 6,000 cubic yards of VOC-contaminated soil. The entire property and the North and South Schlage OUs are subject to land use restrictions and certified with ongoing long-term O&M including a groundwater monitoring program.

5.4.2 Former Martin Service Center

Martin Service Daly City Yard / OU-2 and Levinson (HMS IDs 90 and 101; EnviroStor IDs 41360100 and 41360093) are environmental sites in the PG&E Martin Substation in Daly City at 731 Schwerin Street and 3004 Geneva Avenue in Daly City, where project activities are planned in the eastern portion of the project area (Figures 3-7 and 3-9). The property contains six distinct areas: Daly City Yard, Brisbane Yard, Brisbane Yard Annex, Martin Substation, Levinson North Parcel, and the building located at 2850 Bayshore Boulevard (Haley & Aldrich, Inc., 2017). An MGP operated on the 52-acre site from approximately 1905 to 1916. DTSC has overseen characterization efforts, monitoring, and remedial action activities at the site since the 1980s. Soil and groundwater impacts were identified, and a network of monitoring wells was installed on the property. The site contains two OUs: OU-1 and OU-2. OU-1 includes areas with PAHs in surface soil in the western portion. OU-2 includes the eastern portion of the site where surface water and groundwater PAH-impacts are a concern, specifically for offsite migration. MGP-related residual waste including lampblack and tar has been identified in soil at the site and neighboring properties at depths up to 16 ft-bgs (Haley & Aldrich, Inc., 2017). Soil COCs are PAHs (total PAHs

[19] Southern Pacific Brisbane, also known as Brisbane Baylands (HMS IDs 79 and 141; EnviroStor IDs 41490037 and 41490054), is described in Section 5.2.4, as it also includes a SWRCB cleanup site.

[20] Certification by DTSC can be different for each site. A cleanup site may have been issued a no further action status requiring no additional work to be done, except for special circumstances, or a site may have been issued a certificate of completion with stewardship requirements such as a land use restriction, operation and maintenance, annual inspections, and five-year review reports.

[21] DTSC EnviroStor Glossary of Terms (https://www.envirostor.dtsc.ca.gov/public/EnviroStor%20Glossary.pdf) defines a tiered permit site as a "corrective action cleanup project on a hazardous waste facility that either was eligible to treat or permitted to treat waste under the Tiered Permitting system."

up to 6,951 mg/kg), total phenol (up to 300 mg/kg), benzene, toluene, ethylbenzene, xylenes (BTEX; up to 13.4 mg/kg), and cyanide (up to 7.11 mg/kg). Petroleum hydrocarbons, and metals including arsenic, cadmium, chromium, lead, nickel, and mercury were also detected in soil above applicable screening levels. Groundwater COCs are PAHs. A groundwater interceptor trench to prevent offsite migration of PAHs was installed in 2002 and stopped in 2015 with DTSC approval after concentrations decreased (Haley & Aldrich, Inc., 2017). Areas with in-place MGP-impacted soils are managed beneath an asphalt, concrete, and/or chipseal cap.

The San Francsico Water Department easement through a portion of the PG&E Martin Substation (HMS ID 86; EnviroStor ID 41360101) is a former MGP site listed as a voluntary cleanup site with no further action as of June 26, 2001 (Figure 3-7). Soil contaminated with BTEX and PAHs was removed for a San Francisco Water Department pipe replacement.

A separate technical memorandum addresses the site history and environmental management requirements at the PG&E Martin Substation (CDIM, 2024).

5.4.3 Former Midway Village

Midway Village North, Midway Village South, and Bayshore Park (collectively Former Midway Village, HMS IDs 109 and 106; EnviroStor IDs 41650007 and 41990001) are certified state response sites at 45 Midway Drive in the eastern portion of the project area, in the Southeast separation and system reinforcements areas (Figures 3-7 and 3-9). The entire property is approximately 15.8 acres and neighbors the PG&E Martin Service Center, a former MGP site. In the 1940s, Navy housing was constructed on Midway Village using MGP-impacted fill from the neighboring PG&E property to raise the site grade (Langan, 2021). By the 1970s, the site was developed into an affordable housing community. COCs include PAHs and heavy metals in soil and VOCs (benzene, ethylbenzene, naphthalene, and vinyl chloride) in soil vapor. Several soil removal efforts were completed under DTSC oversight, and the property has a clean soil cap or hardscape cap to protect users. The Site is certified by DTSC with land use restrictions and ongoing O&M. In 2021, site redevelopment efforts began to construct new, higher-density apartment buildings, and vapor mitigation systems are installed at buildings overlying areas with elevated soil vapor concentrations.

5.5 DTSC Evaluation Sites

The San Francisco Police Department pistol range (HMS ID 66; EnviroStor ID 38990001) is located at John Muir Drive and Skyline Boulevard in the western portion of the project area, just southeast of Lake Merced (Figure 3-3). This 0.62-acre property is a pistol range that was constructed in the 1940s. Around 1989, fourteen soil borings and three groundwater monitoring wells were installed across the property. Elevated lead concentrations were identified in soil, and no lead was detected in groundwater. DTSC completed a Site Screening in 1990 to support a renovation of the facility that was later completed in 1995. DTSC indicates that the site is under local agency oversight as of September 27, 2018.

5.6 DTSC School Cleanup

Bayshore Elementary Reconstruction project (HMS ID 84; EnviroStor ID 60002128) at 155 Oriente Street in Daly City is in the eastern portion of the project area for local distribution system separation activities (Figure 3-7). Past site uses include an MGP, hazardous materials storage in USTs, and school buildings. COCs included

metals (lead) and organochlorine pesticides in soil, and the removal of approximately 1,500 cubic yards of soil was completed in 2016. DTSC issued a removal action certification requiring no further action in 2017.

6 OTHER ENVIRONMENTAL CONDITIONS

Based on the historical uses of the project vicinity, the following are commonly encountered conditions that may result in the presence of hazardous materials in soil or groundwater. Sampling and analysis of materials encountered within the project area would be needed to confirm the presence or absence of hazardous substances.

6.1 Historical Fill, Aerially-Deposited Lead, and the Maher Ordinance

Portions of the project area are located on soil potentially impacted by historical fill, industrial activities, or aerially-deposited lead. Near the San Francisco Bay shoreline on the eastern side of the project area, known Bay fill is present. Additionally, the potential for soil and or groundwater contamination exists in locations where historic land use or site activity suggests potential historical use of hazardous materials. In the 1920s, lead-alkyl compounds were added to gasoline and were later phased out following an order from the EPA in the mid-1980s. Aerially-deposited lead can be found in shallow soils near freeways and was deposited as a result of vehicular exhaust emissions from vehicles prior to the elimination of lead as a fuel additive. Due to the presence of Interstate 280 right-of-way (ROW) and US Route 101 ROW in the project vicinity, aerially-deposited lead may be encountered during project activities, especially in work areas within 30 feet of the roadway corridors (DTSC, 2009).

In San Francisco, a Maher Ordinance area is defined by Article 22A of the San Francisco Health Code and is under the jurisdiction of the San Francisco Department of Public Health Site Assessment and Mitigation Program. The City developed Article 22A of the San Francisco Health Code to assess pollutant impacts associated with fill and industrial activities as part of the building permit process. Maher Ordinance areas are mapped[22] in the Interstate 280 ROW, the US Route 101 ROW, and portions of San Francisco likely to be underlain by impacted fill material, including the eastern portion of the project area located east of the former San Francisco Bay shoreline (Figure 4).

6.2 Naturally-Occurring Asbestos

Serpentinite is a metamorphic rock that contains naturally-occurring asbestos. Portions of the project may occur in fill containing serpentinite fragments. While some geologic maps do not show serpentinite bedrock mapped in the project area (United States Geological Survey [USGS], 2006), a modified map[23] presented in AEG's Geology of the Cities of the World (AEG, 2018) shows small zones that may be underlain by serpentinite (Figure 5). These areas are also mapped[24] as locations where construction activities are subject to the Dust Control

[22] https://sfplanninggis.org/pim/map.html?layers=Maher%20Ordinance accessed on March 15, 2024. The map includes areas with current or historical industrial use or zoning; areas within 100 feet of a current or historical UST; sites on the Cortese List; filled former Bay, marsh, or creek areas; and areas within 150 feet of a current or former elevated highway. Once a parcel is added to the Maher map, it cannot be removed and remains on the map in perpetuity.

[23] Geologic map of the City and County of San Francisco. Modified from Blake and others (2000); Bonilla (1998; 1971); and Schlocker (1974).

[24] https://sfplanninggis.org/pim/map.html?layers=Serpentine%20Rocks accessed on March 15, 2024.

Ordinance requirements contained in San Francisco Health Code Article 22B and San Francisco Building Code Section 106.A.3.2.6

6.3 Lead-Based Paint and Asbestos in Structures

Lead-based paint and/or asbestos-containing materials may be present in painted surfaces or structures in the project vicinity. The use of these products was phased out in the 1970s to 1980s; however, the substances continued to be used for specialized purposes including traffic paints and asbestos-strengthened concrete. Demolition and removal of structures may be subject to CalEPA, Bay Area Air Quality Management District (BAAQMD) and California Division of Occupational Safety and Health (Cal/OSHA) protocols and could require a pre-demolition building materials survey and sampling for lead-based paint and asbestos-containing materials.

Lead-based paint, if present in structures proposed for demolition or renovation, can be separated from building materials to be handled and disposed of as hazardous waste depending on total lead concentrations. Federal OSHA and Cal/OSHA regulate worker exposure during construction activities that disturb lead-based paint. Additionally, Section 3407 of the San Francisco Building Code would apply to the demolition of structures in the project vicinity within San Francisco.

Asbestos could be encountered during demolition of existing structures that would require containment or disposal, and the affected structures would require appropriate abatement of identified asbestos prior to demolition or renovation. Asbestos-containing materials are regulated as a hazardous air pollutant by the EPA[25] and under the Clean Air Act[26] and as a potential worker safety hazard under the authority of Cal/OSHA[27]. The modification or demolition of structures containing asbestos in the project vicinity would require hiring a licensed asbestos abatement contractor and notifying the BAAQMD[28] ten days ahead of proposed work. Section 19827.5 of the California Health and Safety Code requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable Federal regulations regarding hazardous air pollutants, including asbestos.

6.4 PCB-Containing Transformers

PCBs were historically used in transformers and other electrical equipment as coolants and lubricants; however, PCB manufacturing stopped in 1977. Transformers within the project area are currently owned and operated by PG&E, and if a transformer was installed prior to the 1980s, it may contain PCBs. PCBs are hazardous materials subject to Federal, state, and local regulations for hazardous material handling and health and safety mitigations. Demolition and removal of structures could require a pre-demolition building materials survey and sampling for PCBs.

[25] Hazardous Air Pollutants requirements of EPA Title 40 Code of Federal Regulations Part 61, Subpart M – National Emission Standard for Asbestos.

[26] 42 U.S. Code Section 7401 et seq.

[27] California Code of Regulations Title 8, Subchapter 4, Article 4, Section 1529.

[28] Local Bay Area Air Quality Management District Regulation 11, Rule 2.

Transformers containing PCBs are subject to EPA protocols[29] and could require removal, replacement, or remediation of PCB-containing equipment. Additionally, work with potential PCB-containing equipment would require screening and notification as part of the Bay Area regional municipal stormwater NPDES permit (SWRCB, 2013) and the construction stormwater general permit (SWRCB, 2022).

[29] The Toxic Substances Control Act of 1976 provides EPA the authority to require reporting, record-keeping and testing requirements, as found in Title 40 of the Code of Federal Regulations, Part 761.

7 CONCLUSIONS

A review of online environmental databases and an evaluation of documented hazardous materials release sites identified potential sources of hazardous materials that may impact soil, groundwater, and soil vapor underlying the project area:

- Petroleum and petroleum-related compounds including benzene are present in soil, groundwater, and soil vapor at LUST site Shell Station #4003.
- Various SWRCB and DTSC cleanup sites with ongoing remediation efforts have elevated concentrations of VOCs, often PCE and TCE, in soil, groundwater, and soil vapor.
- Former MGP sites (Former Martin Service Center and Former Midway Village) are capped and managed under DTSC oversight and have elevated concentrations of PAHs, BTEX, cyanide, petroleum hydrocarbons, and metals in soil and/or groundwater.
- Other environmental conditions may exist in the project area including historical fill, naturally occurring asbestos, aerially deposited lead, lead-based paint, asbestos-containing building material, and PCB-containing transformers.

8 REFERENCES

Association of Environmental and Engineering Geologists [AEG], 2018. Geology of Cities of the World Series, Geology of San Francisco, California, United States of America.

Arcadis, 2024. Semiannual Groundwater Monitoring Report, July 1st to December 31, 2023. SFPP, L.P. Brisbane Terminal, 950 Tunnel Avenue, Brisbane, California. February 14.

California Department of Conservation Division of Mines and Geology, 1991. Geologic Map of the San Francisco-San Jose Quadrangle, California.

CDIM Engineering (CDIM), 2024. DRAFT Technical Memorandum, Site Management Requirements, PG&E Martin Service Center, PG&E Power Assets Acquisition Project, Brisbane and Daly City, California. April 24.

DTSC, 2009. Fact Sheet, April 2009: Caltrans Statewide Variance for Reuse of Lead-Contaminated Soils. April.

DTSC, 2024a. Information Required from the Department of Toxic Substances Control Under Government Code Section 65962.5(a), https://calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/: Accessed in March.

DTSC, 2024b. EnviroStor Online Database, http://www.envirostor.dtsc.ca.gov/public/: Accessed in March.

EKI Environment & Water, 2024. Work Plan for Vapor Intrusion Mitigation, Former Crocker Cleaners, 6215 Mission Street, Daly City, California. March 4.

ESA, 2024. Administrative Draft – PG&E Power Asset Acquisition Environmental Impact Report, Project Description. February.

Geosyntec Consultants, 2012. Hazardous Materials Summary Report, Brisbane Landfill, Brisbane, San Mateo County, California. February 29.

Geosyntec Consultants, 2021. Feasibility Study / Remedial Action Plan. San Mateo county Portion of Universal Paragon Corporation Operable Unit (UPC OU-SM), Brisbane, California. October 11.

Geosyntec Consultants, 2023. Pre-Design Investigation Work Plan – Chlorinated Volatile Organic Compound-Impacted Area, Brisbane Baylands Operable Unit 2, Brisbane, California. April 20

Geosyntec Consultants and Terra Pacific Group, 2020. Sitewide Risk Management Plan, Potrero Power Station, San Francisco, California. December 28.

Google Earth: http://www.googleearth.com.

Langan, 2021. Remedial Design Implementation Plan, Phase 1 – Midway-Bayshore Village Redevelopment, Daly City, California. August 24.

Northgate, 2024. Winter 2022 Interim Soil Vapor and Indoor Air Sampling Data Submittal, Former Westlake French Dry Cleaners Site, 247 Westlake Center, Daly city, California 94015. February 15.

Path Forward, 2024. Remedial Action Plan, 355 Valley Drive, Brisbane, California. March 19.

San Mateo County Groundwater Protection Program, 2024. Conditional Approval of Work Plan for Vapor Intrusion Mitigation. Crocker Cleaners (Former) 6215 Mission Street, Daly City, California. March 27.

SCS Engineers, 2024. Risk Management Plan, 88 Dixon Court, California. March 21.

SWRCB, 2012. Low-Threat Underground Storage Tank Case Closure Policy.

SWRCB, 2013. SWRCB Order No. 2013-001-DWQ, National Pollutant Discharge Elimination System (NPDES), General Permit No. CAS000004, Waste Discharge Requirements (WDRs) For Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (General Permit).

SWRCB, 2022. National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit), Order WQ 2002-0057-DWQ, NPDES No. CAS000002.

SWRCB, 2023. Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin (Region 2). March 7.

SWRCB, 2024. GeoTracker Website, http://www.geotracker.swrcb.ca.gov: Accessed in March.

Wayne Perry, 2024. Groundwater Monitoring and Status Report Fourth Quarter 2023, Former Shell Service Station, 5897 Mission Street, San Francisco, California. January 29.

TABLE

Table 1. Environmental Sites Summary

HMS ID[1]	Regulatory Agency Oversight	Regulatory ID	Case Type	Project or Business Name	Latitude	Longitude	Status
1	DTSC	80000607	Military Evaluation	FUDS SF AAA Battery 61-N	37.73027778	-122.5041667	No Further Action
2	SWRCB	T0607501212	LUST Cleanup Site	Pomeroy Center for Recreation and Rehabilitation	37.72982349	-122.5011865	Completed - Case Closed
3	SWRCB	T10000004506	Military Cleanup Site	San Francisco Armory	37.72963	-122.503845	Completed - Case Closed
4	SWRCB	T10000008283	LUST Cleanup Site	Private Residence	37.72873	-122.47125	Completed - Case Closed
5	SWRCB	T0607599391	LUST Cleanup Site	Private Residence	37.728404	-122.463441	Completed - Case Closed
6	SWRCB	T0607591461	LUST Cleanup Site	Private Residence	37.72782726	-122.468956	Completed - Case Closed
7	SWRCB	T10000004800	LUST Cleanup Site	Private Residence	37.7273722	-122.4656425	Completed - Case Closed
8	SWRCB	T10000006037	LUST Cleanup Site	Private Residence	37.7258009	-122.4667657	Completed - Case Closed
9	SWRCB	T0607500083	LUST Cleanup Site	Chevron Station #9-6225	37.725244	-122.473713	Completed - Case Closed
10	SWRCB	T0607500266	LUST Cleanup Site	SFPD-Balboa Park Station	37.724937	-122.443164	Completed - Case Closed
11	SWRCB	T0607501230	LUST Cleanup Site	Cornerstone Baptist Church	37.724851	-122.416838	Completed - Case Closed
12	SWRCB	38-000-025345	UST (3 total)	Unocal/Best Auto Care	37.723186	-122.444298	No Additional Information
13	SWRCB	T0607501144	LUST Cleanup Site	Commercial Building	37.7231354	-122.4424605	Completed - Case Closed
14	SWRCB	T0607500185	LUST Cleanup Site	BP Oil (Independent)	37.723124	-122.443097	Completed - Case Closed
15	SWRCB	T0607501133	LUST Cleanup Site	James Denman Middle School	37.7218403	-122.4428229	Completed - Case Closed
16	SWRCB	T0607500471	LUST Cleanup Site	CCSF MUNI Railway-Geneva	37.7207947	-122.4464597	Completed - Case Closed
17	SWRCB	T0607500578	LUST Cleanup Site	Woodrow Wilson High	37.7206315	-122.4050707	Completed - Case Closed
18	SWRCB	38-000-031538	UST (3 total)	Alemany Shell #152	37.71787	-122.44277	No Additional Information
19	SWRCB	T0607500291	LUST Cleanup Site	Shell Station #2304	37.717869	-122.442778	Completed - Case Closed
20	SWRCB	T0607507524	LUST Cleanup Site	Commercial Property	37.717723	-122.440601	Completed - Case Closed
21	SWRCB	T10000005188	Cleanup Program Site	Pacific Rod and Gun Club	37.71728621	-122.4961416	Completed - Case Closed
22	SWRCB	T0607500023	LUST Cleanup Site	ARCO #00319	37.717106	-122.439186	Completed - Case Closed
23	SWRCB	T0607508486	LUST Cleanup Site	Gas Station	37.716994	-122.440999	Completed - Case Closed
24	SWRCB	38-000-031072	UST (3 total)	Mission Martco	37.716991	-122.44101	No Additional Information
25	SWRCB	T0607500211	LUST Cleanup Site	Regal Station (former) #417	37.716987	-122.440999	Completed - Case Closed
26	SWRCB	38-000-009041	UST	SFFD Station #44	37.716662	-122.400342	No Additional Information
27	SWRCB	T0607501084	LUST Cleanup Site	SFFD Station #44	37.7165812	-122.4001425	Completed - Case Closed
28	SWRCB	T0607501250	LUST Cleanup Site	Century 21 Alliance	37.716136	-122.441159	Completed - Case Closed
29	SWRCB	T10000001941	LUST Cleanup Site	Commercial	37.715394	-122.44218	Completed - Case Closed
30	SWRCB	T0607500015	LUST Cleanup Site	ARCO #6136	37.7139681	-122.4360583	Completed - Case Closed
31	SWRCB	38-000-035205	UST (3 total)	ARCO #6136	37.713825	-122.436028	No Additional Information
32	SWRCB	T0607500653	LUST Cleanup Site	Nopuente Property	37.712559	-122.457337	Completed - Case Closed
33	SWRCB	T0607500884	LUST Cleanup Site	Anderson Roofing & Sheet Metal	37.712038	-122.455281	Completed - Case Closed
34	SWRCB	T10000013328	LUST Cleanup Site	Sadowa Street	37.7119	-122.45527	Completed - Case Closed
35	SWRCB	38-000-009369	UST (2 total)	San Francisco Golf Club Maintenance	37.711753	-122.473079	No Additional Information'

Table 1. Environmental Sites Summary

HMS ID[1]	Regulatory Agency Oversight	Regulatory ID	Case Type	Project or Business Name	Latitude	Longitude	Status
36	SWRCB	38-000-021389	UST (3 total)	Chevron #090787	37.711709	-122.455568	No Additional Information
37	SWRCB	T10000000315	LUST Cleanup Site	San Francisco Golf Course	37.711426	-122.471281	Completed - Case Closed
38	SWRCB	T0607500080	LUST Cleanup Site	Chevron Station #9-0787	37.711266	-122.45446	Completed - Case Closed
39	SWRCB	T0607500469	LUST Cleanup Site	Robinson Property	37.711179	-122.456308	Completed - Case Closed
40	UST	T0607500260	LUST Cleanup Site	SFFD Station #33	37.710954	-122.4589884	Completed - Case Closed
41	DTSC	71002252	Tiered Permit	Schlage Lock Company	37.711129	-122.4035866	Inactive - Needs Evaluation
42	DTSC	38340157	State Response or NPL	Schlage Lock Company	37.71056479	-122.4031448	Certified / Operation & Maintenance and Land Use Restrictions
43	SWRCB	T0607500774	LUST Cleanup Site	TW Automotive	37.7104416	-122.4043693	Completed - Case Closed
44	SWRCB	T0607500433	LUST Cleanup Site	Giusto Property	37.710245	-122.449004	Completed - Case Closed
45	SWRCB	T0607500065	LUST Cleanup Site	Macor Inc./Norcal Waste System	37.710114	-122.400101	Completed - Case Closed
46	SWRCB	T0607534907	LUST Cleanup Site	7-Eleven #23342	37.709817	-122.457893	Completed - Case Closed
47	SWRCB	T0607500192	LUST Cleanup Site	Olympic Station (Former)	37.7096844	-122.4048875	Completed - Case Closed
48	SWRCB	T10000005032	LUST Cleanup Site	Commercial	37.709202	-122.450612	Completed - Case Closed
49	SWRCB	T0607594006	LUST Cleanup Site	Sanitary Fill Co/Transfer Stat	37.709039	-122.401572	Completed - Case Closed
50	DTSC	60001756	Tiered Permit	Super Excavators, Inc. (Site 1)	37.709015	-122.392849	Inactive - Needs Evaluation
51	SWRCB	38-000-002093	UST	Recology San Francisco	37.709	-122.3966	No Additional Information
52	SWRCB	38-000-030250	UST (3 total)	Quality Gas for Your Cash Arco AM/PM	37.708994	-122.452658	No Additional Information
53	SWRCB	T0607500036	LUST Cleanup Site	Bayshore Service	37.7089088	-122.4052487	Completed - Case Closed
54	SWRCB	T0607553872	LUST Cleanup Site	Bayshore Service	37.708907	-122.405192	Completed - Case Closed
55	SWRCB	T0607501253	LUST Cleanup Site	Sanitary Fill Co./100 Alana	37.708849	-122.398144	Completed - Case Closed
56	SWRCB	T0607501254	LUST Cleanup Site	Sanitary Fill Co. (SWETS)	37.708849	-122.398144	Completed - Case Closed
57	SWRCB	T0607500024	LUST Cleanup Site	ARCO #6185	37.70883	-122.451323	Completed - Case Closed
58	SWRCB	T0607538367	LUST Cleanup Site	Sanitary Fill Co/Shop Bldg. E	37.708724	-122.397035	Completed - Case Closed
59	SWRCB	T0607500320	LUST Cleanup Site	Sanitary Fill Co./SWETS SHOP	37.708724	-122.397035	Completed - Case Closed
60	SWRCB	T0607500304	LUST Cleanup Site	Shell Station #4003	37.70872142	-122.4523295	Open - Assessment & Interim Remedial Action
61	SWRCB	T10000002024	LUST Cleanup Site	Commercial	37.708346	-122.454729	Completed - Case Closed
62	SWRCB	T0608100817	LUST Cleanup Site	Norcal-Sanitary Fill Company	37.70825501	-122.400776	Completed - Case Closed
63	SWRCB	T10000008384	Non-Case Information	Tunnel Avenue Overpass	37.70813	-122.40102	Informational Item / Review Complete
64	SWRCB	T10000008418	Non-Case Information	Goethe Street Properties	37.70807043	-122.4585594	Informational Item / Review Complete
65	SWRCB	T0608100607	LUST Cleanup Site	Venturino Trust	37.708006	-122.454309	Completed - Case Closed
66	DTSC	38990001	Evaluation Evaluation	SFPD - Pistol Range	37.7078	-122.4836	Refer: Local Agency
67	SWRCB	T0608101010	LUST Cleanup Site	Norcal - Sunset Scavanger	37.70761531	-122.3983984	Completed - Case Closed
68	SWRCB	T0608182606	LUST Cleanup Site	Michelucci & Associates	37.707382	-122.400768	Completed - Case Closed
69	SWRCB	T0608178943	LUST Cleanup Site	Fomer Rykoff Sexton	37.707083	-122.407465	Completed - Case Closed
70	DTSC	41070008	Voluntary Cleanup	Cow Palace	37.70703611	-122.4154806	Refer: Local Agency

Table 1. Environmental Sites Summary

HMS ID[1]	Regulatory Agency Oversight	Regulatory ID	Case Type	Project or Business Name	Latitude	Longitude	Status
71	SWRCB	T0608100323	LUST Cleanup Site	McDonald's Restaurant	37.7069014	-122.4157746	Completed - Case Closed
72	SWRCB	T0608100718	LUST Cleanup Site	Nationwide Papers	37.706851	-122.411008	Completed - Case Closed
73	SWRCB	T0608100352	LUST Cleanup Site	Cow Palace	37.7067959	-122.4188601	Completed - Case Closed
74	SWRCB	T0608192688	LUST Cleanup Site	P&F Distributors	37.70657602	-122.40104	Completed - Case Closed
75	SWRCB	FA0017148	UST	PG&E Martin Service Center	37.70629	-122.41303	No Additional Information
76	SWRCB	T10000017029	Cleanup Program Site	Crocker Cleaners (Former)	37.70627	-122.45897	Open - Site Assessment
77	SWRCB	T0608101076	LUST Cleanup Site	S.E. Rykoff & Co.	37.706093	-122.408888	Completed - Case Closed
78	SWRCB	T0608100189	LUST Cleanup Site	Norcal-Chet C. Smith Trucking	37.705988	-122.399535	Completed - Case Closed
79	DTSC	41490037	State Response or NPL	Southern Pacific - Brisbance (North Area)	37.70591748	-122.4039433	Active
80	SWRCB	SLT2O05258	Cleanup Program Site	PG&E Martin Service Center	37.7058105	-122.4134872	Completed - Case Closed
81	SWRCB	41-000-017132	UST (3 total)	Chevron Bayshore	37.705761	-122.406998	No Additional Information
82	SWRCB	T10000010270	LUST Cleanup Site	Chevron 9-9428	37.70571	-122.40698	Completed - Case Closed
83	SWRCB	T0608100129	LUST Cleanup Site	Chevron 9-9428	37.70567078	-122.4068271	Completed - Case Closed
84	DTSC	60002128	School Cleanup School	Bayshore Elementary Reconstruction Project	37.7053714	-122.4142488	Certified
85	SWRCB	41-000-017141	UST (3 total)	7-Eleven Inc. #19235	37.705227	-122.406912	No Additional Information
86	DTSC	41360101	Voluntary Cleanup	SF Water Department (PG&E Martin)	37.7051121	-122.4106121	No Further Action
87	SWRCB	T0608100151	LUST Cleanup Site	CITGO (Southland)	37.70504704	-122.4072059	Completed - Case Closed
88	SWRCB	T10000020267	Sampling Point - Public	Doelger Senior Center	37.70494	-122.4847	Open - Active
89	SWRCB	T0608100617	LUST Cleanup Site	Western Art Stone	37.704884	-122.399391	Completed - Case Closed
90	DTSC	41360100	State Response or NPL	PG&E Martin Service Daly City Yard	37.704807	-122.412286	Certified / Operation & Maintenance
91	SWRCB	T0608100154	LUST Cleanup Site	City of Daly City	37.7047182	-122.4623262	Completed - Case Closed
92	SWRCB	T0608147688	LUST Cleanup Site	V & A Auto Repair	37.70452356	-122.4073291	Completed - Case Closed
93	SWRCB	SL18250671	Cleanup Program Site	Tuntex Properties	37.70450093	-122.4040675	Completed - Case Closed
94	SWRCB	T0608100625	LUST Cleanup Site	Winston Tire Co.	37.7042317	-122.4627164	Completed - Case Closed
95	SWRCB	T10000009204	Non-Case Information	Martin Substation	37.7040229	-122.408802	Informational Item / Review Complete
96	SWRCB	T0608100603	LUST Cleanup Site	Vab Arsdale Harris Lumber Company	37.703873	-122.399216	Completed - Case Closed
97	SWRCB	T0608100912	LUST Cleanup Site	Unocal Station #3816	37.703699	-122.475655	Completed - Case Closed
98	SWRCB	T0608130089	Cleanup Program Site	Hillside Village AKA Schindel Property	37.70368604	-122.4237013	Completed - Case Closed
99	SWRCB	T0608192697	LUST Cleanup Site	Daly City Fire Department	37.7035747	-122.4807019	Completed - Case Closed
100	SWRCB	41-000-017152	UST (2 total)	Mayfair Gas	37.703526	-122.475723	No Additional Information
101	DTSC	41360093	State Response or NPL	PG&E Martin Service OU-2 and Levinson	37.702871	-122.409754	Certified / Operation & Maintenance
102	SWRCB	T0608138359	LUST Cleanup Site	Sofos Property	37.702868	-122.462935	Completed - Case Closed
103	SWRCB	SL0608104752	Cleanup Program Site	Sofos Property	37.702868	-122.462935	Completed - Case Closed
104	SWRCB	NPD100051565	* NPDES	North San Mateo County Sanitation District WWTP	37.70279	-122.48501	Active
105	SWRCB	220110_023096	UST (3 total)	Daly City Garage at Sanitation	37.702733	-122.485533	No Additional Information

Table 1. Environmental Sites Summary

HMS ID[1]	Regulatory Agency Oversight	Regulatory ID	Case Type	Project or Business Name	Latitude	Longitude	Status
106	DTSC	41990001	State Response or NPL	Bayshore Park	37.70234174	-122.4126496	Certified / Operation & Maintenance - Land Use Restrictions Only
107	SWRCB	T0608100181	LUST Cleanup Site	Daly City Wastewater Plant	37.70224355	-122.4835692	Completed - Case Closed
108	DTSC	60001493	Military Evaluation FUDS	Former Midway Village - (J09CA1013)	37.70212415	-122.4141741	No Further Action
109	DTSC	41650007	State Response or NPL	Midway Village	37.70212415	-122.4141741	Certified / Operation & Maintenance
110	SWRCB	T0608100148	LUST Cleanup Site	Chevron 9-6982	37.70191109	-122.4841906	Completed - Case Closed
111	SWRCB	T10000000103	Cleanup Program Site	Brisbane Baylands	37.70180158	-122.4056339	Open - Assessment & Interim Remedial Action
112	SWRCB	T0608100152	LUST Cleanup Site	City of Daly City	37.701531	-122.4708303	Completed - Case Closed
113	SWRCB	SL0608106505	Cleanup Program Site	Westlake French Cleaners	37.70109916	-122.4820813	Open - Site Assessment
114	SWRCB	T0608100243	LUST Cleanup Site	City of Daly City	37.7009404	-122.4695278	Completed - Case Closed
115	SWRCB	T0608135649	LUST Cleanup Site	Pacific Plaza - Block 51	37.70076554	-122.4700997	Completed - Case Closed
116	SWRCB	SLT2O04248	Non-Case Information	INndustrial Way Properties	37.7003663	-122.4074855	Informational Item / Review Complete
117	SWRCB	T0608100125	LUST Cleanup Site	Chevron 9-7455	37.70013296	-122.470488	Completed - Case Closed
118	DTSC	41990004	Voluntary Cleanup	South Levinson Parcel	37.7	-122.4088889	No Further Action
119	DTSC	41490052	Historical	Southern Pacific Landfill	37.6994603	-122.3967501	Refer: RWQCB
120	SWRCB	T0608100530	LUST Cleanup Site	Stump Property	37.69934839	-122.4642491	Completed - Case Closed
121	SWRCB	SL0608131398	Cleanup Program Site	Pacific Plaza III	37.698782	-122.470457	Completed - Case Closed
122	SWRCB	T0608100822	LUST Cleanup Site	Mobil, Former	37.6986479	-122.4640257	Completed - Case Closed
123	SWRCB	41-000-008661	UST (3 total)	Daly City Corp Yard & Public Works	37.697903	-122.469163	No Additional Information
124	SWRCB		UST (3 total)	Speedway No. 4505	37.6979	-122.47041	No Additional Information
125	SWRCB	T0608100783	LUST Cleanup Site	Olympian Westlake	37.69786484	-122.4704334	Completed - Case Closed
126	SWRCB	T0608198948	LUST Cleanup Site	Olympian Junipero Serra	37.69784733	-122.4704602	Completed - Case Closed
127	SWRCB	T0608100179	LUST Cleanup Site	Daly City Corp Yard	37.6976787	-122.469009	Completed - Case Closed
128	SWRCB	T0608100292	Non-Case Information	Kessler and Kessler #1	37.69763719	-122.4064787	Informational Item / Review Complete
129	SWRCB	L10001853784	Land Disposal Site	Brisbane Class II Landfill	37.69632008	-122.3969669	Open - Remediation
130	SWRCB	T0608100586	LUST Cleanup Site	Tosco #4113 (Former Unocal)	37.69605428	-122.4643231	Completed - Case Closed
131	SWRCB		UST (2 total)	Daly City Fast Fill Market	37.69597	-122.46426	No Additional Information
132	SWRCB		UST	Mission Street 76	37.695965	-122.464233	No Additional Information
133	SWRCB	220422_053620	UST (2 total)	Mission Valero	37.69596	-122.46422	No Additional Information
134	SWRCB	T0608101090	LUST Cleanup Site	Circle K #5638 (Tosco)	37.69581096	-122.464489	Completed - Case Closed
135	SWRCB	T0608100293	LUST Cleanup Site	Kessler and Kessler #2	37.69568946	-122.4053201	Completed - Case Closed
136	SWRCB	T0608105654	Cleanup Program Site	Steeg Property	37.695327	-122.464652	Completed - Case Closed
137	SWRCB	T0608100053	LUST Cleanup Site	B & B Transmission	37.694791	-122.464402	Completed - Case Closed
138	SWRCB	T0608119056	LUST Cleanup Site	Agbayani Construction	37.6947344	-122.4695536	Completed - Case Closed
139	SWRCB	T10000002674	Cleanup Program Site	Agbayani Construction	37.694665	-122.469536	Open - Remediation
140	SWRCB	T10000020887	Non-Case Information	60 Station Avenue	37.69421	-122.46945	Informational Item / Review Complete

Table 1. Environmental Sites Summary

HMS ID[1]	Regulatory Agency Oversight	Regulatory ID	Case Type	Project or Business Name	Latitude	Longitude	Status
141	DTSC	41490054	State Response or NPL	Southern Pacific - Brisbane (OU-2)	37.69239946	-122.4030113	Refer: RWQCB
142	DTSC	71003515	Tiered Permit	SFPP (Kinder Morgan) Brisbane Terminal	37.69171	-122.399666	Refer: Other Agency
143	SWRCB	SL372271174	Cleanup Program Site	SFPP (Kinder Morgan) Brisbane Terminal	37.691673	-122.399616	Open - Verification Monitoring
144	SWRCB	T0608100306	LUST Cleanup Site	Santa Cruz Imports	37.6889	-122.4103	Completed - Case Closed
145	SWRCB	T0608100647	LUST Cleanup Site	S.E. Rykoff & Co.	37.68850823	-122.4044949	Completed - Case Closed
146	DTSC	41280138	State Response or NPL	Quicksilver Products Inc.	37.688504	-122.403266	Certified
147	DTSC	80001472	Corrective Action	Quicksilver Products Inc.	37.688016	-122.403399	Certified
148	EPA	CAD981424732	Historical - Non-Operating	Quicksilver Products Inc.	37.688016	-122.403399	Closed
149	RWQCB	T0608100834	LUST Cleanup Site	Proxy Message Center	37.687745	-122.402209	Completed - Case Closed
150	SWRCB	T0608133889	Cleanup Program Site	Heidelburg West	37.68767821	-122.4094106	Open - Site Assessment
151	SWRCB	T0608100254	LUST Cleanup Site	Heidelburg West	37.687505	-122.409205	Completed - Case Closed
152	SWRCB	T0608100371	LUST Cleanup Site	Oxford Chemical Co.	37.687483	-122.406472	Completed - Case Closed
153	SWRCB	SL0608145485	Cleanup Program Site	Crocker Business Park	37.687109	-122.403458	Completed - Case Closed
154	SWRCB	T0608100021	LUST Cleanup Site	Gil's ARCO	37.684569	-122.401893	Completed - Case Closed
155	SWRCB	T0608100827	LUST Cleanup Site	Filling Station Pizza	37.684107	-122.402052	Completed - Case Closed

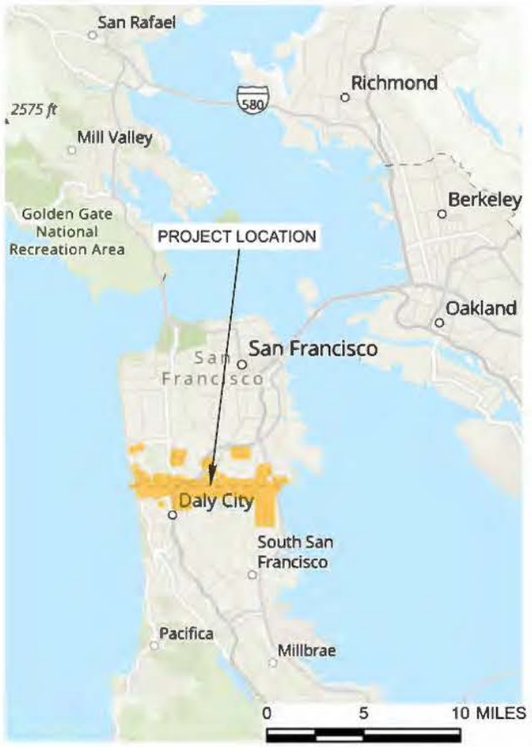
Notes:
1. Hazardous Materials Study (HMS) ID is a unique identification number assigned to environmental sites based on their geographic location in the Project area or vicinity (generally numbered from west to east). See Figures 3-1 through 3-9.

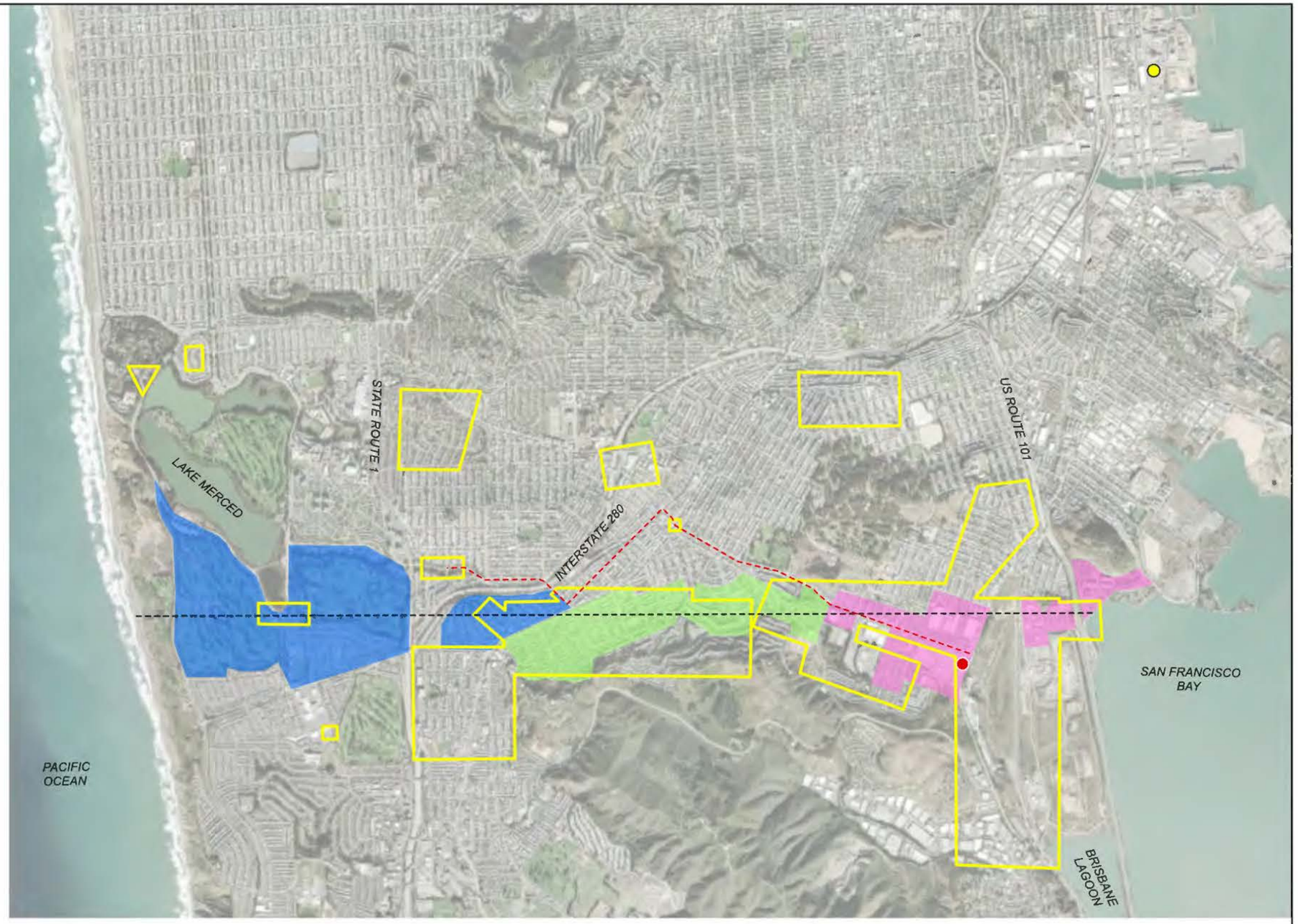
Abbreviations:
DTSC - California Department of Toxic Substances Control
EPA - United States Environmental Protection Agency
LUST - Leaking Underground Storage Tank
NPDES - National Pollutant Discharge Elimination System
PG&E - Pacific Gas and Electric Company
SWRCB - State Water Resources Control Board
UST - underground storage tank

FIGURES

LEGEND

- PROJECT LOCATION
- MARTIN SUBSTATION
- DISTRIBUTION EXPRESS FEEDER
- SAN FRANCISCO-SAN MATEO COUNTY BORDER
- SYSTEM REINFORCEMENTS
- CENTRAL AREA SEPARATION
- SOUTHEAST AREA SEPARATION
- SOUTHWEST AREA SEPARATION
- POTRERO SUBSTATION





NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. GROUND DISTURBANCE WOULD OCCUR AT THE MARTIN SUBSTATION, DISTRIBUTION EXPRESS FEEDER, AND AT VARIOUS LOCATIONS WITHIN AREAS SHADED OR OUTLINED FOR SYSTEM REINFORCEMENT.

0 0.5 1 MILES

N

CDIM ENGINEERING

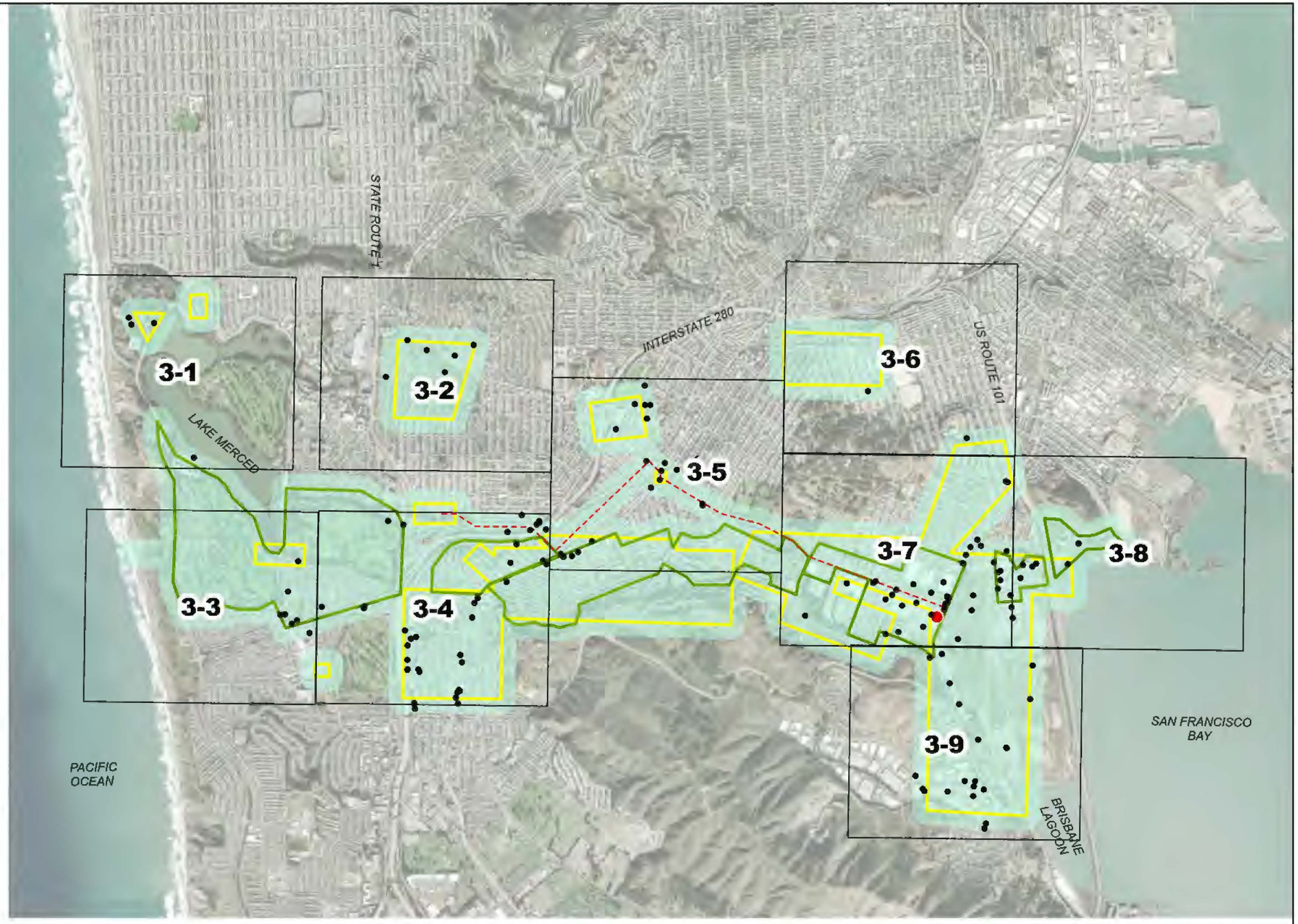
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

PROJECT LOCATION AND LAYOUT
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
1

LEGEND

- ALL ENVIRONMENTAL SITES
- KEY MAP PAGES, FIGURE NUMBER
- MARTIN SUBSTATION
- DISTRIBUTION EXPRESS FEEDER
- SEPARATION AREAS
- SYSTEM REINFORCEMENTS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS. WORK COULD OCCUR AT VARIOUS LOCATIONS WIHIN AREAS OUTLINED.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.

0 0.5 1 MILES

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITE LOCATIONS KEY MAP WITH FIGURE NUMBERS
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
2

LEGEND

- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- DTSC - MILITARY EVALUATION - NO FURTHER ACTION
- SWRCB - LUST CLEANUP SITE - CLOSED
- SWRCB - CLEANUP PROGRAM SITE - CLOSED
- SWRCB - MILITARY CLEANUP SITE - CLOSED

NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 1 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-1

DRAFT WORK IN PROGRESS

LEGEND

- SYSTEM REINFORCEMENTS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- SWRCB - LUST CLEANUP SITE - CLOSED

NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

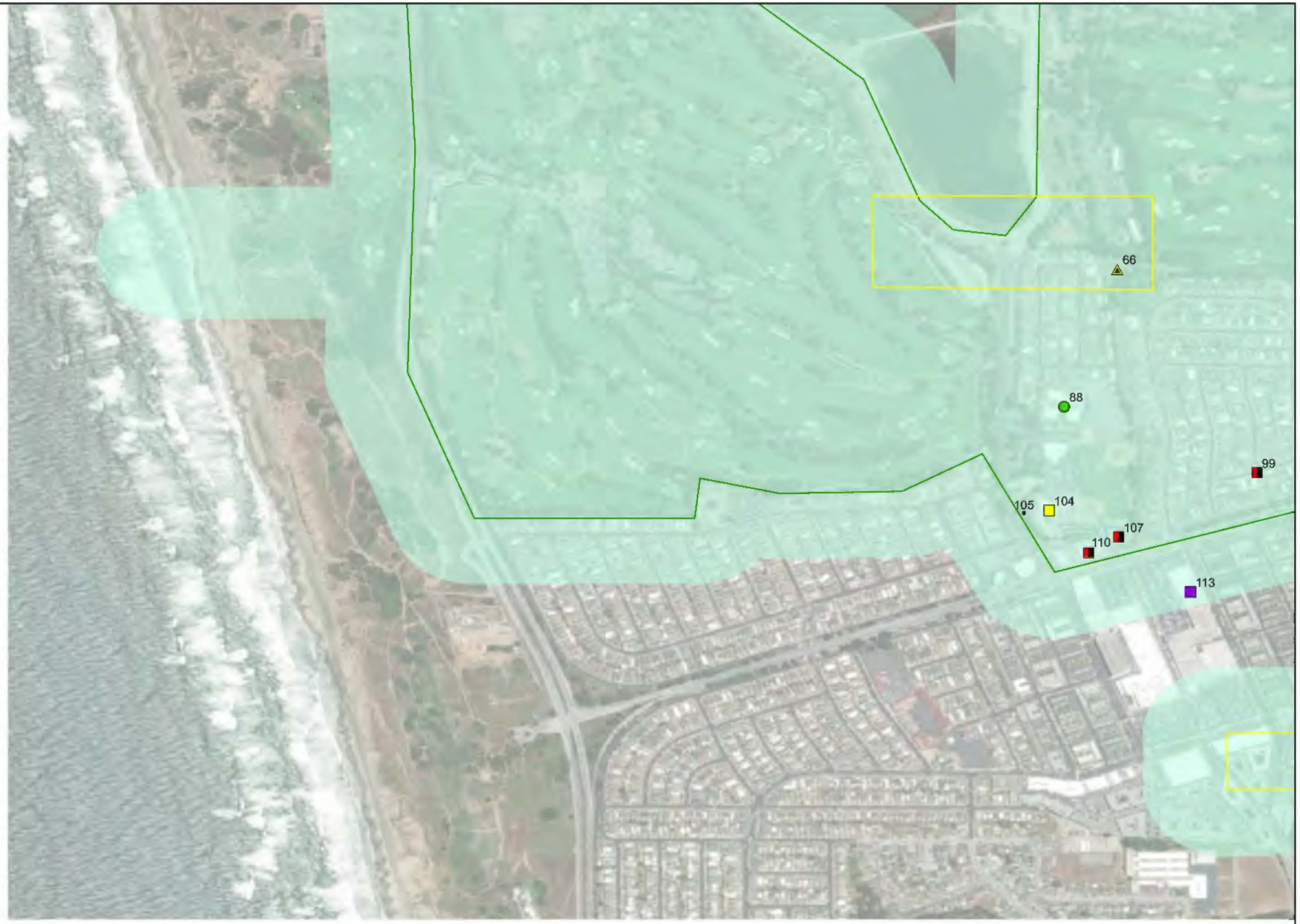
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 2 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-2

LEGEND

- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- DTSC - EVALUATION - REFER TO LOCAL AGENCY
- SWRCB - NPDES - ACTIVE
- SWRCB - LUST CLEANUP SITE - CLOSED
- SWRCB - CLEANUP PROGRAM SITE - OPEN
- SWRCB - SAMPLING POINT - PUBLIC
- SWRCB - UST (1 OR MORE)



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK
5. NPDES = NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.
6. UST = UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

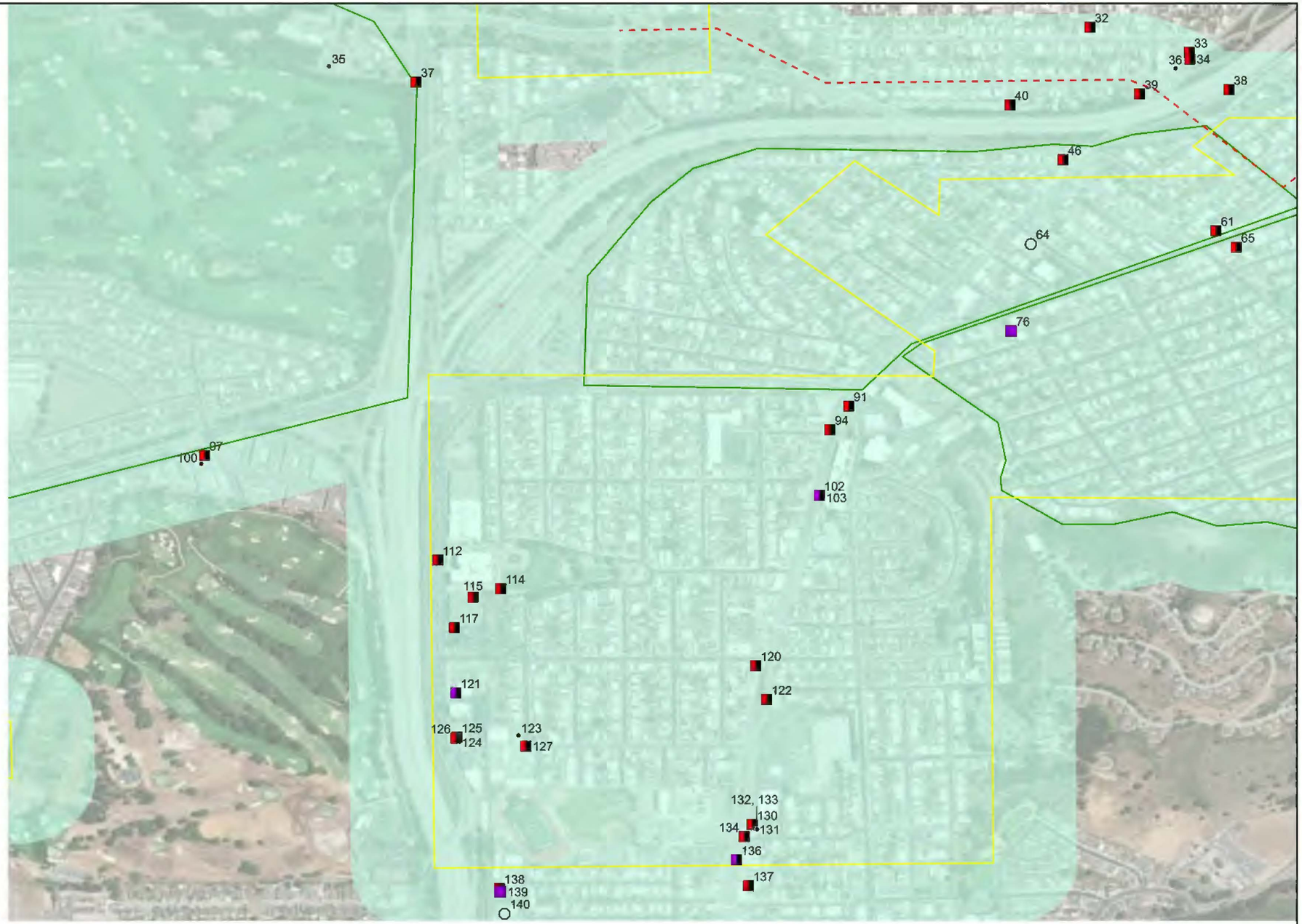
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 3 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-3

LEGEND

- EXPRESS FEEDER
- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- SWRCB - LUST CLEANUP SITE - CLOSED
- SWRCB - CLEANUP PROGRAM SITE - OPEN
- SWRCB - CLEANUP PROGRAM SITE - CLOSED
- SWRCB - NON-CASE INFORMATION
- SWRCB - UST (1 OR MORE)



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK
5. UST = UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

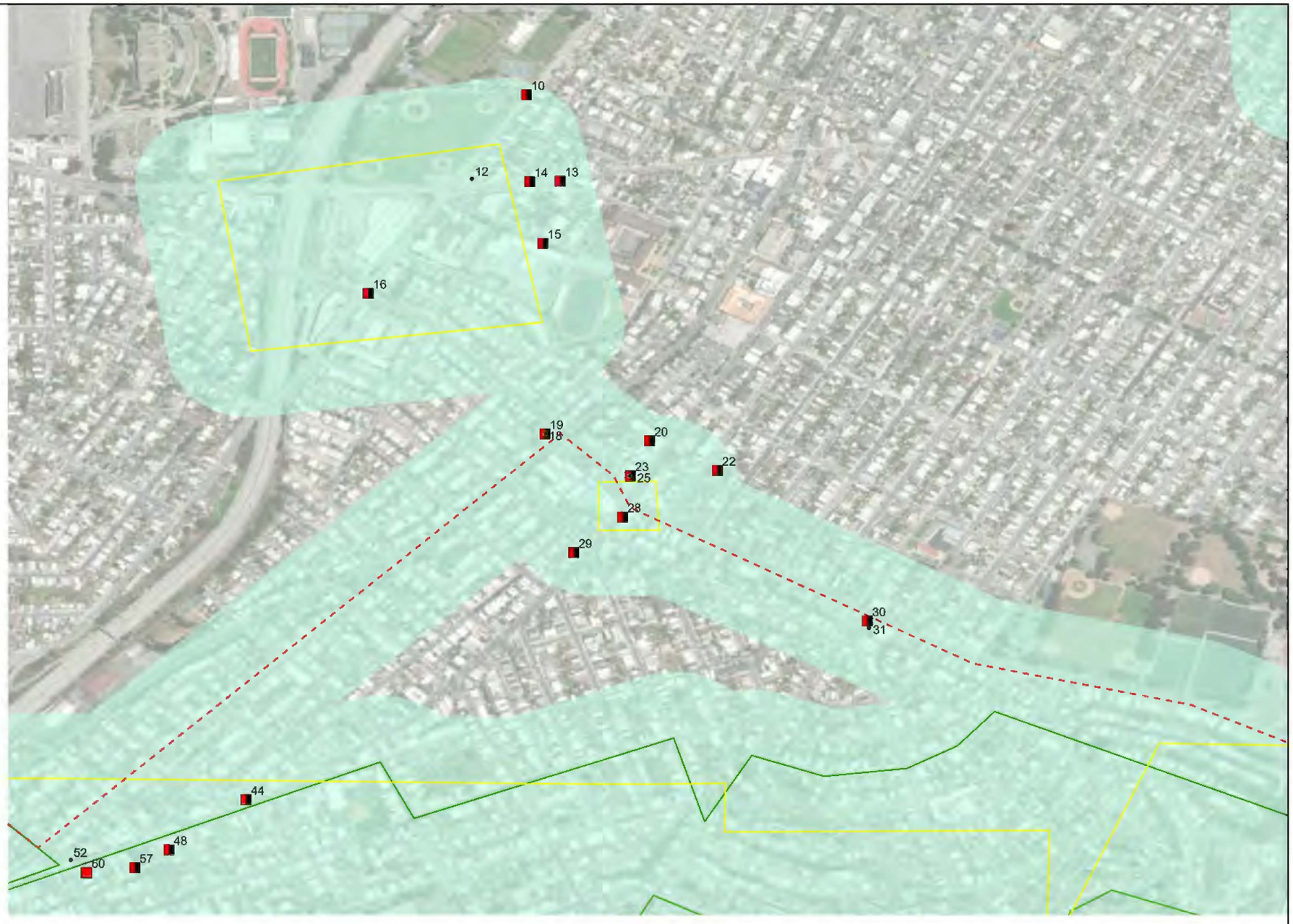
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 4 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-4

LEGEND

- EXPRESS FEEDER
- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- SWRCB - LUST CLEANUP SITE - OPEN
- SWRCB - LUST CLEANUP SITE - CLOSED
- SWRCB - UST (1 OR MORE)



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK
5. UST = UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 5 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-5

LEGEND

- SYSTEM REINFORCEMENTS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- SWRCB - LUST CLEANUP SITE - CLOSED

NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

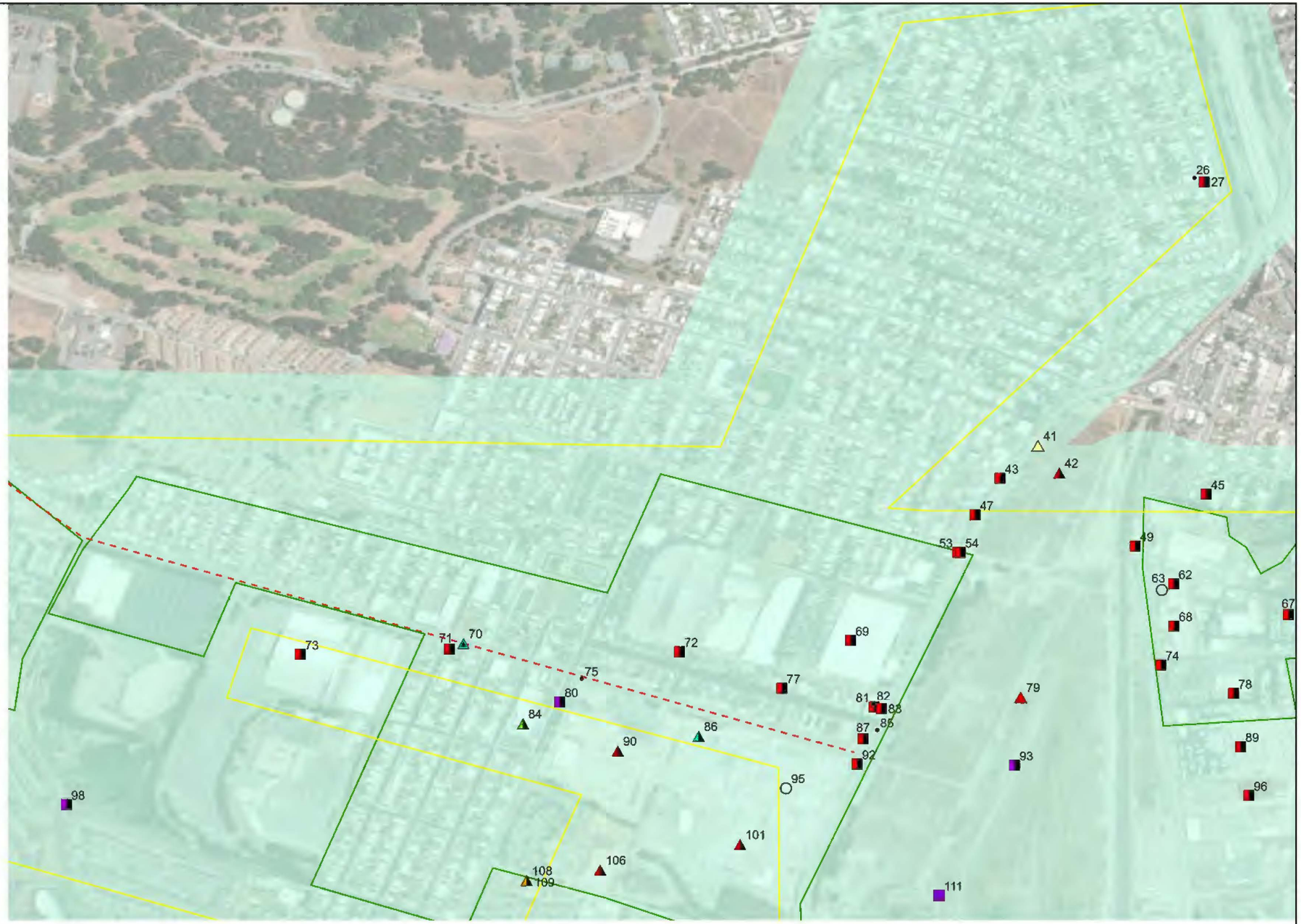
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 6 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-6

LEGEND

- EXPRESS FEEDER
- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- DTSC - STATE RESPONSE OR NPL - OPEN
- DTSC - STATE RESPONSE OR NPL - CERTIFIED
- DTSC - VOLUNTARY CLEANUP - NO FURTHER ACTION
- DTSC - VOLUNTARY CLEANUP - REFER LOCAL AGENCY
- DTSC - MILITARY EVALUATION - NO FURTHER ACTION
- DTSC - SCHOOL CLEANUP SCHOOL - CERTIFIED
- DTSC TIERED PERMIT - INACTIVE OR NEEDS EVALUATION
- SWRCB - LUST CLEANUP SITE - CLOSED
- SWRCB - CLEANUP PROGRAM SITE - OPEN
- SWRCB - CLEANUP PROGRAM SITE - CLOSED
- SWRCB - NON-CASE INFORMATION
- SWRCB - UST (1 OR MORE)



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK
5. NPL = NATIONAL PRIORITIES LISTS
6. UST = UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 7 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-7

LEGEND

- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- △ DTSC TIERED PERMIT - INACTIVE OR NEEDS EVALUATION
- ■ SWRCB - LUST CLEANUP SITE - CLOSED
- • SWRCB - UST (1 OR MORE)

NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. LUST = LEAKING UNDERGROUND STORAGE TANK
5. UST = UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

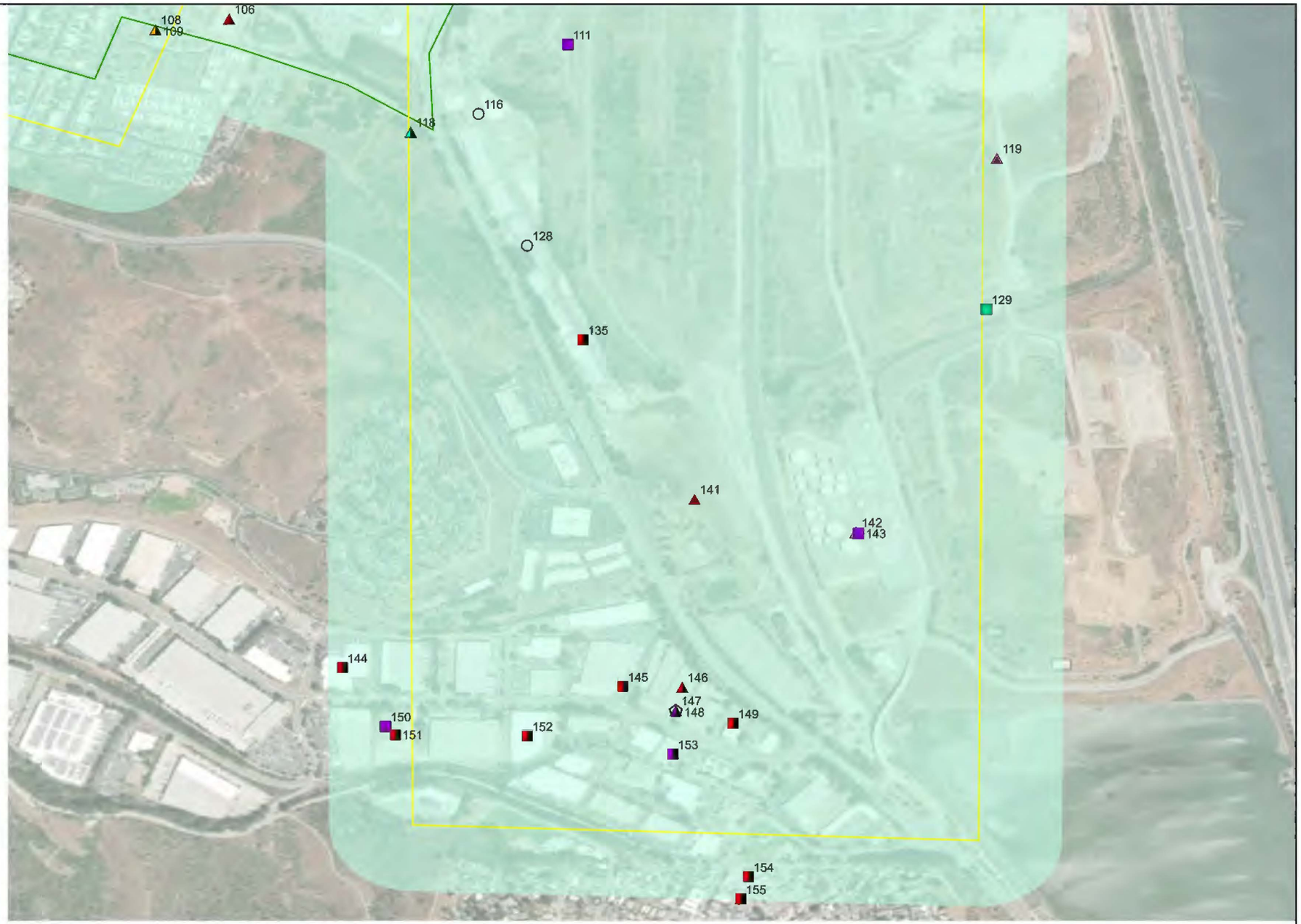
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 8 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-8

LEGEND

- SYSTEM REINFORCEMENTS
- SEPARATION AREAS
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- EPA - HISTORICAL - NON-OPERATING
- DTSC - STATE RESPONSE OR NPL - CERTIFIED
- DTSC - STATE RESPONSE OR NPL - REFER TO SWRCB
- DTSC - CORRECTIVE ACTION - CERTIFIED
- DTSC - VOLUNTARY CLEANUP - NO FURTHER ACTION
- DTSC - MILITARY EVALUATION - NO FURTHER ACTION
- DTSC TIERED PERMIT - INACTIVE OR NEEDS EVALUATION
- DTSC - HISTORICAL - REFER TO SWRCB
- SWRCB - LUST CLEANUP SITE - CLOSED
- SWRCB - CLEANUP PROGRAM SITE - OPEN
- SWRCB - CLEANUP PROGRAM SITE - CLOSED
- SWRCB - LAND DISPOSAL SITE - OPEN
- SWRCB - NON-CASE INFORMATION



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. THE "PROJECT AREA" IS DEFINED AS THE PROPOSED WORK AREAS SHOWN INCLUDING MARTIN SUBSTATION, THE DISTRIBUTION EXPRESS FEEDER, SEPARATION AREAS, AND SYSTEM REINFORCEMENTS.
3. ENVIRONMENTAL SITE LOCATIONS SHOWN ARE FROM ONLINE ENVIRONMENTAL DATABASES: THE CALFORNIA STATE WATER RESOURCES CONTROL BOARD (SWRCB) GEOTRACKER WEBSITE AND CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC) ENVIROSTOR WEBSITE. ACCESSED IN MARCH 2024.
4. EPA = UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
5. LUST = LEAKING UNDERGROUND STORAGE TANK
6. NPL = NATIONAL PRIORITIES LISTS
7. UST = UNDERGROUND STORAGE TANK

0 0.1 0.2 MILES

N

CDIM ENGINEERING

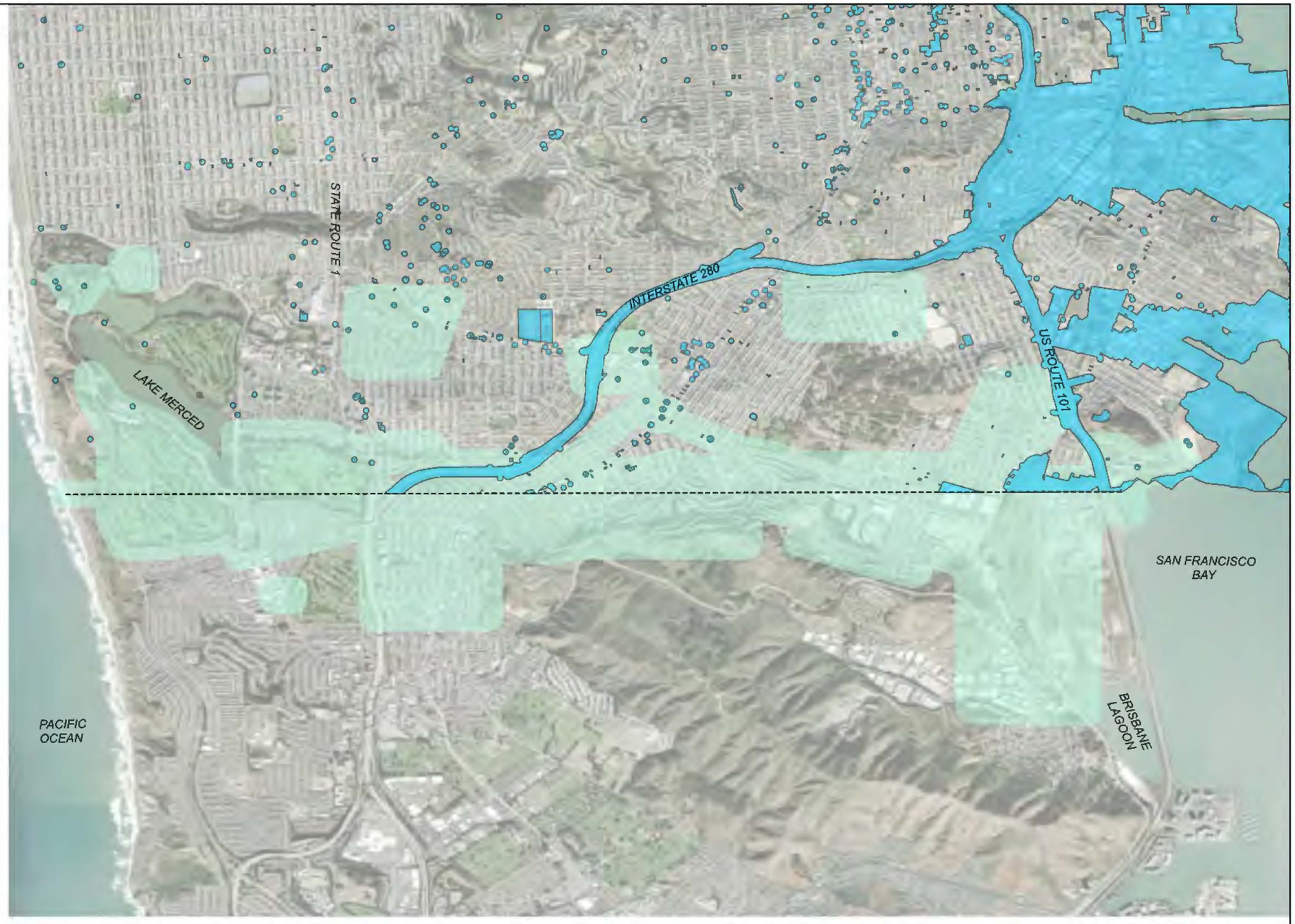
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

ENVIRONMENTAL SITES - MAP 9 OF 9
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
3-9

LEGEND

- MAHER ORDINANCE ZONES
- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- SAN FRANCISCO-SAN MATEO COUNTY BORDER



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. IN SAN FRANCISCO, A MAHER ORDINANCE AREA IS DEFINED BY ARTICLE 22A OF THE SAN FRANCISCO HEALTH CODE. MAHER ZONES SHOWN ARE FROM THE SAN FRANCISCO PROPERTY INFORMATION MAP VIEWER, LAYER UPDATED FEBRUARY 2022.

0 0.5 1 MILES

N

CDIM ENGINEERING

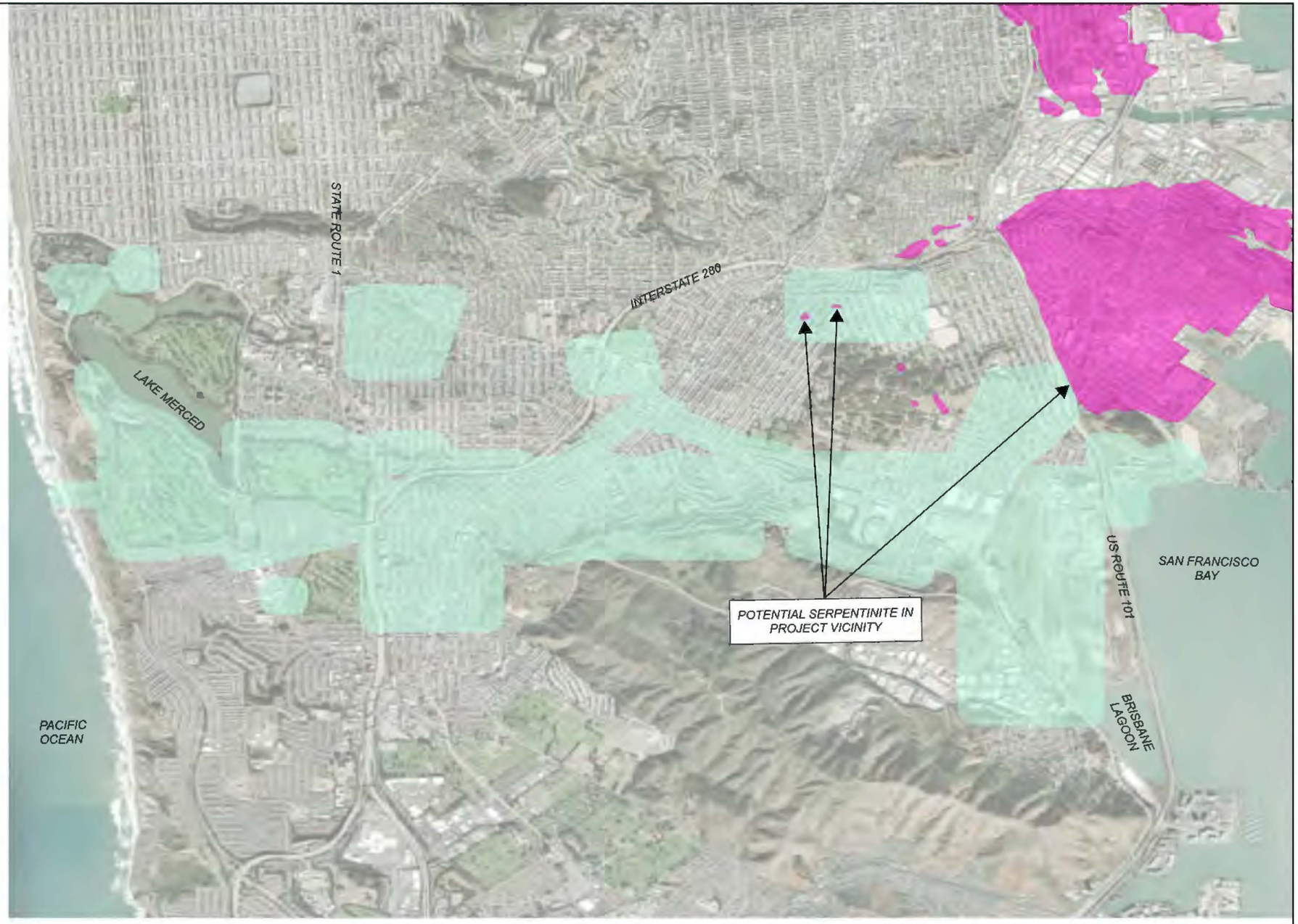
CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

MAHER ORDINANCE AREAS IN PROJECT VICINITY
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
4

LEGEND

- PROJECT VICINITY (500-FOOT OFFSET FROM PROJECT AREA)
- APPROXIMATE LOCATION OF MAPPED SERPENTINITE



NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. EXTENT OF AREAS POTENTIALLY UNDERLAIN BY SERPENTINITE FROM A MODIFIED MAP (BLAKE AND OTHERS [2000]; BONILLA [1998, 1971], AND SCHLOCKER [1974]) IN THE 2018 ASSOCIATION OF ENVIRONMENTAL AND ENGINEERING GEOLOGISTS PUBLICATION, GEOLOGY OF CITIES OF THE WORLD SERIES, GEOLOGY OF SAN FRANCISCO, CALIFORNIA, UNITED STATES OF AMERICA.
3. SERPENTINITE MAY BE PRESENT OUTSIDE OF THESE MAPPED AREAS.

0 0.5 1 MILES

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

SERPENTINITE MAPPED IN PROJECT VICINITY
PG&E POWER ASSET ACQUISITION PROJECT
SAN FRANCISCO AND SAN MATEO COUNTIES, CALIFORNIA

FIGURE
5

Environmental Science & Engineering
Construction • Development • Industrial • Municipal
45 Polk Street, 3rd Floor • San Francisco, California 94102 • 415.498.0535 • cdimengineering.com

TO: Karen Lancelle and Tiffany Edwards, Environmental Science Associates;
Julie Moore, San Francisco Environmental Planning;
Sue Chau, San Francisco Public Utilities Commission

FROM: Scott Bourne, PE and Kylie Cush, PG, CDIM Engineering

RE: Technical Memorandum, Site Management Requirements, PG&E Martin Service Center, PG&E Power Asset Acquisition Project, Brisbane and Daly City, California

DATE: August 5, 2024

INTRODUCTION

The City and County of San Francisco (City) is proposing (1) purchase ("acquisition") of Pacific Gas and Electric Company- (PG&E-) owned electrical transmission and distribution assets ("Assets") located in San Francisco and San Mateo counties that are needed to provide electricity service to customers within San Francisco, and (2) other transactions and physical changes necessary for the City to own, operate, and maintain the electricity grid in San Francisco ("separation"). The terms "PG&E Power Asset Acquisition Project" and "project" refer to the acquisition and separation, including construction and related work required for independent operation of the system.

The Assets include equipment, facilities, property, and records that the City would acquire, including the following:

- PG&E's distribution assets within San Francisco (distribution-level substations, metering, customer serving distribution lines, and related facilities);
- PG&E's 115 kilovolt[1] (kV) and 230 kV transmission assets (substations, transmission lines, transformers, and related facilities needed for operations);
- Certain PG&E distribution lines in Brisbane emanating from the Martin Substation that serve customers in San Francisco[2];
- A portion of the Martin Substation facilities (located in Brisbane) or interconnections[3] needed to enable the San Francisco Public Utilities Commission (SFPUC) to control all power flows from Martin Substation into San Francisco; and

[1] Kilovolt is a unit of electric potential and electromotive force. One kilovolt is equal to 1,000 volts.

[2] Existing distribution lines serving only San Francisco customers would be acquired by the City. Distribution lines serving only PG&E customers outside of San Francisco would remain with PG&E. Finally, some of the distribution lines serve both customers in San Francisco and customers outside of San Francisco. These feeders would be separated at the border and the City would construct new infrastructure to ensure that each utility would have its own system and that all customers would continue to be served.

[3] Interconnection is defined as an electrical connection between multiple entities.

- Other systems and equipment, materials, records, operating and maintenance facilities, property, and other land-related agreements as necessary for safe and reliable operation, maintenance, repair, control, and protection of the acquired transmission and distribution system.

After the City completes its acquisition of the Assets, the City would own, operate, and maintain the electricity grid in San Francisco, most of which is currently owned, operated, and maintained by PG&E. In addition, the City would acquire property rights as needed to operate and maintain the Assets and new City equipment, as needed, on public and private lands. This transaction would not include the purchase of PG&E's natural gas facilities; thus, PG&E would continue providing natural gas services to customers in San Francisco.[4]

In addition to acquiring the necessary transmission and distribution system and electrical facilities, the City would physically separate PG&E's existing electric system into two separate systems (generally divided along the San Francisco-San Mateo County border), to allow both systems to be safely, reliably, and independently operated by the SFPUC and PG&E. After the proposed separation of the system, the SFPUC would provide electricity service to customers in San Francisco currently served by PG&E; PG&E would continue to provide electricity service to its customers outside San Francisco.

The construction portion of the project is anticipated to take approximately 3 to 5 years after the acquisition of the Assets. It is anticipated that the City and PG&E would coordinate on the implementation of the project.

Martin Substation Separation

The project includes the Martin Substation separation component, where the City would need to reconfigure the existing Martin Substation transmission and distribution infrastructure to create a separate City-owned system (Martin Substation separation). As a project variant, the City would construct the a new substation at the Daly City Yard (New City Substation) instead of the Martin Substation separation.

For the Martin Substation separation, the City would rearrange and install new and existing equipment within Martin Substation. Above- and below-ground components required at Martin Substation for City and PG&E systems to function independently include transformers, circuit breakers, metering devices, one control house with associated equipment, and underground duct banks and vaults. Changes could include adding or relocating cable terminations, circuit breakers, cable trenches, revenue meters, and transformer locations within the existing substation fence. Installation of new equipment or reconfiguration would necessitate excavation of soil for placement of foundations, concrete containment pits, or trenching. The City would also install approximately 3,500 feet of underground lines within Martin Substation to connect the new equipment to the City's grid. Underground lines would be housed in duct banks and vaults. It is estimated that the Martin Substation separation would involve around 8,000 cubic yards of soil excavation to a maximum depth of 15 feet below ground surface (bgs).

A project variant is to construct a New City Substation at the Daly City Yard, adjacent to the existing Martin Substation, instead of implementing the Martin Substation separation. This work would involve the installation of new incoming transmission lines from Martin Substation to the New City Substation and outgoing transmission and distribution lines from the new substation to the existing distribution system serving customers in San

[4] In addition, the interconnection between the transmission system in San Francisco and the Trans Bay Cable (TBC), and TBC operation, would not be physically changed as a result of the acquisition.

Francisco, as well as construction of new switchgear building, transformers, transmission and distribution lines, and various other improvements (e.g., light and fencing, grading). It is estimated that the New City Substation would involve excavation of around 35,000 cubic yards of soil to a maximum depth of 15 feet bgs and would include pile driving up to 100 feet bgs.

Martin Service Center

Both the Martin Substation and the Daly City Yard are at a location where a former manufactured gas plant (MGP) site operated, in a PG&E complex referred to as the Martin Service Center (MSC; Figure 1). Due to site contamination related to the MGP, the entirety of MSC is managed by PG&E with engineering controls and land use restrictions under regulatory oversight of the California Environmental Protection Agency Department of Toxic Substances Control (DTSC). Any work at MSC must abide by DTSC requirements for site remediation or management. CDIM prepared this technical memorandum to provide planning guidance regarding activities and approvals related to construction on this contaminated site for the San Francisco Public Utilities Commission (SFPUC) to either reconfigure the existing Martin Substation or construct a New City Substation in the Daly City Yard.

The MSC is a 52-acre property at the intersection of Geneva Avenue and Bayshore Boulevard in Daly City and Brisbane, California[5]. The MSC includes six distinct areas: Daly City Yard, Brisbane Yard, Brisbane Yard Annex, Martin Substation, Levinson North, and the building located at 2850 Bayshore Boulevard (see Figure 2). From 1905 to 1916, an MGP operated on the MSC property where both the Daly City Yard and Martin Substation are located. The MGP was established in 1905 as a large oil to gas generating plant. While originally built to generate gas to power gas engines which produced electricity, the gas plant was heavily used in 1906 and perhaps 1907 to supply gas to areas whose supply was cut off by the 1906 earthquake and fire. This plant continued in operation only until 1916 when it was shut down and dismantled (PG&E, 1986). During World War II, the Federal Public Housing Authority (FPHA, which later became HUD) acquired the site where the plant was located. In 1944, FPHA graded the area and constructed Navy housing over it. During site grading and construction activities, soil from the former gas plant property was moved, spread around and used as fill material (SFPUC and DSTC, 2000).

The MSC is located at an approximate elevation of between 25 to 50 feet above mean sea level. A drainage ditch traverses the site between the Brisbane Yard and Brisbane Yard Annex. Storm water at the site appears to flow into the municipal storm sewer collection system before its discharge to the San Francisco Bay. A freshwater marsh exists in a topographically low area of the Levinson North Parcel (Figure 2).

A historical marsh with dense vegetation once extended westward across what is now known as Levinson North Parcel, the Martin Substation, and Brisbane Yard Annex (Figure 2). Between 1940 and 1970 the marsh was filled. The marsh deposits now consist of soft organic clay and follow the outline of the former marsh. At Martin Substation, up to 15 feet of artificial fill overlies the marsh deposits. In the Daly City Yard (west of the former marsh), up to 3 feet of engineered fill overlies a 10- to 15-foot-thick layer of low permeability alluvial deposits consisting of green and brown mottled sandy silt. A more permeable 5- to 10-foot-thick layer of silty sand called the shallow zone lies beneath the low permeability alluvium. Both the shallow zone and the overlying low-permeability alluvium pinch out east of the boundary between the Daly City Yard and the Brisbane Yard. The deep

[5] The property spans two city jurisdictions: Daly City Yard is located at 731 Schwerin Street in Daly City, California; and Martin Substation is located at 3004 Geneva Avenue in Brisbane, California.

zone is composed of clean, blue-green sand that underlies the marsh deposits and alluvium at approximately 30 to 40 feet below ground surface (bgs) (Haley & Aldrich, 2015).

Unconfined groundwater within the artificial fill is encountered at approximately 7 feet bgs, from a range of ground surface elevations. The saturated thickness of this zone is as much as 7 feet. Groundwater in the artificial fill, shallow, and deep zones generally flows from the northwest toward the southeast (Haley & Aldrich, 2015).

SITE REMEDIATION ACTIVITIES

Remediation History

Site contamination was discovered in 1980 during PG&E's grading of the southern portion of the Daly City Yard for expansion of the MSC. Deposits of odorous tar were observed, and analytical testing identified presence of polycyclic aromatic hydrocarbons (PAHs)[6] in the tar. PG&E then initiated site investigation activities (CH2M Hill, 1987 and CH2M Hill, 1988) that resulted in PG&E entering into a consent agreement with California Department of Health Services, the predecessor of DTSC (DTSC, SFRWQCB and PG&E, 1991), to address the historical hazardous material release at the site.

After performing a risk assessment (PG&E, 1991), PG&E prepared a Remedial Action Plan (1993 RAP; CH2M Hill, 1993). The 1993 RAP divided the site into two operable units[7] (OUs). OU-1 is on the western edge of the former MGP site that contains the Daly City Yard and shallow soil contamination, and OU-2 is on the eastern side where groundwater is impacted. The 1993 RAP established the Remedial Action Objectives (RAOs) for the MSC. The RAOs apply to the entire MSC and are to minimize direct or indirect exposure of humans and the environment to PAHs, to minimize the potential for migration of PAHs off the PG&E property, and preserve the existing beneficial uses of the site, including potential wildlife habitat and wetlands.

Since most of OU-1 was already capped, implementation of the 1993 RAP involved capping of the strip of land between Schwerin Street and the MSC and of the berm along the southern boundary of the Daly City Yard (CH2M Hill, 1994) and recordation of a land use covenant for the Daly City Yard (Attachment A; PG&E and DTSC, 1995b). After RAP implementation, most soil at the MSC had been covered by concrete, asphalt or clean fill material, and site access was controlled by a fence around the property. PG&E and DTSC entered into an agreement for operation and maintenance of the cap at the Daly City Yard (PG&E and DTSC, 1995a).

PG&E then prepared a second RAP (CH2M Hill, 1998) that further addressed potential routes of PAH transport offsite and required installation of a groundwater interceptor drain, grading of the Brisbane Yard and

[6] Early PG&E reports refer to PAHs as polynuclear aromatics (PNAs), which is a synonym for PAHs. The term PAH is used in this memorandum.

[7] During cleanup, a site can be divided into a number of distinct areas depending on the complexity of the problems associated with the site. These areas called operable units may address geographic areas of a site, specific site problems, or areas where a specific action is required.

Annex, management of soil generated from the Bayshore Storm Drain Improvement Project[8], fencing of the Levinson North Parcel, and recordation of a second land use covenant to control future land use for the entirety of the MSC (Attachment B; PG&E and DTSC, 2002). Implementation of the 1998 RAP was completed in 2002 (CH2M Hill, 2002) after which PG&E and DTSC entered into a revised agreement for operation and maintenance of the cap at the Daly City Yard (Operations and Maintenance [O&M] Agreement, Attachment C; PG&E and DTSC, 2003).

Requirements for ongoing site management are outlined in the O&M Agreement and associated attachments (PG&E and DTSC, 2003). Among other administrative requirements, the O&M Agreement requires that PG&E inspect the caps, notify DTSC of any modification, discontinuation or disruption of the caps, and report to DTSC on the adequacy of the implemented remedy in protecting public health, safety and the environment.

Per the 2003 O&M Agreement (Attachment C), PG&E prepares an Annual Progress Report describing activities undertaken at the site including the results of cap inspection and a Five-Year Review Report that discusses the effectiveness of the remedy. To date, PG&E and DTSC have completed four Five Year Review Reports. After the second five-year review report (CH2M Hill, 2005), PG&E prepared a revised O&M Plan (PG&E, 2005) to describe irrigation requirements for the berm in OU-1. The most recent Five-Year Review Report concluded that the remedies at the MSC are operating as designed and meeting DTSC protectiveness criteria (Haley & Aldrich, 2015). The fifth five-year review, dated December 29, 2020, was submitted to DTSC but has not been reviewed by DTSC or posted online.[9]

Numerous projects undertaken by PG&E within the MSC for maintenance, operation, or construction of site infrastructure after implementation of the second RAP involved excavation of soils affected by MGP waste and repair of site cap surfaces. Per the O&M agreement, PG&E prepares a notice and documentation report for DTSC to describe project implementation and necessary management measures. PG&E prepared a Soil Management Plan (SMP; Attachment D; Haley & Aldrich, 2017) for the MSC that provides program level guidance on mitigation measures necessary for projects involving disturbance of soils within the known and possible MGP-impacted areas. Subsequent to the publication of the SMP, numerous additional projects for maintenance, operation, or construction of site infrastructure were performed and documented through submitting project-specific addenda to the SMP and a post-construction completion report.

Residual Contamination

Areas of known MGP impacts have been documented across a large portion of the MSC (Figure 2). Residual waste associated with the MGP operations, including lampblack and tar, is known to exist locally in the site fill and on adjacent areas to the south and west. Results of soil sampling indicate the presence of the following constituents of potential concern (COPCs): total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), PAHs, cyanide, and metals including arsenic, cadmium, chromium, lead, nickel, and mercury.

[8] The 1998 RAP addresses onsite re-use and stabilization of 8,500 cubic yards of soils excavated as part of the construction of the Bayshore Storm Drain Improvement Project. Soils with PNA concentrations above 10 mg/kg would be treated by stabilization with cold asphalt batching prior to use.

[9] Personal communication between Scott Bourne of CDIM Engineering and Kimberly Walsh of DTSC on July 8, 2024.

Most characterization at the MSC occurred in 1987 and 1988, and the analytical results from the soil investigation showed PAH concentrations ranging from 40 milligrams per kilogram (mg/kg) to 12,657 mg/kg. PAHs were detected and/or black discolorations in the soil were observed in most soil borings.[10] Total phenol concentrations in the soil samples ranged from 0.6 to 300 mg/kg. Benzene, toluene, ethylbenzene and xylenes (BTEX) concentrations ranged from 0.1 to 13.4 mg/kg. The depth of the soil layer containing residues from the gas plant varies from 3 to 12 feet bgs and depends on the thickness of the overlying fill. Subsurface soil at the MSC contained higher concentrations of PAHs than surface soil. In the Daly City Yard, tar-like residue was mixed with relatively shallow fill, and residues appeared to be distributed randomly (Haley & Aldrich, 2015).

Groundwater contamination was observed in the artificial fill zone, the shallow zone and the deep zone. PAHs were detected in groundwater at the MSC above screening levels. Annual groundwater monitoring was performed between 1987 and 2011 and is now performed every five years. A groundwater interceptor trench designed to prevent offsite migration of PAHs was installed in 2002. PAHs were not detected on the MSC in concentrations above screening levels between 2008 and 2015 (Haley & Aldrich, 2015).

Figure 2 shows both the location of the former MGP as well as the location of known or suspected MGP waste. As stated above, FPHA graded the MGP area and constructed Navy housing over it. During site grading and construction activities, soil from the former gas plant property was moved, spread around and used as fill material. As a result, it is assumed that elevated COPC concentrations extend across the entire MSC (including any hardscape areas) (Attachment D; Haley & Aldrich, 2017).

SITE MANAGEMENT REQUIREMENTS

Reconfiguration of PG&E's Martin Substation or construction of a new substation at the nearby Daly City Yard would occur in areas impacted or potentially impacted by MGP waste. Figure 3 shows the project location relative to MSC OU-1 and OU-2 and the extent of known MGP impacts. Some or all the following site management requirements will be required for any work within MSC.

Land Use Covenant(s)

Table 1 is a summary of land use covenants recorded for the Site. The 1995 land use covenant (Appendix A) applies only to the Daly City Yard. The 2002 land use covenant (Appendix B) applies to the entire MSC. The covenants follow the land and notify landowners of site contaminants, restrict sensitive property uses, prohibit certain activities, require DTSC notice and approval of site construction, and require protection of site remediation remedial measures (e.g., caps and interceptor trench).

Both reconfiguration of PG&E's Martin Substation or the construction of a new substation at Daly City Yard must abide the land use covenants.

[10] For comparison, the 1998 RAP established a most conservative remediation action goal of 4.7 mg/kg total PAHs based on a risk to trespassers at Levinson North Parcel.

Voluntary Cleanup Agreement

DTSC administers the site voluntary agreement program to enable entities to obtain and fund regulatory oversight for cleanup activities. The process involves applying for DTSC oversight, confirming lead agency, negotiating an agreement, conducting a scoping meeting, and then performing technical work under lead-agency oversight.

SFPUC and DTSC entered into a site voluntary agreement in 2000 for the Crystal Springs Pipeline No. 2. Replacement (Attachment E). That project involved installation a new 36-inch diameter, 1,000-ft length, steel pipe within an existing 44-inch diameter pipe within a pipeline easement traversing the MSC. The site voluntary agreement required SFPUC to prepare a Health and Safety Plan for DTSC approval. The site voluntary agreement is available on DTSC's Envirostor website.[11]

DTSC has an agreement in place with PG&E for performing and funding DTSC's oversight activities. It is likely that SFPUC would need to enter into a similar agreement with DTSC for reconfiguration of PG&E's Martin Substation or construction of a new substation at the nearby Daly City Yard.

Existing Requirements for Soil Handling

To assist in compliance with the O&M Agreement and accompanying O&M Plan, PG&E prepared a Soil Management Plan (Attachment D; Haley & Aldrich, 2017) that specifies risk management measures to be implemented before, during, and after any work is conducted that will penetrate below the surface cap and into native soil and/or fill. Measures are summarized below.

- Training—All individuals working in an excavation or with excavation soil must in accordance with Hazardous Waste Operations and Emergency Response training requirements in Code of Federation Regulations, Title 29, Section 1920 and California Code of Regulations, Title 8, Section 5192 (40-HR HAZWOPER).
- Soil Handling, Excavation and Disposal—The SMP specifies that soil in the known or suspected MGP impacted area must be assumed hazardous and handled appropriately and soil handling anywhere else within the MSC should be observed by a qualified environmental professional to identify MGP impacts, (e.g., staining, odors, or the identification of MGP residues) and handled as hazardous as needed. Pending offsite disposal, affected soil must secured within the site in a manner to prevent dispersion (e.g., stockpiled on sheet plastic sheeting, in a roll-off bin, or drums).
- Soil Sampling—The SMP recommends composite sampling of affected soil using methods to detect COPCs identified for MGP waste.[12]

[11] https://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=41360101 . Accessed on July 8, 2024.

[12] VOCs by United States Environmental Protection Agency (EPA) Method 8260B; Title 22 metals and cyanide by EPA method 600/7400 series; TPH by EPA Method 8015B; Semi volatile Organic Compounds by EPA Method 8270 Selective Ion Monitoring (SIM); Benzene Toxicity Characteristic Leaching Procedure (TCLP); Lead Soluble Threshold Limit Concentration (STLC); and Lead (TCLP).

- Soil Disposal—All excavated soil from inside the area of known MGP impacts shall be removed and disposed of at an authorized facility.
- Soil Reuse—Soil excavated from outside the area of known MGP impacts may be reused on the site if analytical results from its corresponding composite soil sample analysis are below lowest of the commercial/industrial limits[13] for each COPC among the DTSC-Modified Screening Levels established by DTSC in the Human Health Risk Assessment Note 3 (DTSC, 2022) and Environmental Screening Levels established by the San Francisco Bay Regional Water Quality Control Board (San Francisco Regional Water Board, 2019).
- Health and Safety Plan—A project health and safety plan must be developed that addresses site safety associated with COPCs and construction activities including contingencies for unexpected conditions and accidental hazardous material releases.
- Other Items—The SMP identifies other mitigations that may appropriate based on project specific requirements, which may include: best management practices for stockpiles, storm water runoff, and odor suppression; dust and noise mitigation; traffic control; dewatering and handling of groundwater; and, quality assurance/quality control for sampling.

These measures serve as a guide as to the type of risk management that could be required for the reconfiguration of PG&E's Martin Substation or construction of a new substation at the nearby Daly City Yard.

Vapor Intrusion Evaluation and Mitigation

Site COPCs include vapor forming chemicals (e.g., TPH and VOCs). Limited soil vapor sampling was performed in 2009 at the MSC related to earlier removal and replacement of underground storage tanks in 2004 (Entrix, 2009). Results showed subsurface vapor impacts present in an area approximately 140 feet from any on-site building. No comprehensive vapor evaluation has been performed for the MSC.

Construction of any new occupied structures will necessitate evaluation of potential for vapor intrusion in accordance with the February 2023 Final Draft Supplemental Guidance: Screening and Evaluating Vapor Intrusion prepared by DTSC and the State Water Resources Control Board and could necessitate that vapor intrusion mitigation be incorporated into future construction.

The need for implementing vapor intrusion would be driven by the location of any occupied structures and the concentrations of COPCs in soil gas beneath the Site. Neither the 1993 nor the 1998 RAP addresses vapor intrusion mitigation.

Capping and/or Excavation

MGP-impacted soils are managed in-place under a cap composed of asphalt, concrete, and/or chipseal. The remediation documents, including RAPs, completion reports, land use covenants, and the O&M Agreement, identify specific capping requirements at Daly City Yard Berm, the Schwerin Street Strip, and the Brisbane Yard

[13] Note that the SMP reference the DTSC-SLs and ESLs effective at that time the SMP was prepared. These values are updated regularly. Communication with DTSC is necessary to determine if current screening levels can be used as reuse criteria.

Annex. Except for these isolated areas, none of the remediation documents reviewed were definitive as to the extent of the "cap" in other areas of the MSC. Most of the Daly City Yard is covered by asphalt, concrete or buildings, all of which are presumed to act as a "cap" to prevent human exposure to soils. The surface conditions at the Martin Substation are a mix of gravel, concrete and pavement.

Future construction at the MSC must include construction of a cap system (e.g., concrete, asphalt, other hardscape, or potentially gravel in the Martin Substation Area depending on observed soil impacts) to protect human health and the environment from exposure to underlying soil or demonstrate to DTSC's satisfaction that soils do not require capping.

Air Monitoring

Based on California Division of Occupational Safety and Health (Cal/OSHA) requirements and previous project-specific Health and Safety Plans developed for MSC, soil handling required for reconfiguration of PG&E's Martin Substation or construction of a new substation at the nearby Daly City Yard would require air monitoring to protect site workers. Depending on the scale of the project, DTSC also would likely require community monitoring using current regulatory guidance (DTSC, 2020) that would involve installation of perimeter and offsite air sensors to determine ambient particulate or PAH concentrations in surrounding residential area or along haul routes.[14] The approved RAP does not include community air monitoring.

Operation and Maintenance

Requirements for ongoing site management are outlined in the O&M Agreement and associated attachments (PG&E and DTSC, 2003 and PG&E, 2005). Among other administrative requirements, the O&M Agreement requires that PG&E:

- Perform routine inspection and maintenance of caps at the Daly City Yard Berm, the Schwerin Street Strip, and the Brisbane Yard Annex;
- Notify DTSC 60-days prior to any proposed modification, discontinuation, or other disruption of the caps;
- Perform environmental monitoring and reporting to DTSC per the approved O&M Plans;
- Prepare Annual Progress Reports for activities conducted under the O&M Agreement;
- Prepare a Five-Year Review Report that evaluates the adequacy of the implemented remedy in protecting public health, safety and the environment; and,
- Immediately take appropriate action to prevent, abate or minimize the threat of release from emergency actions or occurrences (e.g., fire, earthquake, explosion).

Future construction at the MSC that includes capping would require an update to the applicable O&M Plan and Agreement.

[14] Personal communication Scott Bourne of CDIM Engineering and Kimberly Walsh of DTSC on July 8, 2024.

RAP Amendment

It is currently estimated that that the Martin Substation separation would involve around 7,930 cubic yards of soil excavation up to a maximum depth of 15 feet bgs and that the New City Substation would involve excavation of around 34,980 cubic yards of soil up to a maximum depth of 15 feet bgs and would include pile driving up to 100 feet bgs. All soils removed would be disposed of offsite. While the 2002 O&M Agreement and 2005 O&M Plan do contemplate routine excavation of small volumes of soil as a part of site maintenance activities, the approved RAP does not appear to include excavation of MGP-impacted soil for offsite disposal at the quantities and locations proposed.

Depending on DTSC's interpretation of the scale of the project, a RAP amendment could be required to address project elements that do not fit within the scope of the existing approved RAP. California Health and Safety Code Section 25356.1 contains RAP requirements, which generally include robust analysis for site conditions, risk to human health and the environment, development and comparison of remediation alternatives, and selection of a preferred alternative. The RAP must also include community outreach.

STEPS NEEDED

Site remediation information indicates that significant quantities of MGP waste are present in shallow soil at the Daly City Yard. Limited investigation has been performed in the Martin Substation area, but available data suggests some MGP waste is also present throughout this area.

The land use covenants (Attachments A and B), O&M Agreement (Attachment C), and SMP (Attachment D) apply to the entirety of the MSC and would thus be the initial regulatory framework for obtaining DTSC approval for either Martin Substation separation or the New City Substation variant.

Early communication with DTSC is recommended to coordinate the framework for DTSC's approval and site mitigation requirements. It is likely that DTSC and SFPUC would enter an site voluntary agreement for DTSC regulatory oversight and cost reimbursement. Initial scoping meetings would be held with DTSC to determine technical work to be performed for the project.

Ideally, DTSC could then authorize the project via the same approval process used by PG&E to perform new work and maintenance at the MSC (i.e., implementing SMP/Health and Safety Plan per the O&M Agreement process).

Alternatively, depending on the scale of the project, or new remediation or regulatory requirements not addressed in the approved RAP (e.g., substantial excavation, vapor intrusion or community air monitoring), DTSC could require an amendment to the RAP, which would involve a much more robust technical review process.

DTSC indicated that either an SMP/Health and Safety Plan in accordance with existing requirements or a RAP amendment with new requirements would be methods to authorize the project, and the determination of which is appropriate would be made by DTSC based on the scale of the project.[15]

It is currently estimated that that the Martin Substation separation and the New City Substation variant would involve around 7,930 cubic yards and 34,980 cubic yards of soil excavation, respectively. The amount of excavation and potential onsite reuse with or without treatment or offsite disposal necessitated for either exceeds the scope of work performed under the SMPs available on Envirostor.

Given excavation quantities and DTSC precedent at nearby sites[16], it should be assumed that a RAP amendment would be required for either the Martin Substation separation or New City Substation for excavation and onsite reuse with or without stabilization or offsite disposal of MGP-impacted soils that would be incidental to project construction, and for community air monitoring, both of which are not included in the approved RAP.

REFERENCES

Ca Dept of Health Services (DTSC), SFRWQCB and PG&E, 1991. Consent Order, Docket # HAS 90/91-011 Pacific Gas and Electric Company, Martin Service Center. June 28.

CalEPA Department of Tosic Substance Control (DTSC), 2020. Community Air Monitoring Plan Guidance, January.

CDIM and DTSC, 2024. Personal communication between Scott Bourne of CDIM Engineering and Kimberly Walsh of DTSC. July 8.

DTSC, 2022. Human Health Risk Assessment (HHRA) Note Number 3, DTSC Modified Screening Levels. May.

CH2M Hill, 1987. Final Report PG&E Martin Service Center Investigation. November.

_____, 1988. Final Site Characterization Report, Daly City Manufactured Gas Plant Site, Pacific Gas & Electric. November.

_____, 1991. Human Health and Environmental Risk Assessment Report. PG&E Daly City Manufactured Gas Plan Site. August 30.

_____, 1993. Remedial Action Plan, PG&E Daly City Manufactured Gas Plant Site, Operable Units 1 and 2. June.

_____, 1994, Final Construction Report, PG&E Martin Service Center Site OU-1, Daly City Yard Berm and Schwerin Street Strip. December 8.

_____, 1998. Remedial Action Plan, PG&E Daly City Manufactured Gas Plant Site, Operable Unit 2. July.

[15] Ibid.

[16] At the adjacent Midway Housing Development, where the site was impacted by grading of MGP-impacted soil from the MSC during construction of Navy housing in 1944, DTSC required a RAP amendment for implementation of a vapor mitigation system and community air monitoring performing during a housing densification project. See https://www.envirostor.dtsc.ca.gov/public/final_documents2?global_id=41650007&doc_id=60469529.

_____, 2002. Construction Completion Report, PG&E Martin Service Center Former Manufactured Gas Plant – Operable Unit 2. April.

_____, 2005. Second Five-Year Review Report, PG&E Martin Service Center. September.

Entrix, 2009. Soil Vapor Investigation Report, Martin Services Center. August 27

Haley & Aldrich, Inc. (Haley & Aldrich), 2015. Fourth Five Year Review for Pacific Gas and Electric Company's Martine Service Center,731 Schwerin Street, Daly City, California. June 15.

_____, 2017. Soil Management Plan, Pacific Gas and Electric Company, Martin Service Center/Daly City MGP, 3004 Geneva Avenue, Daly City, California. June 15.

PG&E, 1986. Historical Overview of Gas Manufacturing in Daly City, California, 1905-1916. Site NO. GG-SM-DAC.

_____, 2005. Revised Operation and Maintenance Plan for Martin Services Center Operable Unit 1 (the Daly City Yard Berm Cap and Schwerin Street Strip Capped Areas) and Operable Unit 2 (Brisbane Yard Annex cap and Interceptor Trench). October 12.

_____, 2008. Letter from PG&E to DTSC, Completion Report for 2007 Excavations at Martin Service Center and Substation. May 9.

PG&E and DTSC, 1995a. Agreement for Operation and Maintenance, PG&E Martin Service Center Daly City Yard. January 3.

_____, 1995b. Covenant to Restrict Use of Property, Daly City Yard. March 23.

_____, 2002. Covenant and Agreement to Restrict Use of Property, PG&E Martin Service Center February.

_____, 2003. Revised Operation and Maintenance Agreement, Docket# HSA-94/95-010, PG&E Martin Service Center, Daly City Yard, Daly City, California. March 7.

San Francisco Regional Water Board, 2019. Environmental Screening Levels, Rev. 2. January 24.

SFPUC and DTSC, 2000. Voluntary Cleanup Agreement

ENCLOSURES

Figure 1. Proposed Martin Substation Separation and New Substation at Daly City Yard (Project Variant)
Figure 2. Martin Service Center Location and Layout and Environmental Features
Figure 3. Proposed Martin Substation Separation and New Substation at Daly City Yard (Project Variant) with Operable Unites
Table 1. Summary of Land Use Covenants, PG&E Martin Services Center
Attachment A. 1995 Covenant to Restrict Use of Property, Daly City Yard
Attachment B. 2002 Covenant and Agreement to Restrict Use of Property, PG&E Martin Service Center
Attachment C. 2003 Revised Operation and Maintenance Agreement
Attachment D. 2017 Soil Management Plan
Attachment E. Voluntary Cleanup Agreement for Crystal Springs Pipeline No. 1. Replacement (2000)

TABLE

Table 1. Summary of Land Use Covenants, PG&E Martin Services Center

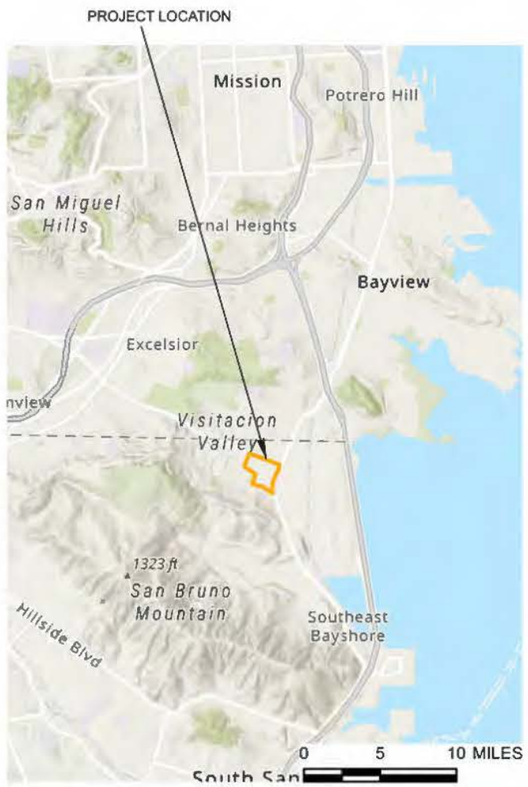
Document	1995 Covenant to Restrict Use of Property for OU-1 (PG&E and DTSC, 1995b):	2002 Covenant and Agreement to Restrict Use of Property for MSC (PG&E and DTSC, 2002a):
Summary	Original land use covenant (LUC) applicable to the Daly City Yard.	Second LUC applicable to the entirety of the MSC.
Contents	Covenantor promises to restrict the use of the Property as follows: (a) Development of the Property shall be restricted to industrial, utility, commercial or office space use. (b) No hospitals or health clinics shall be permitted on the Property. (c) No schools for persons under 18 years of age shall be permitted on the Property. (d) No daycare centers for either children or senior citizens shall be permitted on the Property. (e) No drilling for water for drinking or irrigation purposes shall be permitted on the Property. (f) No raising of food (food crops or animals) shall be permitted on the Property. (g) No subdivision of the Property shall be permitted, except as allowed under Health and Safety Code Sections 25232 (a) (2) and (b) (2). (h) No grading, excavation or construction shall be permitted on the Property that would adversely affect the operation and maintenance of the Cap, excluding routine maintenance or installation of utility facilities at the PG&E Martin Service Center, if said maintenance is performed in compliance with PG&E's "Guidelines for Excavations at Former Manufactured Gas Plant Sites" dated September 1991, or equivalent revisions of those guidelines. (i) No activities that will disturb the soil in the area (e. g., excavation, grading, removal, trenching, filling, or earth movement) shall be permitted on the Property without approval of a Health and Safety Plan and a Soils Management Plan by DTSC, with the exceptions noted in Paragraph h. (j) A sign shall be posted in the PG&E Martin Service Center office in English stating that no grading, excavation or construction activities can occur on the Property without written permission of DTSC, with the exceptions noted in Paragraph h. (k) Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law. (l) All uses and development of the Property shall preserve the integrity of the Cap installed on the Property pursuant to the requirements of the Remedial Action Plan. (m) Any proposed alteration of the Cap shall require written approval by the Department. (n) The Owner shall monitor the Cap regularly to insure the integrity of the Cap as required in the Operation and Maintenance Agreement. (o) The Owner shall notify DTSC of each of the following: 1) The type, cause, location and date of any disturbance to the Cap by fire, explosion, or earthquake, that could affect the ability of the system to contain the encapsulated hazardous substances and 2) the type and date of repair of such disturbance. Notification to DTSC shall be made by registered mail within ten (10) working days of both the discovery of system disturbance and the completion of repairs. The Owner shall provide thirty (30) days advance written notice to the Department of any sale or other conveyance of the Property to a third person. DTSC shall not, by reason of the Covenant, have authority to approve, disapprove, or otherwise affect any sale or other conveyance of the Property.	Prohibited Uses: The Property shall not be used for any of the following purposes: (a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation. (b) A hospital for humans. (c) A public or private school for persons under 21 years of age. (d) A day care center for children. Soil Management (a) No activities that will disturb the soil below the Caps (e.g., excavation, grading, removal, trenching, filling, earth movement, or mining) shall be allowed on the Property without a Soil Management Plan and a Health and Safety Plan approved by DTSC. (b) Any contaminated soil brought to the surface by grading, excavation, trenching, or backfilling shall be managed in accordance with all applicable provisions of state and federal law. (c) The Owner shall provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining, or excavating in the Property below the Caps or interceptor trench except for routine maintenance or installation of utility facilities if said maintenance or installation is performed in compliance with Guidelines for Excavations at Former Manufactured Gas Plant Sites (Pacific Gas and Electric, September 1991) or a comparable excavation guideline approved by DTSC in advance of said maintenance or installation. Prohibited Activities: The following activities shall not be conducted at the Property: (a) Raising of food (cattle, food crops); (b) Drilling for water, oil, or gas without prior written approval by DTSC. (c) Extraction of groundwater for purposes other than site remediation or construction dewatering. Non-interference with Caps and Interceptor Trench (a) Activities that may disturb the Caps or the Interceptor Trench (e.g. excavation, grading, removal, trenching, filling, earth movement/or minings) shall not be permitted on the Property without prior review and approval by the Department except as specified in Section 4.02(c). (b) All uses and development of the Property shall preserve the integrity of the Caps and the Interceptor Trench. (c) The Caps and the Interceptor Trench shall not be altered without written approval by the DTSC. (d) Covenantor shall notify DTSC of each of the following: (i) the type, cause, location, and date of any damage to the Caps or the Interceptor Trench including any work for which prior notice under 4.02 (c) was not required; and (ii) the type and date of repair of such damage. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners and Occupants. DTSC shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by DTSC to protect the public health or safety, or the environment. The entity or person responsible for implementing the Operation and Maintenance Agreement shall have reasonable right of entry and access to the Property for the purpose of implementing the Operation and Maintenance Plan until the DTSC determines that no further Operation and Maintenance are required.

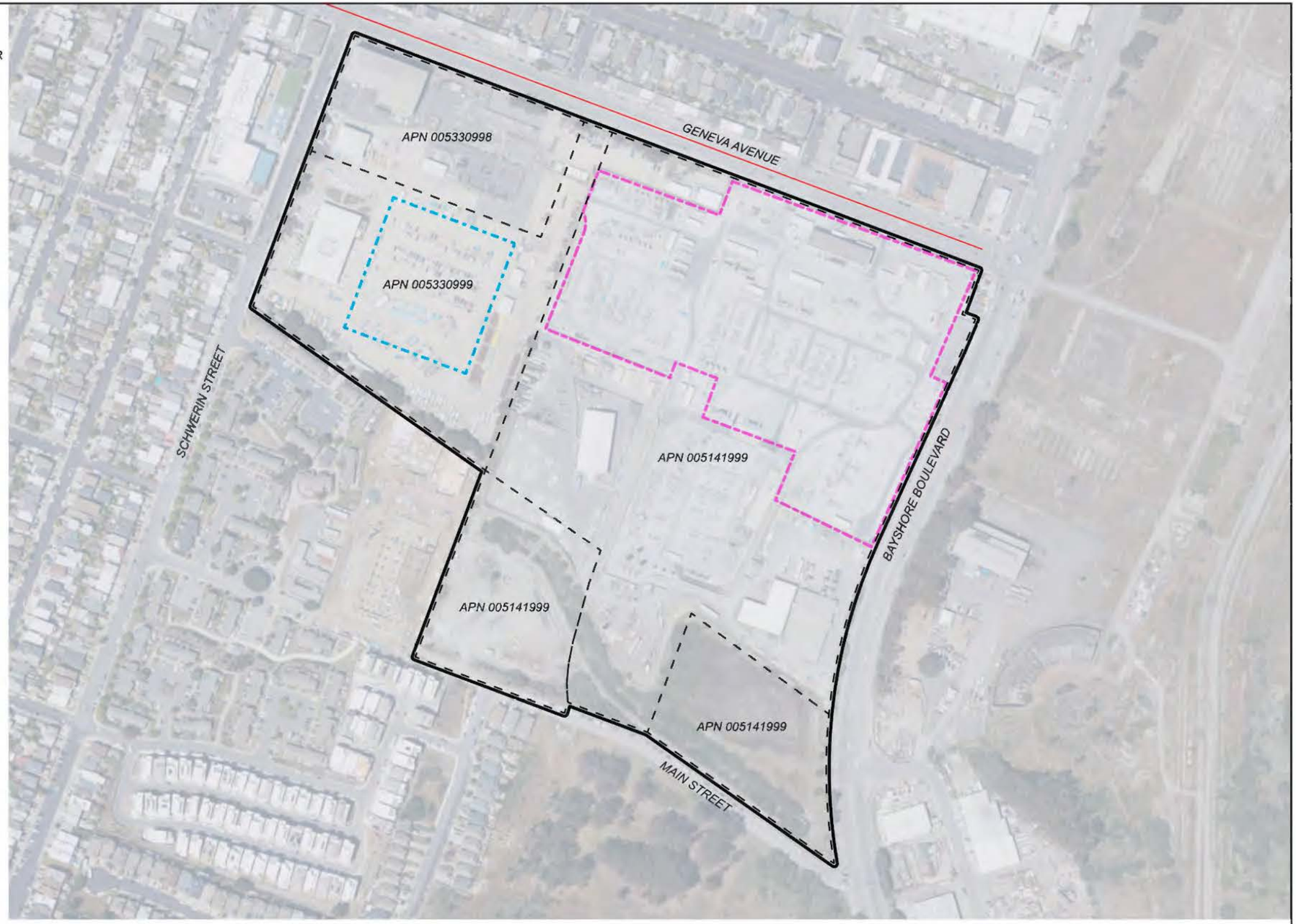
FIGURES

DRAFT WORK IN PROGRESS

LEGEND

- PG&E PROPERTY BOUNDARY / MARTIN SERVICE CENTER
- PARCELS
- PROPOSED MARTIN SUBSTATION PROJECT SITE
- PROPOSED NEW SUBSTATION AT DALY CITY YARD (PROJECT VARIANT)
- DISTRIBUTION EXPRESS FEEDER





NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI, 2022.
3. SAN MATEO COUNTY ASSESOR'S PARCEL NUMBERS (APNS) FROM SHAPEFILE PROVIDED BY ENVIRONMENTAL SCIENCE ASSOCIATES ON MARCH 11, 2024.

0 200 400 FEET

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

PROPOSED MARTIN SUBSTATION SEPARATION AND NEW SUBSTATION AT DALY CITY YARD (PROJECT VARIANT)
PG&E POWER ASSET ACQUISITION PROJECT
GENEVA AVENUE AND BAYSHORE BOULEVARD
BRISBANE, CALIFORNIA

FIGURE
1

DRAFT WORK IN PROGRESS

LEGEND

- PG&E PROPERTY BOUNDARY / MARTIN SERVICE CENTER
- APPROXIMATE EXTENT OF FORMER MGP (1911)
- PARCELS
- DALY CITY YARD
- MARTIN SUBSTATION
- DRAINAGE DITCH
- GROUNDWATER INTERCEPTOR TRENCH
- KNOWN EXTENT OF MGP IMPACTS
- OU-1
- OU-2

NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI, 2022.
3. FORMER MANUFACTURED GAS PLANT (MGP) FOOTPRINT IS APPROXIMATE BOUNDARY OF MGP FEATURES SHOWN IN AN 1911 PLAN OF MARTIN STATION PRESENTED IN PG&E'S PRELIMINARY ASSESSMENT OF THE FORMER MGP SITE IN THE CITY OF DALY CITY, DATED DECEMBER 1986.
4. OPERABLE UNIT (OU) BOUNDARIES AND EXTENT OF MGP IMPACTS SHOWN ARE BASED ON FIGURE 4 PRESENTED IN THE HAYLEY AND ALDRICH SOIL MITIGATION PLAN DATED JUNE 2017.

0 200 400 FEET

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

MARTIN SERVICE CENTER LAYOUT AND ENVIRONMENTAL FEATURES
PG&E POWER ASSET ACQUISITION PROJECT
GENEVA AVENUE AND BAYSHORE BOULEVARD
BRISBANE, CALIFORNIA

FIGURE
2

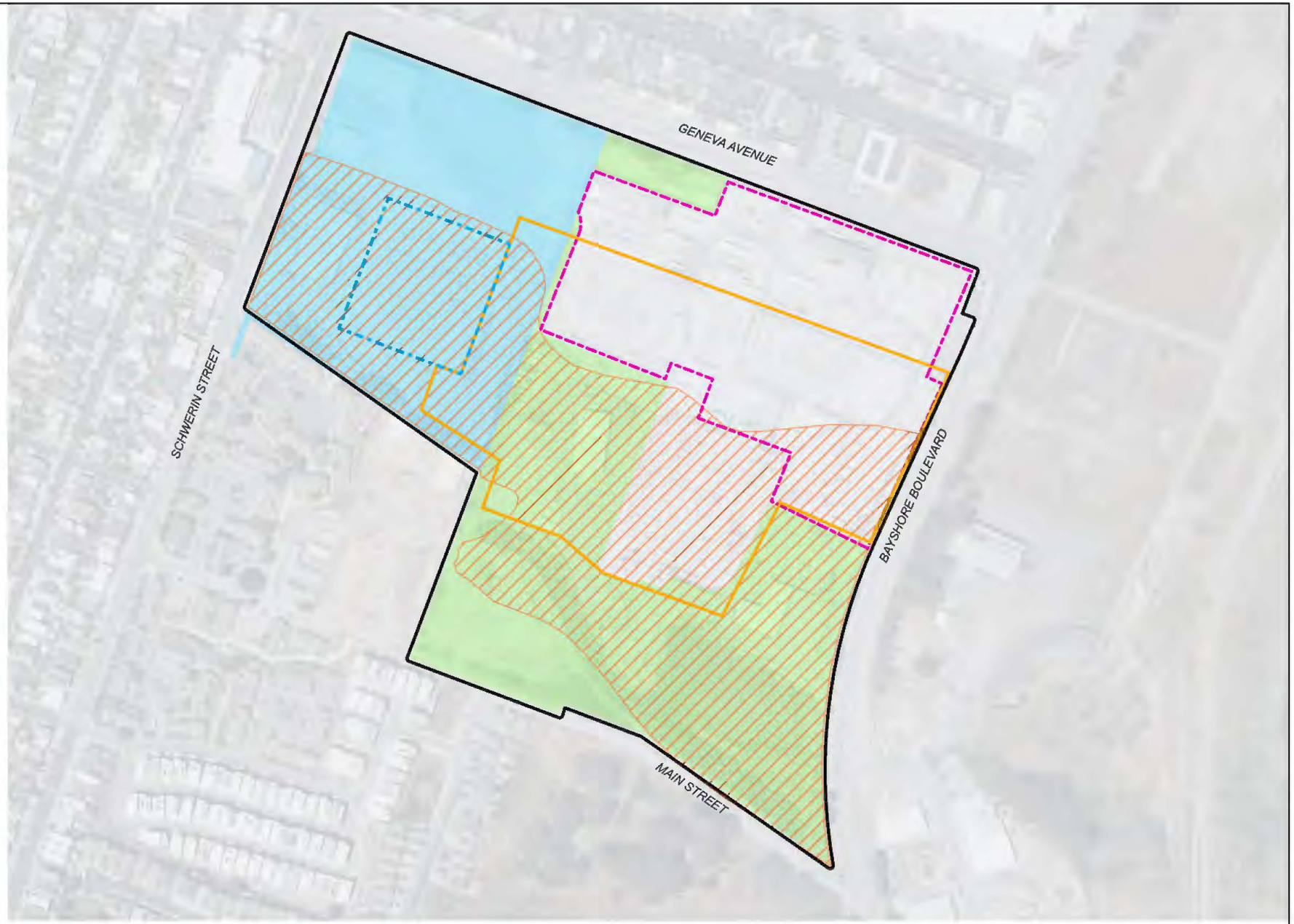
DRAFT WORK IN PROGRESS

LEGEND

- PG&E PROPERTY BOUNDARY / MARTIN SERVICE
- PROPOSED NEW SUBSTATION AT DALY CITY YARD (PROJECT VARIANT)
- PROPOSED INCOMING TRANSMISSION LINE AREA (PROJECT VARIANT)
- PROPOSED MARTIN SUBSTATION PROJECT SITE
- KNOWN EXTENT OF MGP IMPACTS
- OU-1
- OU-2

NOTES

1. FEATURES SHOWN ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI, 2022.
3. OPERABLE UNIT (OU) BOUNDARIES AND EXTENT OF MANUFACTURED GAS PLANT (MGP) IMPACTS SHOWN ARE BASED ON FIGURE 4 PRESENTED IN THE HAYLEY AND ALDRICH SOIL MITIGATION PLAN DATED JUNE 2017.



0 200 400 FEET

N

CDIM ENGINEERING

CDIM ENGINEERING, INC.
45 POLK STREET, THIRD FLOOR
SAN FRANCISCO, CA 94102
WWW.CDIMENGINEERING.COM
PH:(415)498-0535

PROPOSED MARTIN SUBSTATION SEPARATION AND NEW SUBSTATION
AT DALY CITY YARD (PROJECT VARIANT) WITH OPERABLE UNITS
PG&E POWER ASSET ACQUISITION PROJECT
GENEVA AVENUE AND BAYSHORE BOULEVARD
BRISBANE, CALIFORNIA

FIGURE
3

ATTACHMENT A

Covenant to Restrict Use of Property, Daly City Yard (1995)

2303-05-2160

AFTER RECORDING, RETURN TO:
PACIFIC GAS AND ELECTRIC COMPANY
Building & Land Services, H21A
123 Mission Street, Room 2134
P.O. Box 770000
San Francisco, CA 94177
Location: ~~City~~/Uninc.

Recording Fee $ 47.00

Documentary Transfer Tax $_____
X Computed on Full Value of Property Conveyed, or
__ Computed on Full Value Less Liens & Encumberances Remaining at Time of Sale.

Signature of declarant or agent determining tax

OFFICIAL RECORDS OF
SAN MATEO COUNTY
ASSESSOR-COUNTY CLERK-RECORDER
WARREN SLOCUM

Recorded at Request of
PACIFIC GAS AND ELECTRIC CO

95-028573 03/23/95 09:18

Recording Fee: 47.00 ASALAS

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

15 pp

TITLE(S)

COVENANT AND AGREEMENT TO RESTRICT USE OF PROPERTY
PG&E MARTIN SERVICE CENTER DALY CITY YARD
DALY CITY, CALIFORNIA

95028573

Recording Requested By:

The Pacific Gas and Electric Company

When Recorded, Mail To:

Department of Toxic Substances Control
Region 2
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2737
Attention: Barbara Cook, Chief
Site Mitigation Branch

COVENANT AND AGREEMENT
TO RESTRICT USE OF PROPERTY

PG&E Martin Service Center
Daly City Yard
Daly City, California

1.0 This Covenant and Agreement ("Covenant") is made on the 7 day of March, 1995 by the Department of Toxic Substances Control ("Department") and by the Pacific Gas and Electric Company (PG&E) ("Covenantor"), which is the owner of the PG&E Martin Service Center situated in the City of Daly City, County of San Mateo, State of California.

This Covenant and Agreement affects the Daly City Yard of the PG&E Martin Service Center which is located at 731 Schwerin Street, Daly City, California; and approximately 33 feet of the Property bordering Schwerin Street which was dedicated to the City of Daly City by PG&E in 1908 for the purpose of a street right-of-way (Schwerin Street Strip). Daly City retains interest over approximately 176 square yards of this portion of the Property as a limited easement for public passage and utilities.

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

550285 73

~~a limited easement for public passage and utilities.~~

The Property is depicted on the map attached hereto as Exhibit A, and made a part hereof, (hereinafter referred to as the "Property"); and is further described in Exhibit B attached hereto and made a part hereof.

Covenantor and the Department desire and intend that in order to protect the present and future public health and safety, the Property shall be used in such a manner as to avoid potential harm to persons or property, which might otherwise result from hazardous substances which have been encapsulated on the Property. Contaminated soil has been covered by a concrete parking lot, building foundations, and a constructed cap over the berm and the Schwerin Street Strip, hereinafter described as the "Cap". The Cap eliminates any significant risks to human health or the environment by eliminating the exposure pathways.

85029373

ARTICLE I

GENERAL PROVISIONS

1.01. Provisions to Run with the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), upon and subject to which the Property shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and all of the Restrictions shall run with the land, and pass with the Property, and shall apply to, inure to the benefit of, and bind the respective successors in interest thereof. Each and all

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

of the Restrictions are imposed upon the Property as described in Paragraph 1.0. Each and all of the Restrictions are imposed pursuant to Health and Safety Code Sections 25355.5 and 25356.1, and run with the land pursuant to Health and Safety Code Section 25355.5. Each and all of the Restrictions are for the benefit of and enforceable by the Department.

1.02. Concurrence of Owners Presumed. All purchasers, lessees, or possessors of any portion of the Property shall be deemed by their purchase, leasing, or possession of such Property, to be in accord with the foregoing and to agree for and among themselves, their heirs, successors, and assignees, and the agents, employees, and lessees of such owners, heirs, successors, and assignees, that the Restrictions as herein established must be adhered to for the benefit of future Owners and Occupants and that their interest in the Property shall be subject to the Restrictions contained herein.

1.03. Incorporation into Deeds and Leases. Covenantor desires and covenants that the Restrictions set out herein shall be incorporated by reference in each and all deeds and leases of any portion of the Property.

ARTICLE II

DEFINITIONS

2.01. Department. "Department" shall mean the California State Department of Toxic Substances Control and shall include its successor agencies, if any.

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

85026573

2.02. Improvements. "Improvements" shall mean all buildings, roads, driveways, regrading, and paved parking areas, constructed or placed upon any portion of the Property.

2.03. Occupant(s). "Occupant(s)" shall mean those persons entitled by ownership, leasehold, or other legal relationship to the exclusive right to occupy any portion of the Property.

2.04. Owner(s). "Owner(s)" shall mean the Covenantor or its successors in interest, including heirs, and assigns, who hold title to all or any portion of the Property.

2.05. Director. "Director" shall mean the Director of the California Department of Toxic Substances Control or his or her designee.

ARTICLE III

DEVELOPMENT, USE, AND CONVEYANCE OF THE PROPERTY

3.01. Restrictions on Development and Use. Covenantor promises to restrict the use of the Property described in Exhibits A and B as follows:

a. Development of the Property shall be restricted to industrial, utility, commercial or office space use.

b. No hospitals or health clinics shall be permitted on the Property.

c. No schools for persons under 18 years of age shall be permitted on the Property.

d. No daycare centers for either children or senior citizens shall be permitted on the Property.

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

3502857

e. No drilling for water for drinking or irrigation purposes shall be permitted on the Property.

f. No raising of food (food crops or animals) shall be permitted on the Property.

g. No subdivision of the Property shall be permitted, except as allowed under Health and Safety Code Sections 25232 (a)(2) and (b)(2).

h. No grading, excavation or construction shall be permitted on the Property that would adversely affect the operation and maintenance of the Cap described in Paragraph 1.0, excluding routine maintenance or installation of utility facilities at the PG&E Martin Service Center, if said maintenance is performed in compliance with PG&E's "Guidelines for Excavations at Former Manufactured Gas Plant Sites" dated September 1991, or equivalent revisions of those guidelines.

i. No activities that will disturb the soil in the area (e.g., excavation, grading, removal, trenching, filling, or earth movement) shall be permitted on the Property without approval of a Health and Safety Plan and a Soils Management Plan by the Department, with the exceptions noted in Paragraph h.

j. A sign shall be posted in the PG&E Martin Service Center office in English stating that no grading, excavation or construction activities can occur on the Property without written permission of the Department, with the exceptions

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

95028573

noted in Paragraph h.

k. Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

l. All uses and development of the Property shall preserve the integrity of the Cap installed on the Property pursuant to the requirements of the Department's Remedial Action Plan.

m. Any proposed alteration of the Cap shall require written approval by the Department.

n. The Owner shall monitor the Cap regularly to insure the integrity of the Cap as required in the Operation and Maintenance Agreement.

o. The Owner shall notify the Department of each of the following: 1) The type, cause, location and date of any disturbance to the Cap by fire, explosion, or earthquake, that could affect the ability of the system to contain the encapsulated hazardous substances and 2) the type and date of repair of such disturbance. Notification to the Department shall be made by registered mail within ten (10) working days of both the discovery of system disturbance and the completion of repairs.

3.02. Conveyance of Property. The Owner shall provide thirty (30) days advance written notice to the Department of any sale or other conveyance of the Property to a third person. The

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

95028573

Department shall not, by reason of the Covenant, have authority to approve, disapprove, or otherwise affect any sale or other conveyance of the Property.

3.03. Enforcement. Failure of the Owner to comply with any of the requirements set forth in paragraph 3.01 shall be grounds for the Department, by reason of the Covenant, to require that the Owner modify or remove any Improvements constructed in violation of that paragraph. Violation of the Covenant may be grounds for the Department to file civil and criminal actions against the Owner as provided by law.

3.04 Notice in Agreements. Owner and Occupant shall give all purchasers, lessees, and tenants a written notice containing the following statement:

> "The land described herein contains hazardous substances. Such condition renders the land and the owner, lessee, or other possessor of the land subject to requirements, restrictions, provisions, and liabilities contained in Chapter 6.5 and Chapter 6.8 of Division 20 of the Health and Safety Code. This statement is not a declaration that a hazard exists."

Owner and Occupant shall forward a copy of the signed notification to the Department within ten (10) days of purchase, lease or rental agreement.

ARTICLE IV

VARIANCE AND TERMINATION

4.01. Variance. Any Owner or, with the Owner's consent, any Occupant of the Property or any portion thereof may apply to the Department for a written variance from the provisions of this

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

85028573

Covenant. Such application shall be made in accordance with Section 25233, Health & Safety Code.

4.02 Termination. Any Owner or, with the Owner's consent, any Occupant of the Property or a portion thereof may apply to the Department for a termination of the Restrictions as they apply to all or any portion of the Property. Such application shall be made in accordance with Section 25234, Health & Safety Code.

4.03. Term. Unless terminated in accordance with paragraph 4.02 above, by law or otherwise, this Covenant shall continue in effect in perpetuity.

ARTICLE V

MISCELLANEOUS

5.01. No Dedication Intended. Nothing set forth herein shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property or any portion thereof to the general public or for any purposes whatsoever.

5.02. Notices. Whenever any person gives or serves any notice, demand, or other communication with respect to this Covenant, each such notice, demand, or other communication shall be in writing and shall be deemed effective 1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served or official of a government agency being served, or 2) three (3) business days after deposit in the mail if mailed by United States mail, postage paid certified, return receipt requested:

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

85028573

To: "Covenantor"
Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94120
Attn: Corporate Secretary

Copy to: Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94120
Attn: Manager, Environmental Services Department
Site Remediation Group

Copy to: Pacific Gas and Electric Company
123 Mission Street, H21A
San Francisco, California 94177
Attn: Manager, Building and Land Services

Copy to: Department of Toxic Substances Control
Region 2
700 Heinz Avenue, Suite 200
Berkeley, California 94710
Attn: Chief, Site Mitigation Branch

5.03. Partial Invalidity. If any portion of the Restrict ions or terms set forth herein is determined to be invalid for any reason, the remaining portion shall remain in full force and effect as if such portion had not been included herein.

5.04. Article Headings. Headings at the beginning of each numbered article of this Covenant are solely for the convenience of the parties and are not a part of the Covenant.

5.05. Recordation. This instrument shall be executed by the Covenantor and by the Site Mitigation Branch Chief, California Department of Toxic Substances Control. This instrument shall be recorded by the Covenantor in the County of San Francisco within ten (10) days of the date of execution.

COURT PAPER
STATE OF CALIFORNIA
STD 113 (REV. 8-72)

85 34769

95028573

5.06. Reference. All references to Code sections include successors provisions.

IN WITNESS WHEREOF, the parties execute this Covenant as of the date set forth above.

OWNER: Pacific Gas and Electric Company

By: P Bruce Bangle

Title: Manager, Building and Land Services

Date: February 27, 1995

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

By: Barbara J Cook

Barbara Cook

Chief, Site Mitigation Branch, Region 2

Date: March 7, 1995

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

95028573

STATE OF CALIFORNIA)

)

COUNTY OF SAN FRANCISCO)

On this 27TH day of FEBRUARY, in the year 1995, before me MELISSA BROSNAN, personally appeared P. BRUCE BENZLER, personally known to me or proved to me on the basis of satisfactory evidence to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same in his authorized capacity, and that by his signature on the instrument the persons, or the entity upon behalf of which the person acted, executed the instrument.

WITNESS my hand and official seal.

Signature Melissa Brosnan

PWR1 MELISSA BROSNAN Comm. # 1032560 NOTARY PUBLIC CALIFORNIA City and County of San Francisco My Comm. Expires July 17, 1998 PWR1

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

95028573

CALIFORNIA ALL-PURPOSE ACKNOWLEDGEMENT

STATE OF CALIFORNIA)

COUNTY OF ALAMEDA)

On MARCH 7, 1995 (DATE) before me, WILLIE H. McBRIDE, NOTARY PUBLIC (NAME, TITLE OF OFFICER - E.G., "JANE DOE, NOTARY PUBLIC")

personally appeared, BARBARA J. COOK

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Willie H. McBride (SEAL)

NOTARY PUBLIC SIGNATURE

MGC 1 — Willie H. McBride
Comm. #984857
NOTARY PUBLIC - CALIFORNIA
ALAMEDA COUNTY
Comm. Expires Feb. 16, 1997 — MGC 1

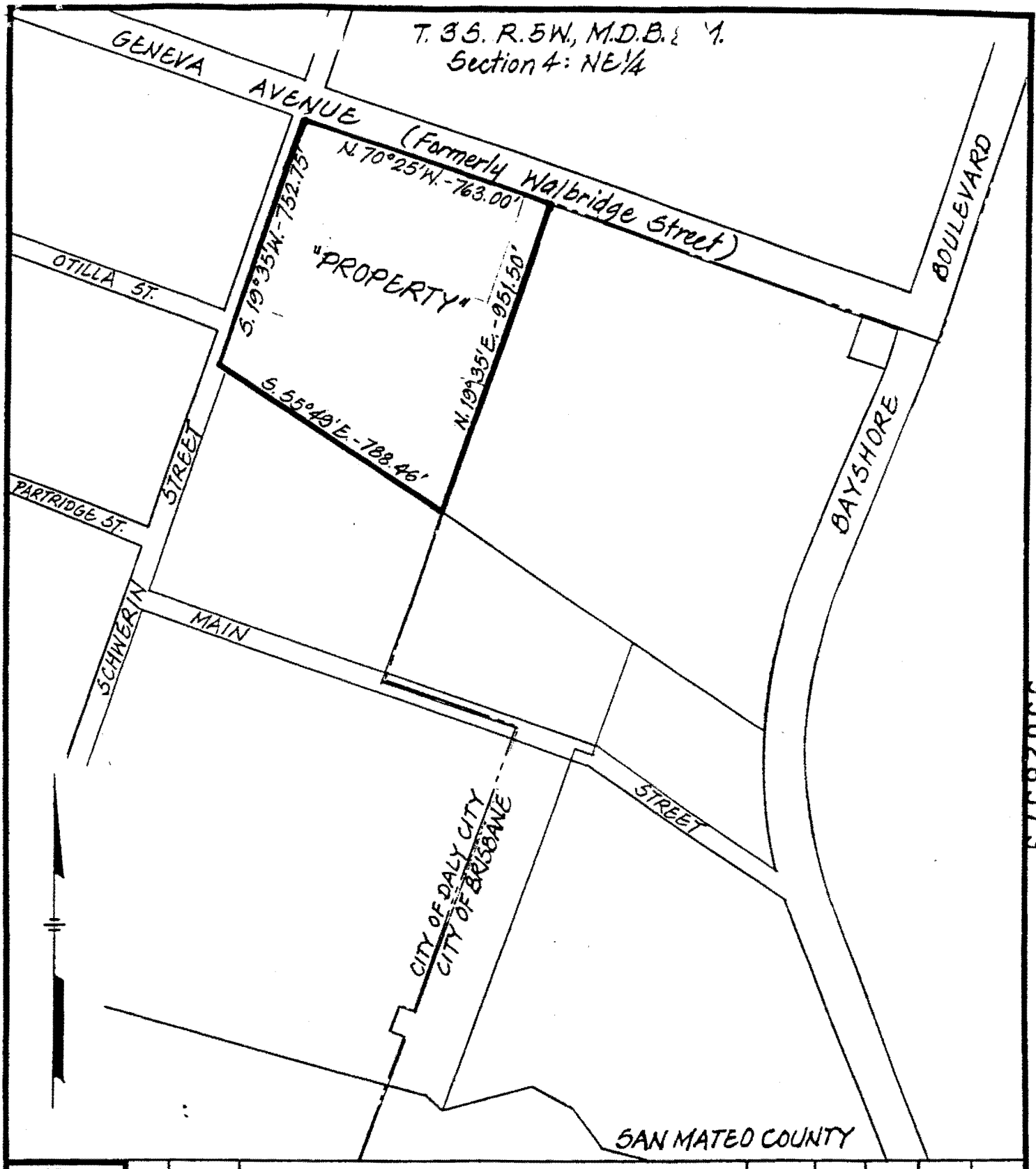
95028573

OPTIONAL INFORMATION

TITLE OR TYPE OF DOCUMENT COVENANT AND AGREEMENT

DATE OF DOCUMENT MARCH 7, 1995 NUMBER OF PAGES 14

SIGNER(S) OTHER THAN NAMED ABOVE



95028573

APPROVED BY								
REV.	DATE	DESCRIPTION	GM	DWN.	CHKD.	SUPV.	APVD.

GM 4150397	
SUPV.	
DSGN. ERC	
DWN.	
CHKD.	
O.K.	
DATE 10-17-94	SCALE 1" = 400'

MARTIN SERVICE CENTER

EXHIBIT "A"

PACIFIC GAS AND ELECTRIC COMPANY

SAN FRANCISCO, CALIFORNIA

B/M	
DWG. LIST	
SUPSDS	
SUPSD BY	
SHEET NO.	SHEETS
DRAWING NUMBER	REV.

MICROFILM

DIETERICH POST REORDER NO. 100882

7000-4047 (EKC-16) 11 94 2
Martin Service Center

EXHIBIT "B"

(SBE 135-41-28 Parcel 1; 135-41-28A Parcels 1 and 2)

The parcel of land, situate in the City of Daly City, County of San Mateo, State of California, described as follows:

Beginning at the point of intersection of the centerline of Schwerin Street and the Southerly line of Geneva Avenue (formerly Walbridge Street) and running thence along said centerline

(1) south 19° 35' west 752.75 feet

to the Northerly line of the "Partridge Tract", as shown upon "Map of the Partition of the Partridge Tract, Visitacion Valley, San Mateo County", filed in Book 12 of Maps, page 76, in the office of the Recorder of said County of San Mateo; thence running along said Northerly line

(2) south 55° 49' east 788.46 feet, more or less,

to a point perpendicularly distant 763.00 feet easterly from the centerline of Schwerin Street; thence running parallel with said centerline

(3) north 19° 35' east 951.50 feet, more or less,

to the Southerly line of Geneva Avenue; thence running along said Southerly line

(4) north 70° 25' west 763.00 feet

to the point of beginning; containing 14.926 acres.

95028573

ATTACHMENT B

Covenant to Restrict Use of Property, Martin Service Center (2002)

Exempt from Recording Fees per Code 6103

RECORDING REQUESTED BY:
The Pacific Gas and Electric Company
77 Beale Street
San Francisco, California 94105-1814

WHEN RECORDED, MAIL TO:

Department of Toxic Substances Control
Berkeley Office
700 Heinz Avenue
Berkeley, California 94710
Attention: Barbara J. Cook, Chief
Northern California - Coastal Cleanup
Operations Branch

[
J

DOC # 2002-208875
10/17/2002 11:48A DR Fee:NC
Page 1 of 25
Recorded in Official Records
County of San Mateo
Warren Slocum
Assessor-County Clerk-Recorder
Recorded By CALIFORNIA ENVIRONMENTAL

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

26 pp

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: PG&E Martin Service Center Brisbane and Daly City
State Board of Equalization Parcel Numbers 135-41-28 Parcel 1, 135-41-28 Parcel 2, 135-41-28B Parcel 3, 135-41-28B Parcel 4, and 135-41-3A Parcel 3)

This Covenant and Agreement ("Covenant") is made by and between the Pacific Gas and Electric Company (the "Covenantor"), the current owner of property situated in Brisbane and Daly City, County of San Mateo, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471(c), the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code ("H&SC") section 25260. The Covenantor and the Department, collectively referred to as the "Parties", hereby agree that the use of the Property be restricted as set forth in this Covenant.

ARTICLE II

STATEMENT OF FACTS

1.01. The Property, totaling approximately 49 acres is more particularly described and depicted in Exhibit "A", attached hereto and incorporated herein by this reference. The Property is located in the area now generally bound by Schwerin Street to the west, Geneva Avenue to the north, Bayshore Boulevard to the east, and Main Street, Bayshore Park, and the Midway Village Housing Complex to the south, in the County of San Mateo, State of California. This property is more specifically described as State Board of Equalization Parcel Numbers: 135-41-28 Parcel 1, 135-41-28 Parcel 2, 135-41-28B Parcel 3, 135-41-28B Parcel 4, and 135-41-3A Parcel 3.

1.02. The Property was remediated pursuant to two separate Remedial Action Plans and a subsequent Explanation of Significant Differences developed pursuant to Chapter 6.8 of Division 20 of the H&SC. Because hazardous substances, as defined in H&SC section 25316, which are also hazardous materials as defined in H&SC section 25260, including polycyclic aromatic hydrocarbons (PAHs), remain in the soil and groundwater in and under portions of the Property, the Remedial Action Plans provide that a deed restriction be required as part of the site remediation. The Department circulated the Remedial Action Plans, which include health risk assessments, together with negative declarations pursuant to the California Environmental Quality Act, Public Resources Code section 21000 et seq. for public review and comment. The first Remedial Action Plan prescribed remedial actions to be performed at Operable Unit 1 (OU-1) on the Property and the second Remedial Action Plan prescribed remedial actions to be performed at Operable Unit 2 (OU-2) on the Property. The OU-1 Remedial Action Plan and negative declaration were approved by the Department on June 7, 1993. The OU-2 Remedial Action Plan and negative declaration, were approved by the Department on July 20, 1998. Subsequently, the Department amended the OU-2 Remedial Action Plan by finalizing an Explanation of Significant Differences on September 26, 2000. Remediation at OU-1 included: 1) Covering the strip of land between Schwerin Street and the Martin Service Center property

with a concrete cap with accommodations for trees; and 2) covering the berm along the southern boundary of the Martin Service Center Daly City Yard with a shotcrete cap and providing landscaping and drainage. Remediation at OU-2 included: 1) Management of soil generated by the Bayshore Storm Drain Improvement Project including chemical characterization and drying as required for on-site grading and off-site disposal; 2) Off-site transportation and disposal of soil containing concentrations of carcinogenic polycyclic aromatic hydrocarbons (cPNAs) greater than 10 milligrams per kilogram (mg/kg); 3) On-site screening and grading of soil containing concentrations of cPNAs less than or equal to 10 mg/kg, and placement of a final chip seal ("the Cap") over the graded area ("the Capped Property"); and 4) Construction and operation of a groundwater interceptor trench ("Interceptor Trench") along the Bayshore Boulevard boundary of the Martin Service Center property, more particularly described in the Engineering drawings in Exhibit B. The locations of the Caps and the Interceptor Trench are shown on Exhibit C. The operation and maintenance of the Caps and the Interceptor Trench are pursuant to an Operation and Maintenance Plan incorporated into the Operation and Maintenance Agreement between Covenantor and the Department dated August 30, 2002.

1.03. As detailed in the Remedial Action Plans and the subsequent Explanation of Significant Differences, as approved by the Department on June 7, 1993, July 20, 1998, and September 26, 2000, respectively, all or a portion of the subsurface soil below the Caps contain hazardous substances, as defined in H&SC section 25316, which include polycyclic aromatic hydrocarbons (PAHs) in the ranges set forth below: total PAHs up to 12,657 mg/kg (in lampblack). Groundwater levels in monitoring wells at the Property historically have ranged from 3.94 feet above the ground surface to 7.35 feet below the ground surface. Contaminants in the groundwater include PAHs at up to 3,566 micrograms per liter (ug/l) (unfiltered sample). The Department concludes that the groundwater could present an unacceptable threat to human health and safety should a complete pathway to the human receptor exist.

Based on the Remedial Action Plans and the subsequent Explanation of Significant Differences the Department concluded that use of the Property for a residence, hospital, school for persons under the age of 21, or day care center would entail an unacceptable

health risk. The Department further concluded that the Property, as remediated, and subject to the restrictions of this Covenant, does not present an unacceptable threat to human safety or the environment if limited to commercial, industrial, or open space use.

ARTICLE II

DEFINITIONS

2.01. Department. "Department" means the California Department of Toxic Substances Control and includes its successor agencies, if any.

2.02. Owner. "Owner" means the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to all or any portion of the Property.

2.03. Occupant. "Occupant" means Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

ARTICLE III

GENERAL PROVISIONS

3.01. Restrictions to Run with the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Each and every Restriction: (a) runs with the land pursuant to H&SC section 25355.5(a)(1)(C) and Civil Code section 1471; (b) inures to the benefit of and passes with each and every portion of the Property, (c) is for the benefit of, and is enforceable by the Department and/or Covenanter, and (d) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding upon Owners/Occupants. Pursuant to H&SC section

25355.5(a)(1)(C), this Covenant binds all owners of the Property, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive owners of the Property are expressly bound hereby for the benefit of the Department.

3.03. *Written Notice of the Presence of Hazardous Substances.* Prior to the sale, lease or sublease of the Property, or any portion thereof, the owner, lessor, or sublessor shall give the buyer, lessee, or sublessee notice that hazardous substances are located on or beneath the Property, as required by H&SC section 25359.7.

3.04. Incorporation into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds and leases for any portion of the Property.

3.05. Conveyance of Property. The Owner shall provide notice to the Department not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances). The Department shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect proposed conveyance, except as otherwise provided by law, by administrative order, or by a specific provision of this Covenant.

ARTICLE IV
RESTRICTIONS

4.01. Prohibited Uses. The Property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.

(b) A hospital for humans.

(c) A public or private school for persons under 21 years of age.

(d) A day care center for children.

4.02. Soil Management

(a) No activities that will disturb the soil below the Caps (e.g., excavation, grading, removal, trenching, filling, earth movement, or mining) shall be allowed on the Property without a Soil Management Plan and a Health and Safety Plan approved by the Department.

(b) Any contaminated soil brought to the surface by grading, excavation, trenching, or backfilling shall be managed in accordance with all applicable provisions of state and federal law.

(c) The Owner shall provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining, or excavating in the Property below the Caps or interceptor trench except for routine maintenance or installation of utility facilities if said maintenance or installation is performed in compliance with *Guidelines for Excavations at Former Manufactured Gas Plant Sites* (Pacific Gas and Electric, September 1991) or a comparable excavation guideline approved by the Department in advance of said maintenance or installation.

4.03. *Prohibited Activities*. The following activities shall not be conducted at the Property:

(a) Raising of food (cattle, food crops);

(b) Drilling for water, oil, or gas without prior written approval by the Department.

(c) Extraction of groundwater for purposes other than site remediation or construction dewatering.

4.04. Non-Interference with Caps and Interceptor Trench. Covenantor agrees:

(a) Activities that may disturb the Caps or the Interceptor Trench (e.g. excavation, grading, removal, trenching, filling, earth movement, or

2002 11480

mining) shall not be permitted on the Property without prior review and approval by the Department except as specified in Section 4.02(c).

(b) All uses and development of the Property shall preserve the integrity of the Caps and the Interceptor Trench.

(c) The Caps and the Interceptor Trench shall not be altered without written approval by the Department.

(d) Covenantor shall notify the Department of each of the following: (i) the type, cause, location, and date of any damage to the Caps or the Interceptor Trench including any work for which prior notice under 4.02 (c) was not required, and (ii) the type and date of repair of such damage. Notification to the Department shall be made as provided below within ten (10) working days of both the discovery of any such disturbance and the completion of any repairs. Timely and accurate notification by any Owner or Occupant shall satisfy this requirement on behalf of all other Owners and Occupants.

4.05. Access for Department. The Department shall have reasonable right of entry and access to the Property for inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department to protect the public health or safety, or the environment.

4.06. Access for Implementing Operation and Maintenance. The entity or person responsible for implementing the Operation and Maintenance Agreement shall have reasonable right of entry and access to the Property for the purpose of implementing the Operation and Maintenance Plan until the Department determines that no further Operation and Maintenance are required.

ARTICLE V
ENFORCEMENT

5.01. Enforcement. Failure of the Covenantor, Owner, or Occupant to comply with any of the Restrictions specifically applicable to it shall be grounds for the Department to

require that the Covenantor or Owner modify or remove any improvements ("Improvements" herein shall mean all buildings, roads, driveways, and paved parking areas) constructed or placed on any portion of the Property in violation of the Restrictions. Violation of this Covenant shall be grounds for the Department to file civil or criminal actions as provided by law.

ARTICLE VI

VARIANCE, TERMINATION, AND TERM

6.01. *Variance*. Covenantor, or any other aggrieved person, may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with H&SC section 25233.

6.02 Termination. Covenantor, or any other aggrieved person, may apply to the Department for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with H&SC section 25234..

6.03 Term. Unless ended in accordance with the Termination paragraph above, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE VII

MISCELLANEOUS

7.01. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02. Department References. All references to the Department include successor agencies/departments or other successor entity.

7.03. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of San Mateo within ten (10) days of the Covenantor's receipt of a fully executed original.

7.04. Notices. Whenever any person gives or serves any Notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner:

Darrell S. Klingman

The Pacific Gas and Electric Company

77 Beale Street

San Francisco, California 94105

To Department:

Barbara J. Cook, P.E., Chief

Northern California

Coastal Cleanup Operations Branch

Department of Toxic Substances Control

700 Heinz Avenue, Suite 200

Berkeley, CA 94710

Any party may change its address or the individual to whose attention a Notice is to be sent by giving written Notice in compliance with this paragraph.

2002-208875

Fee: 0.00

7.05. Partial Invalidity. If any portion of the Restrictions or other term set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

7.06 Statutory References. All statutory references include successor provisions.

7.07 Replacement and Recision of Existing OU-1 Deed Restriction. This document replaces and rescinds the existing *Covenant and Agreement to Restrict the Use of Property*, dated March 7, 1995 between the Department and PG&E for the Martin Service Center Daly City Yard.

IN WITNESS WHEREOF, the Parties execute this Covenant.

Covenantor: The Pacific Gas and Electric Company

By: _____

Title: Robert L. Harris, Vice President- Environmental Affairs

Date: 10/10/02

Department of Toxic Substances Control

By: _____

Title: Barbara J. Cook, P.E., Chief
Northern California
Coastal Cleanup Operations Branch

Date: 10/17/2002

2002-208875

STATE OF CALIFORNIA

COUNTY OF SAN FRANCISCO

On this 10th day of October, in the year 2002,

before me Alline D. Adams, personally appeared

Robert L. Harris

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature

ALLINE D. ADAMS
Comm. # 1232766
NOTARY PUBLIC-CALIFORNIA
City & County of San Francisco
My Comm. Expires Aug 31, 2003

STATE OF CALIFORNIA

COUNTY OF Alameda

On this 17th day of October, in the year 2002,

before me Nicole Dee Thuenmler, personally appeared

Barbara J. Cook,

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

NICOLE DEE THUENMLER
Comm. # 1350260
NOTARY PUBLIC-CALIFORNIA
Alameda County
My Comm. Expires April 8, 2006

Signature Nicole Dee Thuenmler

2002 208875

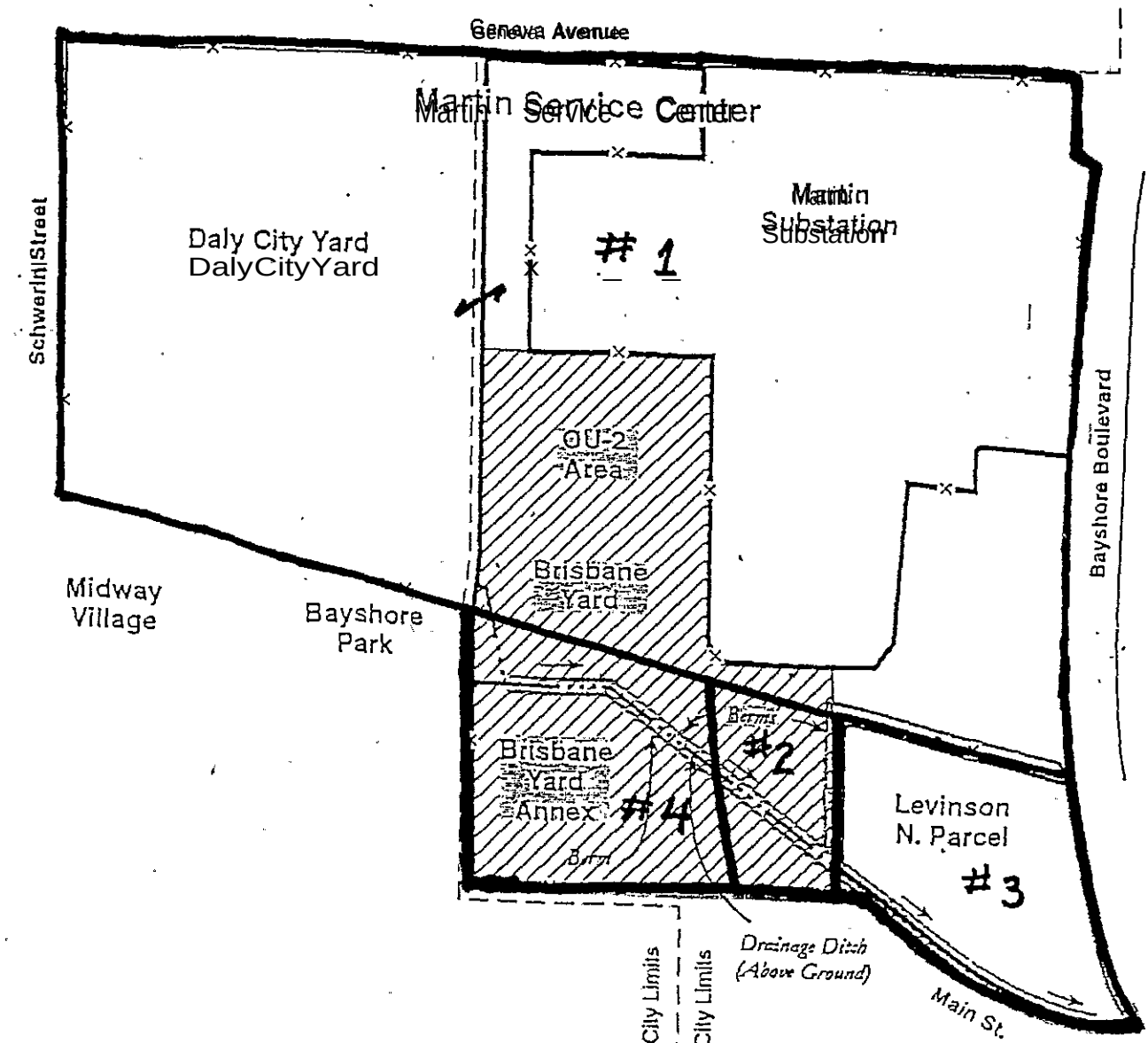


Figure A-1
KEY MAP
Property Descriptions

2002-208875
10/17/2002 11:48A
DR Page: 13 of 26

EXHIBIT A

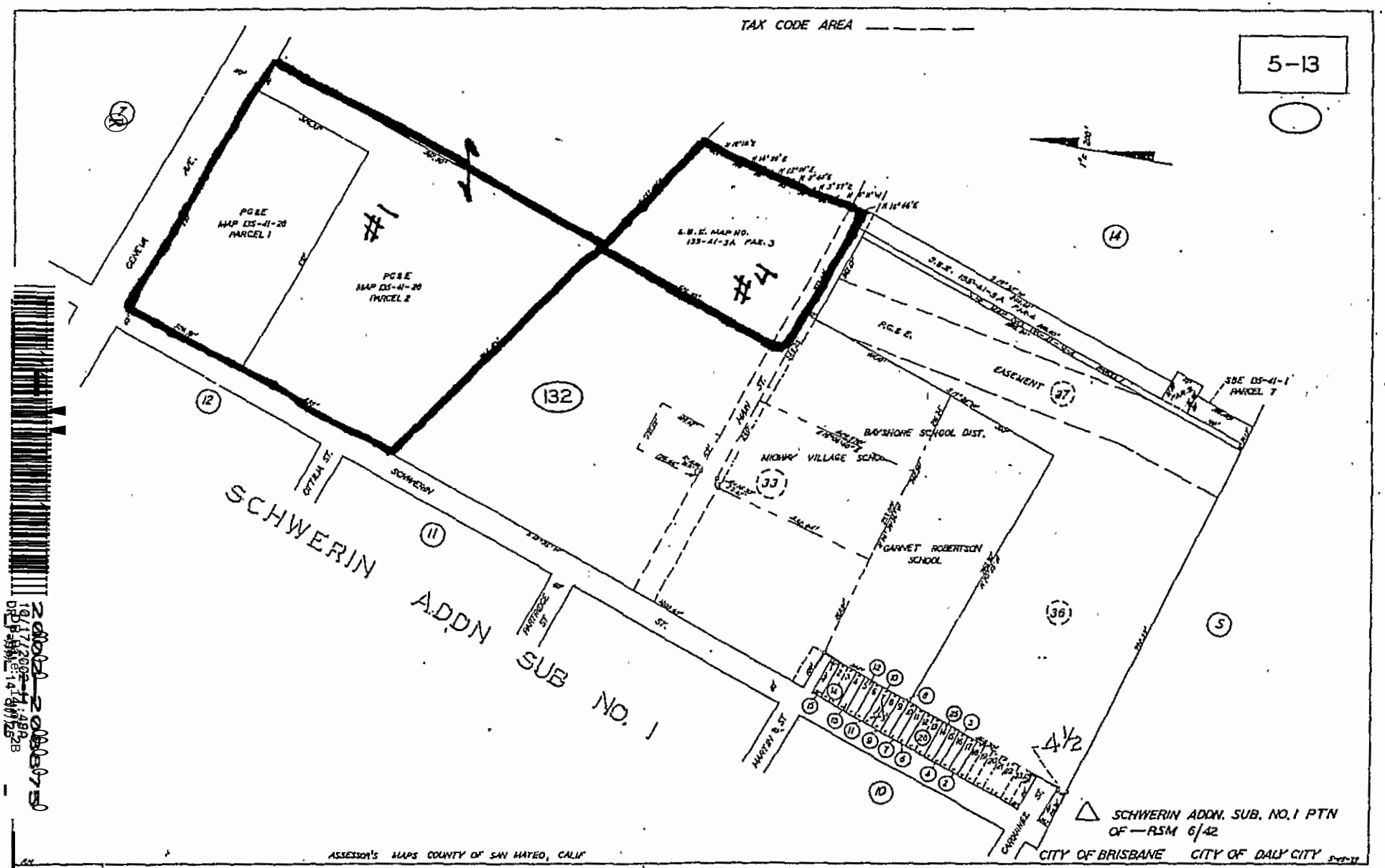


Figure A-2
PROPERTY OUTLINES
Properties 1 (partial) and 4

EXHIBIT A

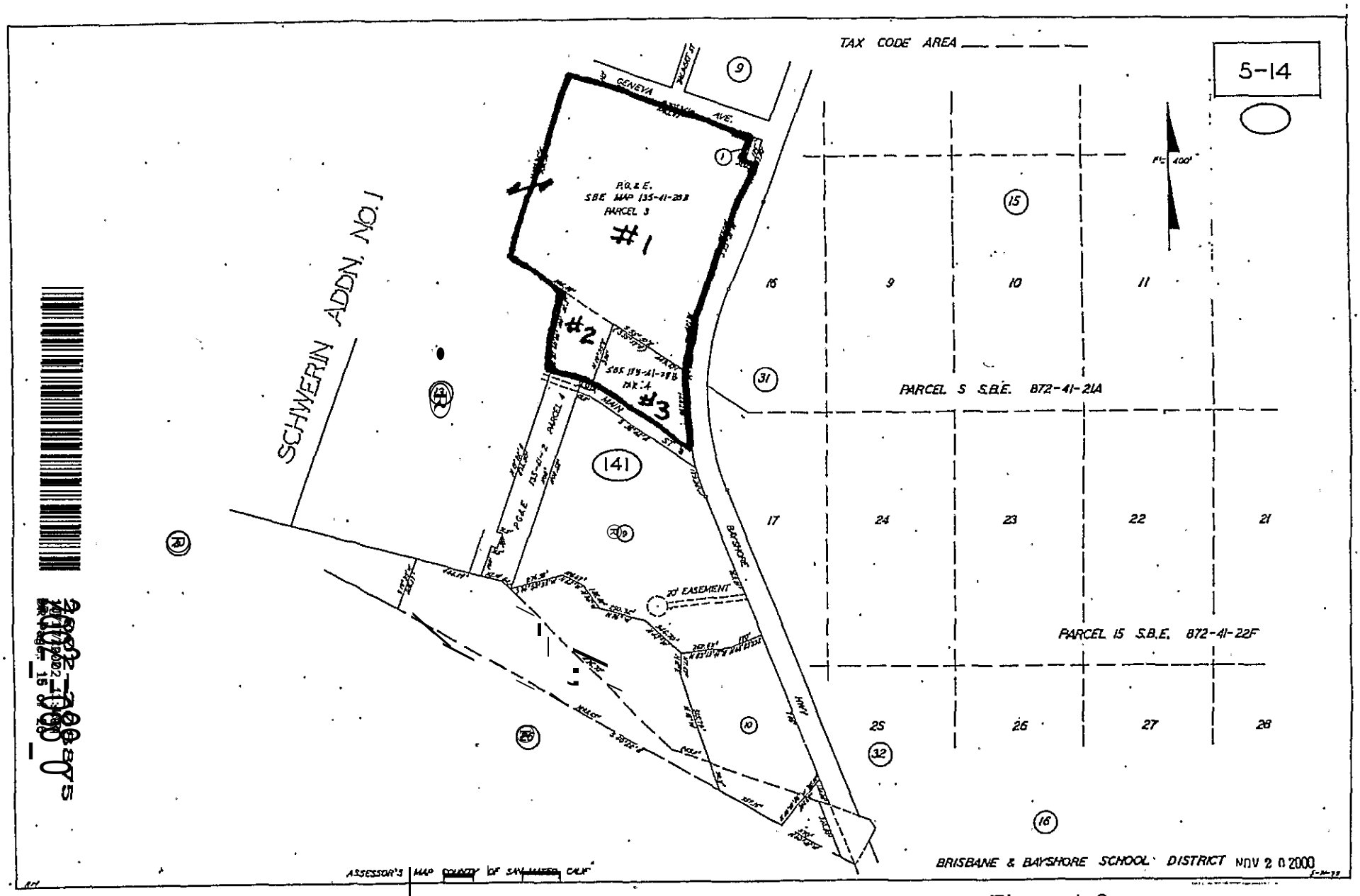


Figure A-3
PROPERTY OUTLINES
Properties 1 (partial), 2 and 3

EXHIBIT A

MARTIN 503

#1

For Pipe Line Easement to City and Co of S.F, see 197-54C

ABS-238

LAND DEPT.
FILE NO. 197-2.

2303-05-0041

THIS INDENTURE made by and between the MERCANTILE TRUST COMPANY OF SAN FRANCISCO, a corporation duly organized and existing under and by virtue of the laws of the State of California, and having its office and principal place of business in the City and County of San Francisco, State aforesaid, the party of the first part, and the SAN MATEO POWER COMPANY, a corporation also duly organized and existing under and by virtue of the laws of the State of California, and having its office and principal place of business in the said City and County of San Francisco, the party of the second part:

W I T N E S S E T H:

That the said party of the first part, for and in consideration of the sum of ten dollars ($10.00) gold coin of the United States of America to it paid by the said party of the second part, the receipt whereof is hereby acknowledged, does hereby remise, release and forever quitclaim unto the said party of the second part, its successors and assigns, that certain tract or parcel of land which is situate in the County of San Mateo, State of California, and is bounded on the north by a highway known as Walbridge Street, on the west by the lands of Schwerin, on the south by the lands of Partridge and on the east by the highway known as the San Bruno Road, and is more particularly described as follows, viz:-

#1

Commencing at the intersection of the center line of Walbridge Street with the center line of Schwerin Street, and running thence southerly along the center line of said Schwerin Street produced southerly, south eighteen and one-half (18½) degrees west eleven and 48/100 (11.48) chains more or less to the southwesterly corner of said tract of land; thence running southeasterly along the boundary line between the said tract of land and the said lands of Partridge,

2002-208875
10/17/2002 11:48A
DR Page: 10 of 26

EXHIBIT A

south fifty-six and three fourths (56¾) degrees east thirty-two (32) chains more or less to the San Bruno Road; thence along the San Bruno Road in a general northerly direction twenty-two chains more or less to the intersection of said San Bruno Road with said Walbridge Street; and thence westerly along said Walbridge Street thirty (30) chains more or less to the point of beginning, except a certain parcel of land situate in the northeasterly corner of said tract, having a frontage of approximately one hundred (100) feet on Walbridge Street and one hundred and twenty-five (125) feet on said San Bruno Road, which was heretofore granted by Isabella D. Walbridge, Thomas H. Walbridge, Narcissa Grace Secor and Mary D. Newton to Guiseppe Lercari by a deed which is recorded in the office of the County Recorder of San Mateo County in Volume 98 of Deeds at page 249; and also except another certain parcel of land which adjoins the last mentioned parcel on the westerly side thereof and which is more particularly described as follows, viz:-

Beginning at the northwesterly corner of said parcel of land which was granted by said Isabella D. Walbridge, Thomas H. Walbridge Narcissa Grance Secor and Mary D. Newton to the said Lercari, and running thence westerly along the southerly line of Walbridge Street seventy-five (75) feet; thence at right angles southerly one hundred and twenty-five (125) feet; thence at right angles easterly seventy-five (75) feet to the southwesterly corner of the said parcel of land which was granted as aforesaid to said Lezmarti, and thence northerly one hundred and twenty-five (125) feet to the point of beginning.

TOGETHER with all and singular the tenements, hereditaments, and appurtenances thereunto belonging or in anywise appertaining, and the rents, issues and profits thereof.

TO HAVE AND TO HOLD unto the said party of the second part, its successors and assigns forever to its and their proper use and behoof.

EXHIBIT A

DESCRIPTION OF THE TRACT OF LAND COVERED BY THIS POLICY OF INSURANCE:

DESCRIPTION OF THE TRACT OF LAND COVERED BY THIS POLICY OF INSURANCE:

#2

That certain parcel of land in the County of San Mateo, State of California, which is described as follows:

That certain parcel of land in the County of San Mateo, State of California, which is described as follows:

Beginning at a point which is distant South 19° 55' West one hundred sixty-nine (169) feet and South 70° 35' East eleven hundred sixty-three and three tenths (1163.3) feet from an iron monument set at the Northeasterly corner of the intersection of Schwerin Street with Partridge Avenue as the same are shown on the recorded map of the Schwerin Tract; thence South 70° 25' East two hundred thirty and fifty-five one hundredths (230.55) feet to a stone monument; thence North 19° 55' East three hundred thirty-six (336) feet, more or less, to a point in the Northerly boundary line of the lands of Partridge; thence on and along said line North 65° 57' West three hundred four and eight tenths (304.8) feet to the Easterly boundary line of the lands of Sierra and San Francisco Power Co.; thence Southwesterly on and along said Easterly boundary line four hundred twelve and seven tenths (412.7) feet, more or less, to the point of beginning.

Containing two and twenty-one one hundredths (2.21) acres of land.

Containing two and twenty-one one hundredths (2.21) acres of land.

- 9 -

2002-208875
10/17/2002 11:48A
DR Page: 18 of 26

EXHIBIT A

ORDER NO: SM6776104
Page 1

#3

LEGAL DESCRIPTION

CITY OF BRISBANE

Pass 1 _GA.L D_-S_ON

ALL THAT CERTAIN REAL PROPERTY SITUATE IN THE CITY OF BRISBANE, COUNTY OF SAN MATEO, STATE OF CALIFORNIA, BEING A PORTION OF LOT "A" 22, AS SAID LOT IS SHOWN ON THE MAP OF THE PARTITION OF THE PARTRIDGE TRACT, VISITACION VALLEY, WHICH WAS RECORDED IN BOOK 12 OF MAPS, AT PAGE 76, SAN MATEO COUNTY RECORDS, SAID PORTIONS BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST NORTHERLY CORNER OF SAID LOT "A" 22, AS SHOWN ON SAID MAP; THENCE ALONG THE NORTHEASTERLY LINE OF SAID LOT, SOUTH 55° 54' 00" EAST (CALLED SOUTH 55° 49' EAST ON SAID MAP), 446.35 FEET TO A POINT THEREON WHICH IS THE MOST NORTHERLY CORNER OF LANDS DESCRIBED AS PARCEL 1 IN THE DEED FROM PACIFIC COAL AND FERTILIZING COMPANY TO THE STATE OF CALIFORNIA, DATED APRIL 2, 1930 AND RECORDED JUNE 30, 1930, IN BOOK 482, OFFICIAL RECORDS OF SAN MATEO COUNTY, PAGE 259; THENCE ALONG THE WESTERLY LINE OF SAID STATE LANDS, FROM A TANGENT THAT BEARS SOUTH 4° 40' 01" WEST, SOUTHERLY ALONG THE ARC OF A CURVE TO THE LEFT HAVING A RADIUS OF 1462.50 FEET AND A CENTRAL ANGLE OF 15° 42' 12", AN ARC DISTANCE OF 400.83 FEET TO INTERSECT WITH THE SOUTHWESTERLY LINE OF SAID LOT "A" 22, AS SHOWN ON SAID MAP; THENCE ALONG SAID SOUTHWESTERLY LINE, NORTH 55° 49' 00" WEST, 605.63 FEET TO THE MOST WESTERLY CORNER OF SAID LOT "A" 22; THENCE ALONG THE NORTHWESTERLY LINE OF SAID LOT, NORTH 19° 28' 00" EAST, 327.67 FEET TO THE POINT OF BEGINNING.

ASSESSOR'S PARCEL NO. 005-141-020 20 JOINT PLANT NO. 005-014-141-02

2002-208875
11/17/2002 1:29P
OR Page: 19 of 26

2002 0172002

EXHIBIT A

#4

S C H E D U L E "A".

DESCRIPTION OF THE PROPERTY COVERED BY THIS POLICY OF INSURANCE:

All these certain lots, pieces or parcels of land situate, lying and being in the County of San Mateo, State of California and bounded and described as follows, to-wit:-

Beginning at a point which is distant the following courses and distances from the intersection of the westerly line of Schwerin Street with the southerly line of Partridge Avenue as the same is shown upon the map of the Schwerin Addition on file in the office of the Recorder of San Mateo County, south 19 degrees 55 minutes west 145 feet and south 70 degrees 25 minutes east 796 feet to said point of beginning; thence south 70 degrees 25 minutes east 423.3 feet; thence north 15 degrees 48 minutes east 50.07 feet, north 4 degrees 11 minutes west 50 feet, north 5 degrees 57 minutes east 50 feet, north 9 degrees 45 minutes east 60 feet, north 13 degrees 01 minutes east 60 feet, north 14 degrees 50 minutes east 100 feet, north 14 degrees 10 minutes east 92.7 feet to a point in the northerly boundary line of the lands of Partridge, thence on and along said boundary line north 74 degrees 49 minutes west 372.01 feet, thence leaving said boundary line south 19 degrees 55 minutes west 328.5 feet to the point of beginning.

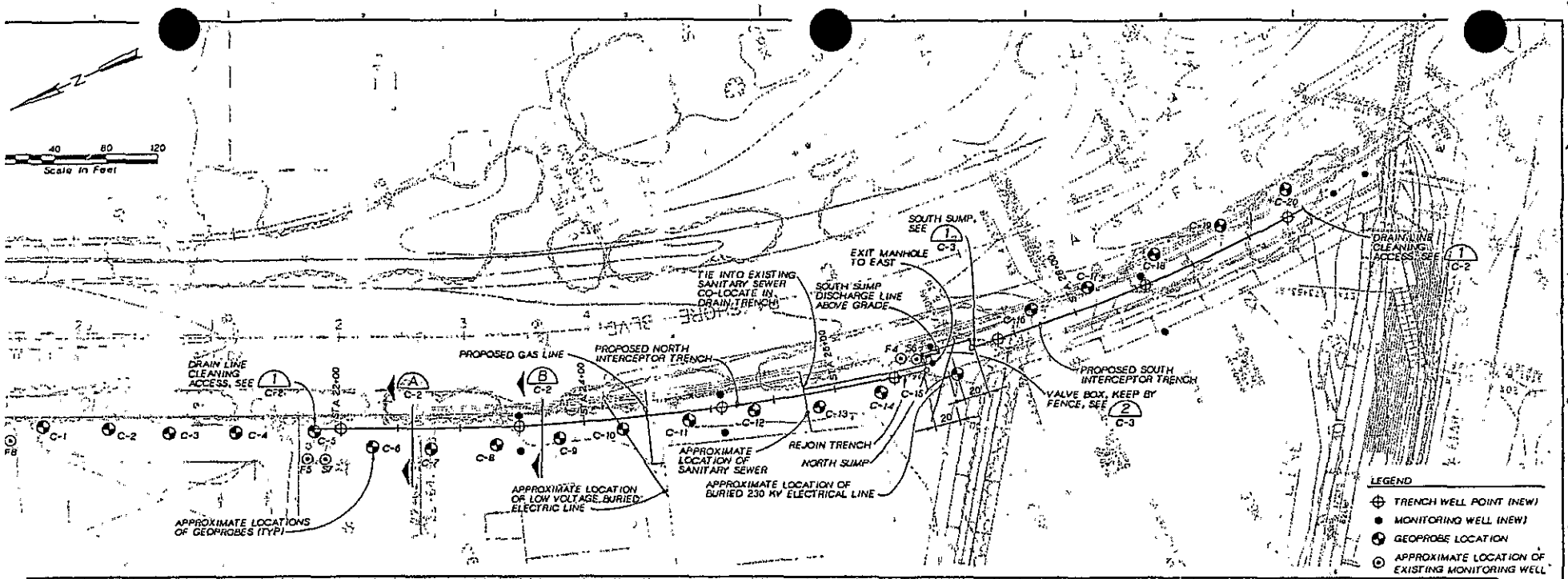
Containing 4.18 acres of land.

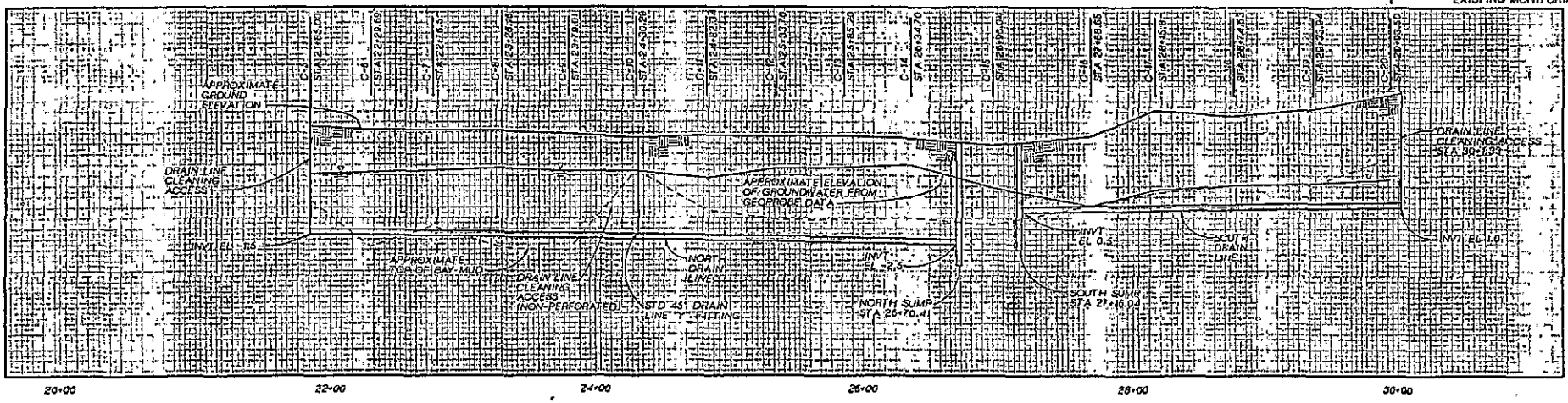
Also- A strip of land 50 feet in width more particularly described as follows:-

Beginning at a point which is distant the following courses and distances from the intersection of the westerly line of Schwerin Street with the southerly line of Partridge Avenue as the same is shown upon the map of the Schwerin Addition on file in the Office of the Recorder of San Mateo County, south 19 degrees 55 minutes west 145 feet and south 70 degrees 25 minutes east 1169.5 feet to said point of beginning; thence south 19 degrees 55 minutes west 30.07 feet, south 19 degrees 33 minutes west 1095.6 feet to a point in the southerly boundary line of the lands of Partridge; thence on and along said boundary line south 74 degrees 38 minutes east 50.13 feet; thence leaving said boundary line north 19 degrees 33 minutes east 1092 feet, north 19 degrees 55 minutes east 30.07 feet, north 70 degrees 25 minutes west 50 feet to the point of beginning.

Excepting therefrom, however, a strip of land commencing at a point on the westerly line of the property hereinabove described and being distant thereon 100 feet northerly from the southerly boundary line of said property hereinabove described, and running thence northerly along said westerly line 75 feet; thence at a right angle easterly 50 feet; thence southerly and along the easterly line of the property hereinabove described 75 feet, and thence westerly 50 feet to the point of commencement.

2002-208875
07/17/2002 11:49:00
OR Page: 20 of 28





DSGN TOM SIUPKIN					VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	CH2MHILL	GROUND WATER INTERCEPTOR SYSTEM MARTIN SERVICE CENTER OPERABLE UNIT 2 PACIFIC GAS & ELECTRIC	CIVIL INTERCEPTOR TRENCH PLAN AND PROFILE	SHEET 1
DR R-CAD (SUM)									DWG NO. C-1
CHK A. DEMORESY									DATE AUG 1999
APVD	NO.	DATE	REVISION	BY	APVD				PROJ NO. 114348.R0.22

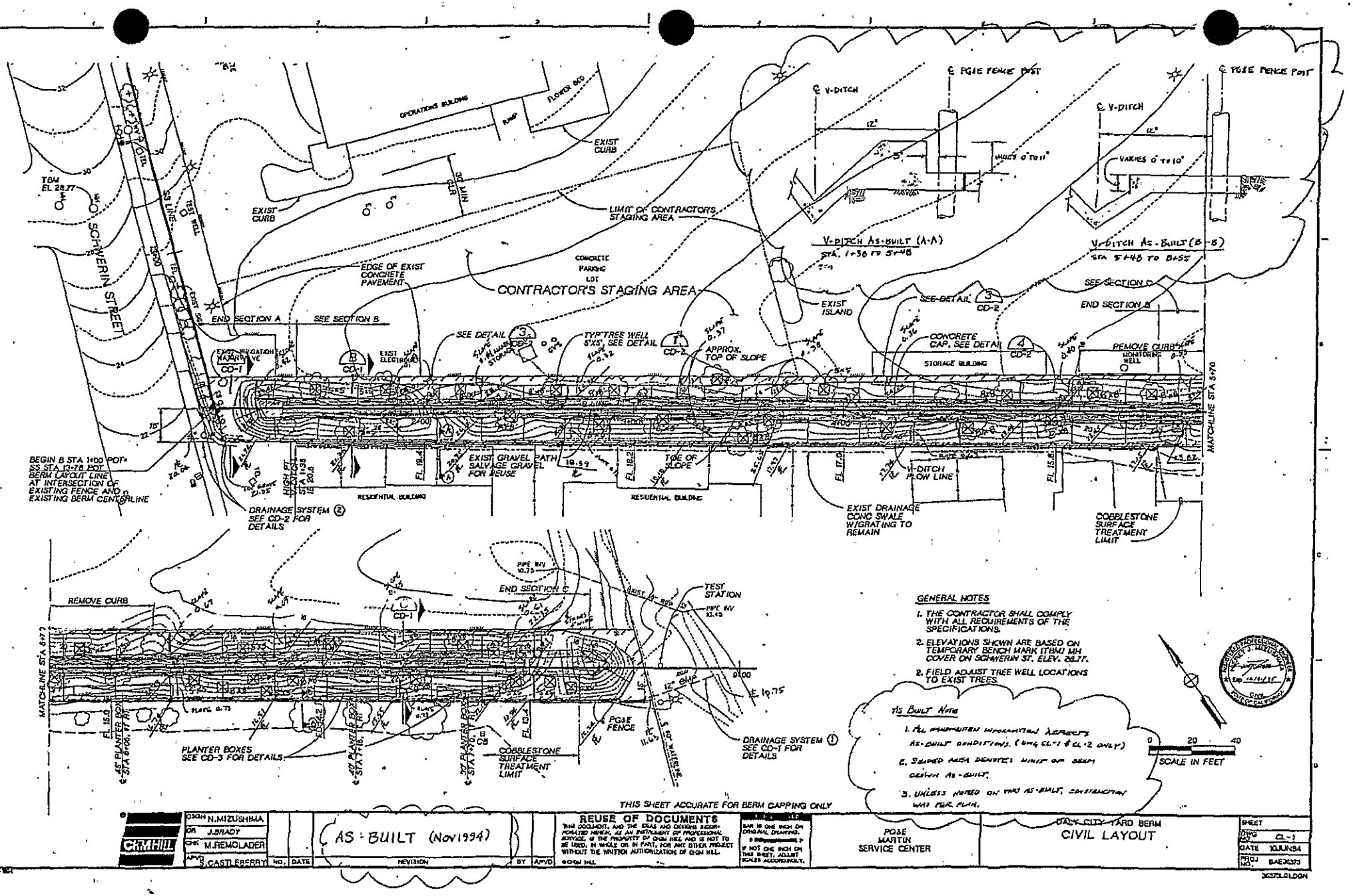
1143C006.dv 12-NOV-1998 12:22:36

PRELIMINARY

REUSE OF DOCUMENTS: THIS DOCUMENT AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2MHILL. ©2001 CH2M HILL

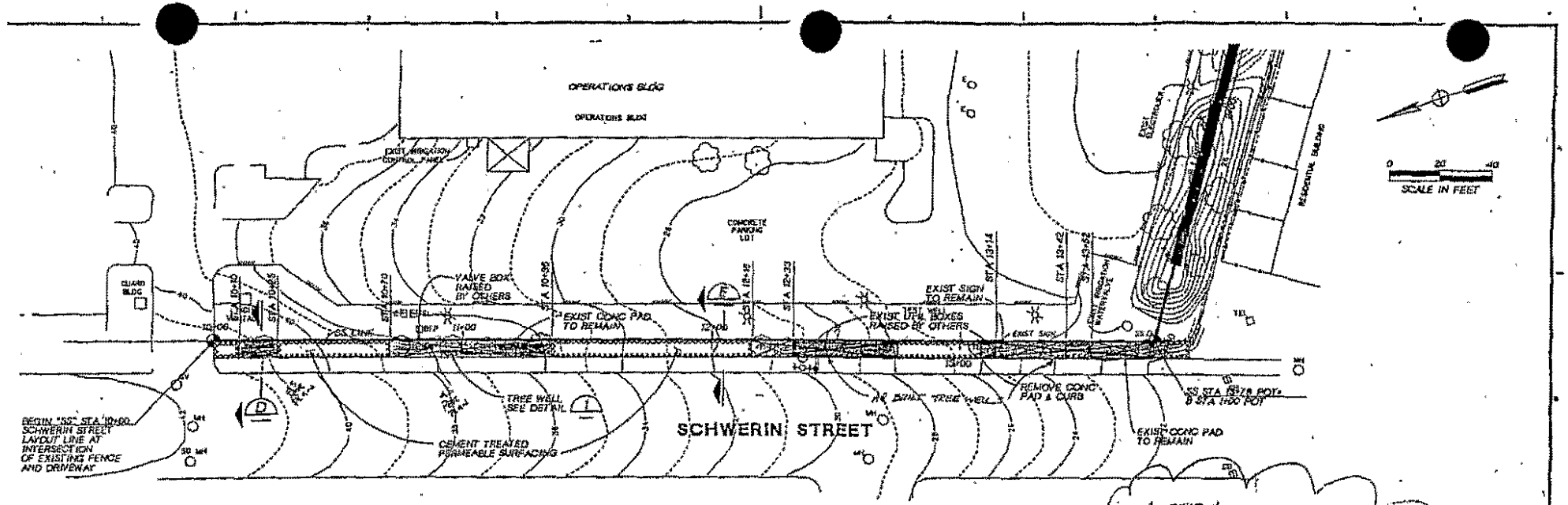
2002-208875
10/17/2002 11:48A
DR Page: 21 of 26

EXHIBIT B



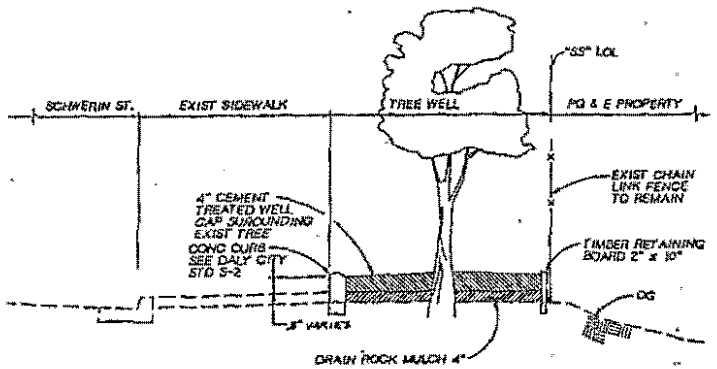
2002-208875
10/17/2002 11:48A
DR Page: 22 of 26

EXHIBIT B

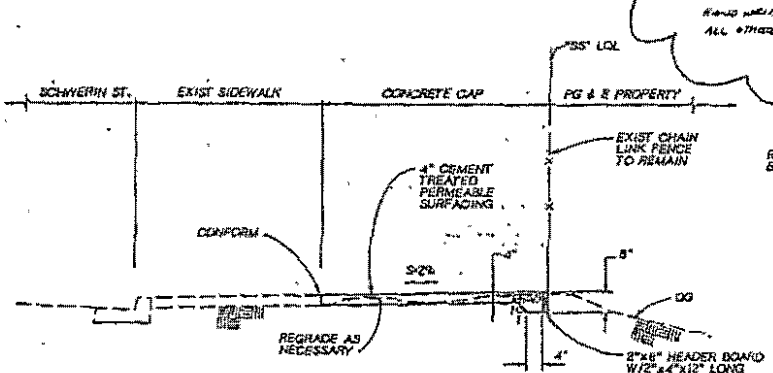


PLAN
SCALE 1"=20'

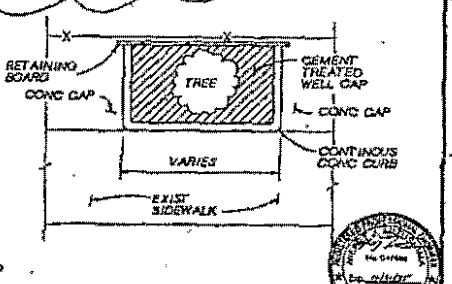
As Built Notes:
1. Shaded areas denote limits of Tree well areas as-built.
2. As built conditions reflected in hand written notes and dimensions. All other information per plan.



SECTION D
NO SCALE



SECTION E
NO SCALE



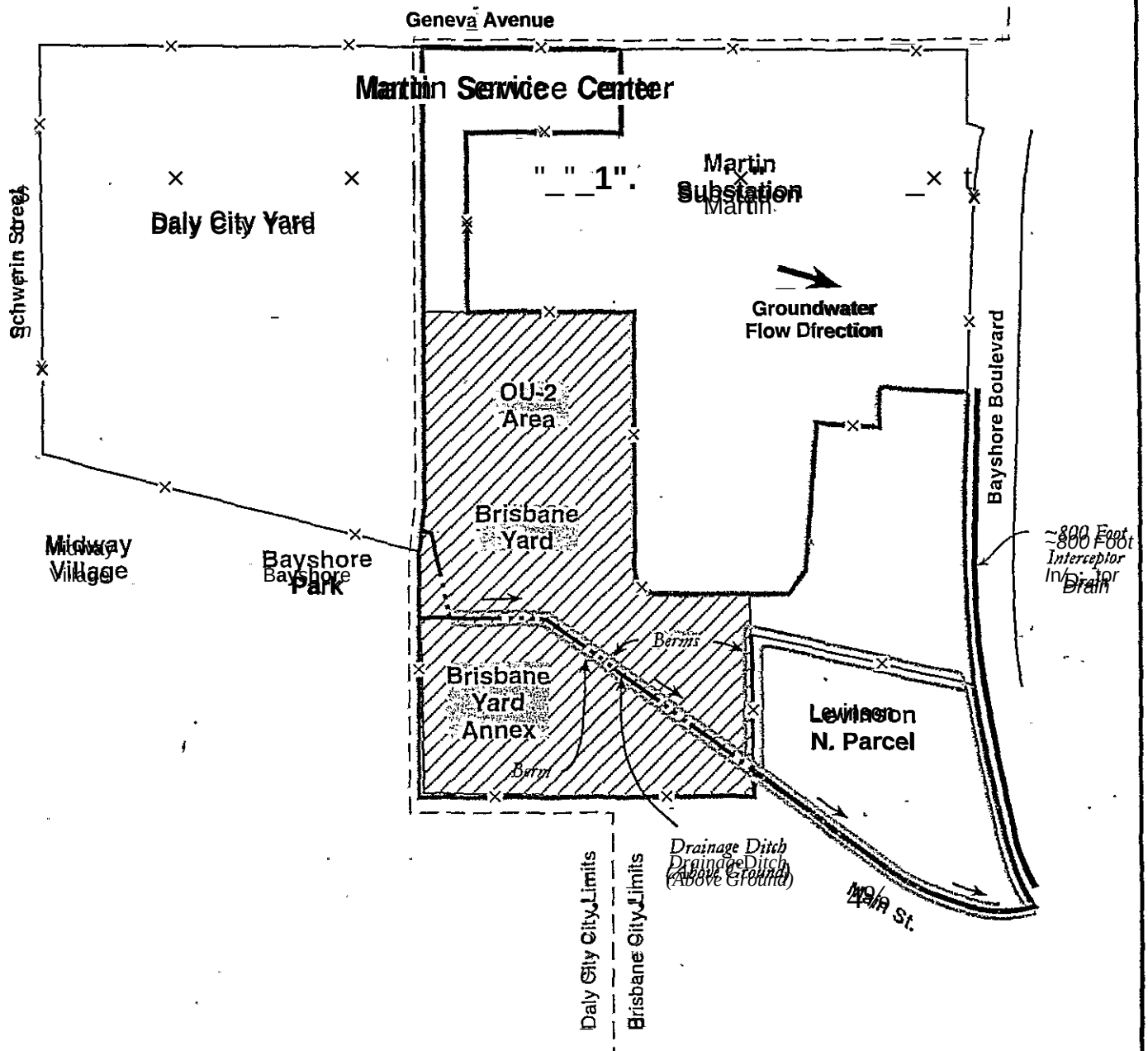
DETAIL 1
NO SCALE

THIS PLAN ACCURATE FOR SIDEWALK MODIFICATION ONLY

DESIGN N. MIZUSHIMA DR F. POON CK M. REMOLADER APVD CASTLEBERRY	NO.	DATE	AS BUILT (Nov 1994) REVISION	BY	APVD	REUSE OF DOCUMENTS: THIS DRAWING AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF DAVID HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF DAVID HILL. ©DAVID HILL	PG&E MARTIN SERVICE CENTER	SCHWERIN STREET SIDEWALK MODIFICATION CIVIL LAYOUT AND DETAILS	SHEET NO. CL-2 DATE 10JUN94 PROJ NO. 9403073

2002-208875
10/17/2002 11:48A
DR Page: 23 of 26

EXHIBIT B

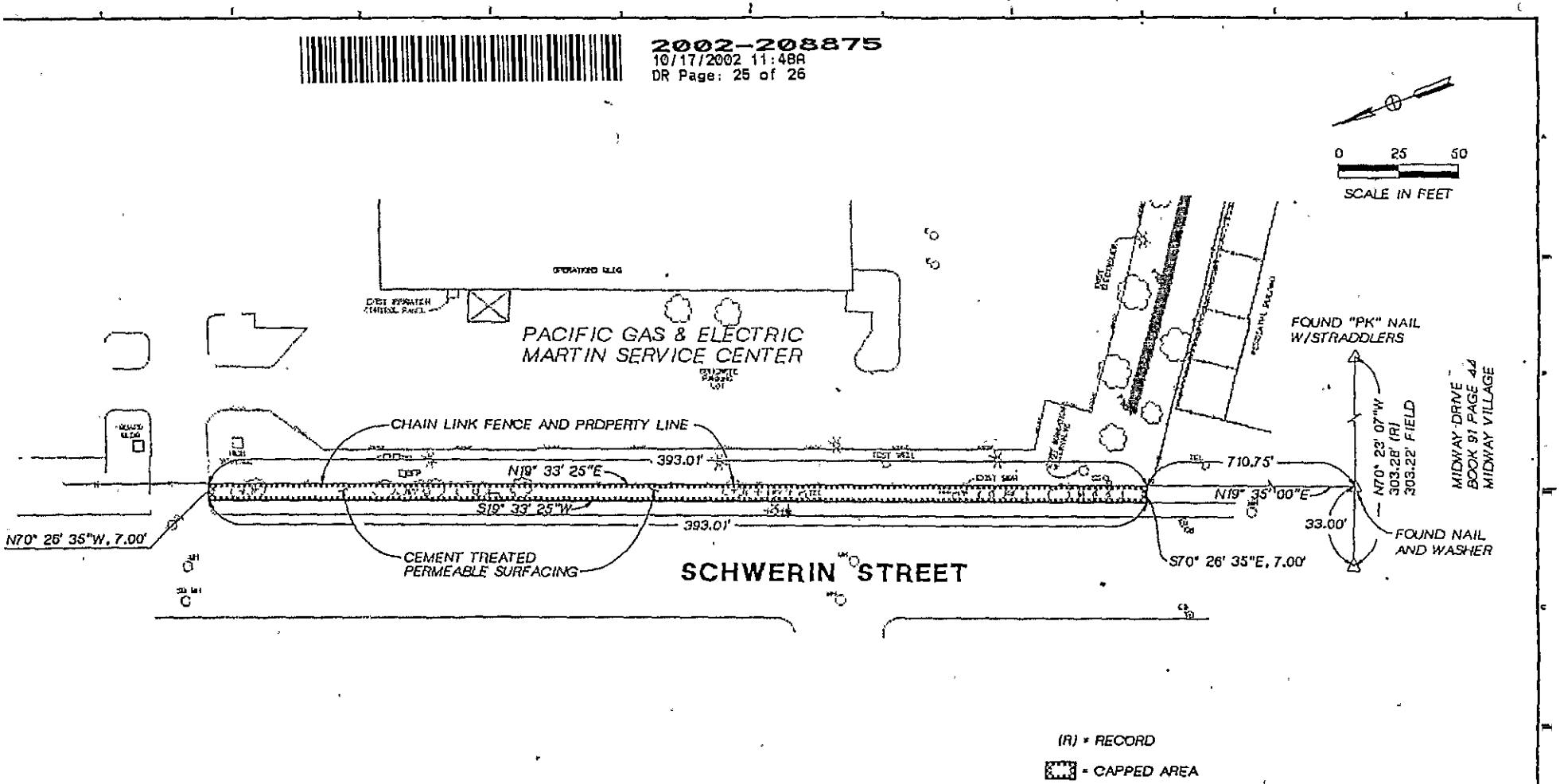


OU-2 Remediation Activities
Martin Service Center
Operable Unit 2

CH2MHILL

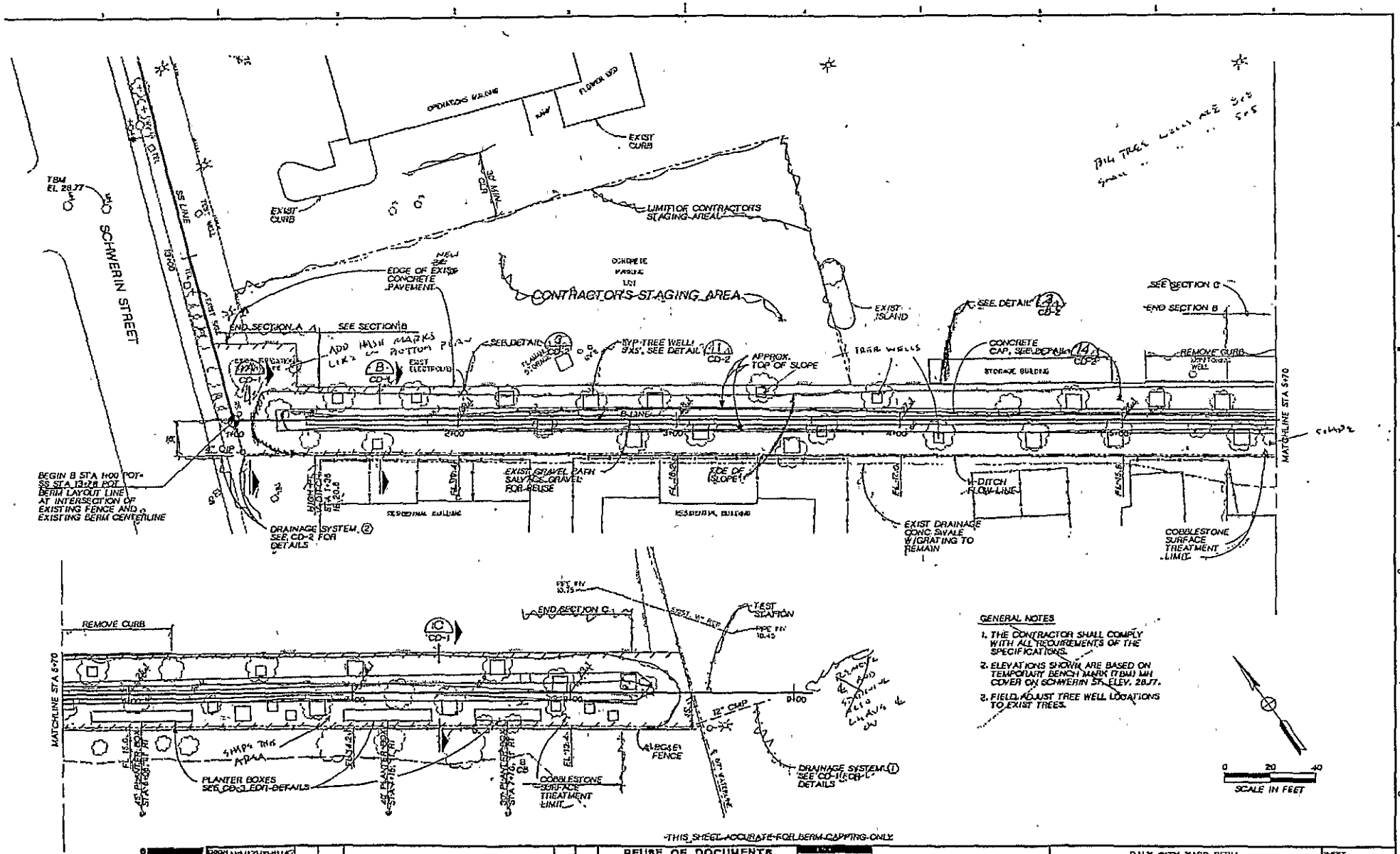
2002-208875
Page: 25 of 25

2002-208875
10/17/2002 11:48A
DR Page: 25 of 26



DSGN R. ANDERSON DR F. POON CHK R. VAUGHN APVD N. MIZUSHIMA	NO.	DATE	REVISION	BY	APVD	REUSE OF DOCUMENTS THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF OHM HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF OHM HILL. ©OHM HILL	BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.	DALY CITY, CA SAN MATEO COUNTY	CEMENT - TREATED PERMEABLE CAP ALONG THE EASTERLY SCHWERIN STREET SIDE WALK	SHEET 1 DWG NO. 1 DATE DEC 1994 PROJ NO. BAE36373

EXHIBIT C



THIS SHEET ACCURATE FOR BERM CAPPING ONLY

CH2MHILL

DSGN J.NIIZUSHIMA
DT J.BRADY
CK M.BELVOLADEN
APVD S.CASTLEBERRY

NO.	DATE	REVISION	BY	APVD

REUSE OF DOCUMENTS
THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL.

IF THIS BAR IS ONE INCH ON ORIGINAL DRAWING, 0 = FULL SIZE. IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

PG&E MARTIN SERVICE CENTER

DALY CITY YARD BERM
-CIVIL LAYOUT-
CONCRETE CAP

SHEET NO.	CL-1
DATE	10JUN04
PROJ NO.	364503

EXHIBIT C

ATTACHMENT C

Revised Operation and Maintenance Agreement (2003)

In the matter of:	)	
	)	
Pacific Gas and Electric Co.	)	
Martin Service Center	)	
731 Schwerin Street	)	AMENDMENT TO ENFORCEABLE
Daly City, California 94014	)	AGREEMENT DOCKET No.
	)	HSA-94/95-010
	)	
	)	
	)	Health and Safety Code
A Hazardous Waste Site	)	Section 25355.5(a)(1)(C)
	)	

The Enforceable Agreement Docket No. HSA-94/95-010 entered into by the Department of Toxic Substances Control (DTSC) and Pacific Gas and Electric Company (PG&E) on January 6, 1995 (hereinafter referred to as the Agreement) is hereby amended as follows:

1. Paragraph 1.0. is replaced by a new paragraph 1.0., as follows:

1.0. It will be necessary to maintain the Caps that were installed at the PG&E Martin Service Center to prevent public and environmental exposure to soil and groundwater contaminated with polynuclear aromatic hydrocarbons (PNAs). It will be necessary to maintain the Interceptor Trench that was installed to ensure that potentially contaminated groundwater does not flow offsite.

2. Paragraph 3.1. is replaced by a new paragraph 3.1., as follows:

3.1. Implementation of Operation and Maintenance Plans. Respondent shall implement the Operation and Maintenance Plan (OMP) dated August 30, 2002 and attached hereto as Exhibit A for continuing maintenance of the Caps and the Interceptor Trench installed at the PG&E Martin Service Center. The Caps and the Interceptor Trench shall be left in place and maintained by Respondent until and except to the extent the Department authorizes Respondent in writing to discontinue, move, or modify one or all of the of the Caps or the Interceptor Trench.

3. Paragraph 3.2. is replaced by a new paragraph 3.2., as follows:

3.2. Modifications. Respondent shall give the Department at least thirty [30] days advance written notice prior to any proposed modifications, discontinuation or other disruption of the Caps or Interceptor Trench, excluding routine maintenance or installation of utility facilities at the PG&E Martin Service Center, if said maintenance is performed in compliance with PG&E's "Guidelines for Excavations at Former Manufactured Gas Plant Sites" dated September 1991 and attached hereto as Exhibit B. The written notice to the Department shall include a detailed description of the work to be done or modifications to be made, a map showing the exact location of the proposed work, and the reasons for the modification, disruption or discontinuation.

4. Paragraph 3.4. is replaced by a new paragraph 3.4., as follows:

3.4 Annual Summary Reports. Respondent shall submit an Annual Summary Report of its activities under the provisions of this Agreement. The report shall be received by the Department by February 15 each year and shall describe:

a) Specific actions taken by or on behalf of Respondent during the previous year;
b) Actions expected to be undertaken during the current year;
c) All planned activities for the next year;
d) Any requirements under this Agreement that were not completed;
e) Any problems or anticipated problems in complying with this Agreement; and
f) All results of sample analyses, tests, and other data generated under this Agreement, and any significant findings from these data.

5. Paragraph 22.0 is replaced by a new paragraph 22.0, as follows:

22.0 Financial Assurance. Respondent must assure that sufficient monies are available to: implement the OMP; conduct the Five-Year Review as outlined in paragraph 3.5; and pay costs as outlined in paragraph 23.0. PG&E will use a Trust Fund to provide continuing maintenance at the PG&E Martin Service Center and the Department's incurred oversight costs. The cost estimate for the Operation and Maintenance is shown by a new Exhibit D attached hereto.

6. Exhibit C (Site Map) is replaced by a new Exhibit C attached hereto.

7. Exhibit A (Operation and Maintenance Plan) is replaced by a new Exhibit A attached hereto.

8. The effective date of this Amendment to the Agreement is the date when it is signed by DTSC.

9. Each undersigned representative of the parties to this Amendment to the Agreement certifies that she or he is fully authorized to enter into the terms and conditions of this Amendment to the Agreement and to excavate and legally bind the parties to this Amendment to the Agreement.

10. This Amendment to the Agreement may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Barbara J. Cook

Date: 2/10/2003

Barbara J. Cook, P.E. Chief
Site Mitigation Branch
Department of Toxic Substances Control

Date: 10/8/02

Name: Robert L. Harris
Title: Vice President – Environmental Affairs
Pacific Gas and Electric Company

In the Matter of:	Docket No. HSA - 94/95-010
PACIFIC GAS AND ELECTRIC COMPANY MARTIN SERVICE CENTER OPERABLE UNIT ONE 731 Schwerin Street Daly City, California 94014	ENFORCEABLE AGREEMENT
Pacific Gas and Electric Company Respondent	Health and Safety Code Section 25355.5(a)(1)(C)

AGREEMENT
OPERATION AND MAINTENANCE

PG&E MARTIN SERVICE CENTER
DALY CITY YARD
Daly City, California

This Agreement is made and entered into, by and between the State Department of Toxic Substances Control ("Department") and the Pacific Gas and Electric Company, at 77 Beale Street, San Francisco, California 94120 ("Respondent").

W H E R E A S:

1.0. It will be necessary to maintain the Cap which has been installed at the Daly City Yard of the PG&E Martin Service Center to prevent public and environmental exposure to soil contaminated with polynuclear aromatic hydrocarbons (PNAs) (the Cap).

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

1.1 The PG&E Martin Service Center is located at 731 Schwerin Street, Daly City, California. The Property is currently owned by the Pacific Gas and Electric Company.

1.2. PG&E dedicated approximately 33 feet of the Property bordering Schwerin Street to the City of Daly City in 1908 for the purpose of a street right-of-way (Schwerin Street Strip). Daly City retains interest over approximately 176 square yards of this portion of the Property as a limited easement for public passage and utilities.

1.3 The Property is depicted on the map attached hereto as Exhibit A, and is further described on Exhibit B attached hereto.

2.0. The parties hereto, based upon the foregoing and in exchange for the mutual performances and forbearances described below, agree as follows:

AGREEMENT

3.0. Obligations of the Pacific Gas and Electric Company.

3.1. Implementation of Operation and Maintenance Plans. Respondent shall implement the Operation and Maintenance Plan (OMP) dated December 8, 1994 and attached hereto as Exhibit C for continuing maintenance of the Cap installed at the PG&E Martin Service Center. The Cap shall be left in place and maintained by Respondent until and except to the extent that the Department authorizes

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

Respondent in writing to discontinue, move or modify some or all of the Cap.

3.2. Modifications. Respondent shall give the Department at least sixty [60] days advance written notice prior to any proposed modifications, discontinuation or other disruption of the Cap, excluding routine maintenance or installation of utility facilities at the PG&E Martin Service Center, if said maintenance is performed in compliance with the PG&E's "Guidelines for Excavations at Former Manufactured Gas Plant Sites" dated September 1991 and attached hereto as Exhibit D. The written notice shall be sent by certified mail to the Department at the address set out in Paragraph 8.0 of this Agreement. The written notice to the Department shall include a detailed description of the work to be done or modifications to be made and a map showing the exact location of the proposed work and the reasons for modification, disruption or discontinuation.

3.3 Environmental Monitoring. Respondent shall implement the maintenance plans and reporting requirements approved by the Department. The inspection and maintenance plans are included in the OMP, attached hereto as Exhibit C. Respondent shall also comply with the inspection and maintenance requirements of other agencies.

3.4 Annual Summary Reports. Within thirty [30] days of the initial completion of Cap construction, and on an annual

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

basis thereafter, Respondent shall submit an Annual Summary Report of its activities under the provisions of this Agreement. The report shall be received by the Department by the fifteenth [15th] day of the first month after each year ends and shall describe:

a) Specific actions taken by or on behalf of Respondent during the previous year;

b) Actions expected to be undertaken during the current year;

c) All planned activities for the next year;

d) Any requirements under this Agreement that were not completed;

e) Any problems or anticipated problems in complying with this Agreement; and

f) All results of sample analyses, tests, and other data generated under this Agreement, and any significant findings from these data.

3.5 Five Year Review. Pursuant to Section 121(c) of CERCLA (42 U.S.C. 9601, et seq.), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, Respondent shall submit a remedial action review workplan within thirty [30] days before the end of the five-year period following approval of the final RAP. Within sixty [60] days of the Department's approval of the workplan, Respondent shall implement the workplan and shall submit a comprehensive report of the results of the remedial action

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

review. The report shall provide the results of all sample analyses, tests and other data generated or received by the Respondent and evaluate the adequacy of the implemented remedy in protecting public health, safety and the environment.

3.6 Emergency Response Action/Notification. In the event of any action or occurrence (such as a fire, earthquake, explosion, or human exposure to hazardous substances caused by the release or threatened release of a hazardous substance, with the exception of routine maintenance as described in Paragraph 2.2) during the course of this Agreement, Respondent shall immediately take all appropriate action to prevent, abate, or minimize such emergency, release, or immediate threat of release and shall immediately notify the Project Manager. Respondent shall take such action in consultation with the Project Manager and in accordance with all applicable provisions of this Agreement. Within seven [7] days of the onset of such an event, Respondent shall furnish a report to the Department, signed by Respondent's Project Coordinator, setting forth the events which occurred and the measures taken in the response thereto. In the event that Respondent fails to take appropriate response and the Department takes the action instead, Respondent shall be liable to the Department for all costs of the response action. Nothing in this

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

section shall be deemed to limit any other notification requirement to which the Respondent may be subject.

4.0 Obligations of the Department. The Department agrees to review and oversee the measures to be performed by Respondent pursuant to this Agreement.

5.0 Project Coordinator. Within five [5] days of the effective date of this agreement Respondent shall submit to the Department in writing, the name and address of a Project Coordinator. The responsibilities of the Project Coordinator will be to receive and submit all notices, comments, approvals, and other communications from and to the Department. Respondent shall promptly notify the Department of any change in the identity of the Project Coordinator.

6.0 Project Engineer/Geologist. The work performed pursuant to this Agreement shall be under the direction and supervision of a qualified professional engineer or a registered geologist in the State of California with expertise in hazardous substance site cleanup. Within five [5] calendar days from the date the Agreement is signed by the Department, Respondent must submit: a) The name and address of the project engineer or geologist chosen by the Respondent; and b) in order to demonstrate expertise in hazardous substance cleanup, the resume of the engineer or geologist, and the statement of qualifications of the consulting firm responsible for the work. Respondent shall

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

promptly notify the Department of any change in the identify of the Project Engineer/Geologist.

7.0 Quality Control/Quality Assurance (QC/QA). All sampling and analysis conducted by Respondent under this Agreement shall be performed in accordance with QC/QA procedures submitted by Respondent and approved by the Department pursuant to this Agreement.

8.0 Submittals. All submittals and notifications from Respondent that are required by this Agreement, shall be sent simultaneously to:

Barbara J. Cook
Site Mitigation Branch Chief
Department of Toxic Substances Control
700 Heinz Avenue Suite 200
Berkeley, California 94710
Attn: Project Manager

Steven Ritchie, Director
San Francisco Bay Regional Water
Quality Control Board
2101 Webster Street
Oakland, California 94612
Attn: Project Manager

9.0. Communications. All approvals and decisions of the Department made regarding submittals and notifications will be communicated to Respondent in writing by the Site Mitigation Branch Chief, Department of Toxic Substances Control, or his/her designee. No informal advice, guidance, suggestions or comments by the Department regarding reports, plans, specifications, schedules or any other writings by Respondent shall be construed to relieve Respondent of the

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

obligations to obtain such formal approvals as may be required.

10.0. Department Review and Approval. (a) If the Department determines that any report, plan, schedule or other document submitted to the Department for approval pursuant to this Agreement fails to comply with this Agreement or fails to protect public health or safety or the environment, the Department may: (1) modify the document as deemed necessary and approve the document as modified; or (2) return comments to Respondent with recommended changes and a date by which Respondent must submit to the Department a revised document incorporating the recommended changes.

(b) Any modifications, comments or other directive issued pursuant to (a) above, are incorporated into this Agreement. Any noncompliance with these modifications or directives shall be deemed a failure or refusal to comply with this Agreement.

11.0 Stop Work Order. In the event that the Department determines that any activity (whether or not pursued in compliance with this Agreement) may pose an imminent or substantial endangerment to the health or safety of people on the Site or in the surrounding area or to the environment, the Department may order Respondent to stop further implementation of this Agreement for such period of time needed to abate the endangerment. In the event that the Department determines that any activities (whether or

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

not pursued in compliance with this Agreement) are proceeding without Department authorization, the Department may order Respondent to stop further implementation of this Agreement or activities for such period of time needed to obtain Department authorization, if such authorization is appropriate. Any deadline in this Agreement directly affected by a Stop Work Order, under this section, shall be extended for the term of the Stop Work Order.

12.0. Department Required Modifications. The Department may require modification, replacement, or additions to remediation facilities if those facilities are not achieving remediation objectives or protecting public health, safety or the environment, including those identified in the Remedial Action Plan or Remedial Design. The Department may require additional evaluations, designs and the construction and operation of facilities to achieve these objectives.

13.0. Compliance with Applicable Laws. Respondent shall carry out this Agreement in compliance with all applicable local, state, and federal requirements, including, but not limited to, requirements to obtain permits and to assure worker safety.

14.0 Respondent Liabilities. Nothing in this Agreement shall constitute or be construed as a satisfaction or release from liability for any conditions or claims arising as a result of past, current or future operations of

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

Respondent. Nothing in this Agreement is intended or shall be construe to limit the rights of any of the parties with respect to claims arising out of or relating to the deposit or disposal at any other location of substances removed from the Site. Nothing in this Agreement is intended or shall be construed to limit or preclude the Department from taking any action authorized by law to protect public health or safety or the environment and recovering the cost thereof. Notwithstanding compliance with the terms of this Agreement, Respondent may be required to take further actions as are necessary to protect public health and the environment.

15.0 Site Access. Access to the Site and laboratories used for analyses of samples under this Agreement shall be provided at all reasonable times to employees, contractors and consultants of the Department. Nothing in this paragraph is intended or shall be construed to limit in any way the right of entry or inspection that the Department or any other agency may otherwise have by operation of any law. The Department and its authorized representatives shall have the authority to enter and move freely at the Site at all reasonable times for purposes including, but not limited to: inspecting records, operating logs, sampling and analytical data, and contracts relating to the Site; reviewing the progress of Respondent in carrying out the terms of this Agreement; conducting such tests as the Department may deem necessary; and verifying the data to the Department by

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

Respondent. The Department shall make a reasonable effort to give Respondent prior notification of each inspection date, and shall provide split samples to the Respondent or representative upon request. During the inspection, the Department and representative shall comply with all reasonable security and safety measures. Respondent shall ensure that no conveyance of title, easement or other interest in the property shall be executed or consummated without incorporating the continued right of entry by the Department.

16.0. Sampling, Data and Document Availability. Respondent shall permit the Department and its authorized representatives to inspect and copy all sampling, testing, monitoring or other data generated by Respondent or on Respondent behalf in any way pertaining to work undertaken pursuant to this Agreement. Respondent shall submit all such data upon request of the Department. Respondent shall inform the Department at least seven [7] days in advance of all field sampling under this Agreement, and shall allow the Department and its authorized representatives to take duplicates of any samples collected by Respondent pursuant to this Agreement. Respondent shall maintain a central repository of the data, reports, and other documents prepared pursuant to this Agreement.

17.0 Record Retention. All such data, reports and other documents shall be preserved by Respondent for a

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

minimum of ten [10] years after the conclusion of all activities under this Agreement. If the Department requests that some or all of these documents be preserved for a longer period of time, Respondent shall either comply with that request or deliver the documents to the Department, or permit the Department to copy the documents prior to destruction. Respondent shall notify the Department in writing at least six [6] months prior to destroying any documents prepared pursuant to this Agreement.

18.0. Government Liabilities. The State of California shall not be liable for any injuries or damages to persons or property resulting from acts or omissions by Respondent, or related parties specified in paragraph 30.0, Parties Bound, in carrying out activities pursuant to this Agreement, nor shall the State of California be held as a party to any contract entered into by Respondent or its agents in carrying out activities pursuant to this Agreement.

19.0. Additional Actions. By entering into this Agreement, the Department does not waive the right to take any further actions authorized by law.

20.0. Extension Requests. If Respondent is unable to perform any activity or submit any document within the time required under this Agreement, Respondent may, prior to expiration of the time, request an extension of the time in writing. The extension request shall include a

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

justification for the delay. All such requests shall be in advance of the date on which the activity or document is due.

21.0. Extension Approvals. If the Department determines that good cause exists for an extension, it will grant the request and specify a new schedule in writing. Respondent shall comply with the new schedule, which is incorporated in this Agreement.

22.0 Financial Assurance. Respondent must assure that sufficient monies are available to: implement the OMP; conduct the Five-Year Review as outlined in paragraph 3.5; and pay costs as outlined in paragraph 23.0. Respondent will submit an annual report providing documentation in support of the use of the financial test to demonstrate financial responsibility to provide continuing maintenance of the Cap installed at the PG&E Martin Service Center and the Department's incurred oversight costs.

23.0. Cost Recovery. To the extent required by law, Respondent is liable for all of the Department's costs incurred in responding to the contamination at the Site (including costs of overseeing response work performed by Respondent) or costs to be incurred in the future. Cost recovery may also be pursued by the Department under CERCLA, Health and Safety Code Section 25360, or any other applicable state or federal statute or common law. The

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

Department will invoice Respondent for the Department's costs on a quarterly basis.

24.0. Severability. The requirements of this Agreement are severable, and Respondent shall comply with each and every provision hereof notwithstanding the effectiveness of any other provisions.

25.0. Incorporation of Plans, Schedules and Reports. All plans, schedules, reports, specifications and other documents that are submitted by Respondent pursuant to this Agreement are incorporated in this Agreement upon the Department's approval or as modified pursuant to Paragraph 12.0, Department Review and Approval, and shall be implemented by Respondent. Any noncompliance with the documents incorporated in this Agreement shall be deemed a failure or refusal to comply with this Agreement.

26.0. Modification and Termination. Respondent may, upon written request, seek modification or termination of this Agreement at any time. This Agreement may be modified or terminated by mutual written agreement

27.0. Dispute Resolution. Respondent may seek resolution to a dispute which arises from a decision made by the Department related to this Agreement, including decisions made under the Modification and Termination provisions. Respondent may seek dispute resolution in accordance with the following process:

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

a. Respondent may seek resolution from the Department's first-line supervisor (Senior) who supervises the Project Manager.

b. If the issue is not resolved after review by the first-line supervisor, Respondent may seek resolution from the second-line manager, the Branch Chief.

28.0. Time Periods. Unless otherwise specified, time periods begin from the effective date of this Agreement and "days" means calendar days.

29.0. Effective Date. The effective date of this Agreement is the date it is signed by the Department.

30.0. Parties Bound. This Agreement applies to and is binding upon Respondent and its successors and assignees, and upon the Department and any successor agency of the State of California that may have responsibility for and jurisdiction over the subject matter of this Agreement.

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

31.0. Representative Authority. Each undersigned representative of the parties to this Agreement certifies that she or he is fully authorized to enter into the terms and conditions of this Agreement and to execute and legally bind the parties to this Agreement.

DATE: 1-3-95

NAME

Manager, Building and Land Services

TITLE
For Respondent

DATE: 1-6-95

Barbara J. Cook, Chief
Site Mitigation Branch, Region 2
Department of Toxic Substances Control

COURT PAPER
STATE OF CALIFORNIA
STD. 113 (REV. 8-72)

85 34769

Department of Toxic Substances Control

Edwin F. Lowry, Director
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

August 30, 2002

Darrell Klingman
Pacific Gas and Electric Company
Environmental Services
P.O. Box 770000
Mail Code B24A
San Francisco, California 94120

Dear Mr. Klingman:

The Department of Toxic Substances Control (DTSC) has completed its review of the revisions to the Operation and Maintenance (O&M) Plan dated August 2002 for the PG&E Martin Site. DTSC, hereby, approves the revised O&M Plan.

If you have any questions, please contact Virginia Lasky at (510) 540-3829.

Sincerely,

Barbara J. Cook, P.E., Chief
Northern California - Coastal
Cleanup Operations Branch

cc: Mr. Al Atkinson
Pacific Gas & Electric Company
P.O. Box 770000
Mail Code B24A
San Francisco, California 94120

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.

Printed on Recycled Paper

EXHIBIT A

REVISED
OPERATIONS AND MAINTENANCE PLAN

for

MARTIN SERVICE CENTER OPERABLE UNIT 1 (The Daly City Yard Berm Cap and Schwerin Street Strip Cap) AND OPERABLE UNIT 2 (Brisbane Yard and Annex Cap and Interceptor Trench)

Background

The 49-acre Martin Service Center site is located at 731 Schwerin Street in Daly City, California, approximately 0.1 mile south of the City of San Francisco and approximately 0.6 mile west of the San Francisco Bay. From previous operations at the site, polynuclear aromatic hydrocarbons (PNAs) and volatile organic compounds (VOCs) were detected in the soil and groundwater beneath the PG&E property.

Remedial actions for Operable Unit 1 (OU-1) were presented in the Draft Remedial Action Plan (RAP) that, in conformance with Section 25356.1 of the California Health and Safety Code, was circulated for public review and comment from October 26, 1992 to May 3, 1993. The Final RAP was approved by DTSC in June 1993. Further details of the remediation were described in the Remedial Design and Implementation Plan (RDIP) dated December 1993 and approved by DTSC on December 23, 1993. The final construction documents were approved by DTSC on April 28, 1994.

Remedial actions for Operable Unit 2 (OU-2) were presented in the Draft RAP circulated for public review and comment from April 20 to June 4, 1998. The Revised RAP was approved by DTSC on July 20, 1998. Further information on the remediation was presented in the RDIP dated November 1998 and approved by DTSC on September 16, 1999. DTSC approved the off haul of soil with detected concentrations of greater than 10 mg/kg cPNAs in a letter dated September 26, 2000. The final construction documents were approved by DTSC on June 19, 2002.

The remedial actions for OU-1 were as follows:

- The strip of land between Schwerin Street and the Martin Service Center property was covered with a concrete cap with accommodations for the existing trees.

- The berm along the southern boundary of the Martin Service Center Daly City Yard was covered with a shotcrete cap, with landscaping and drainage provided.

The remedial actions for OU-2 were as follows:

EXHIBIT A

- Installation of a groundwater interceptor trench on PG&E property and the Levinson North Parcel, owned by PG&E, adjacent to the west side of Bayshore Boulevard.

- Classification and management of soil generated during the construction of the Bayshore Storm Drain Improvement Project (BSDIP) including off site disposal of soil that exceeded reuse criteria and filling, grading, and placement of a chip seal cap on the Brisbane Yard and the Brisbane Yard Annex.

- Abandonment of monitoring wells located within the construction area.

Cap Monitoring and Maintenance

PG&E will inspect all capped areas annually. Concrete and asphalt capped areas will be inspected for broken, cracked, or missing concrete. If the concrete is cracked it will be repaired with a suitable concrete patching product. If the area is badly cracked or broken, a contractor will be hired to make the appropriate repairs. If the concrete cannot be repaired, the old concrete and reinforcing will be removed as needed and new concrete and reinforcing placed and connected with dowels into the existing concrete.

Chip seal surfaces will be inspected semi-annually for deterioration and, if found to be deteriorated, worn, or damaged sufficiently to allow significant dust generation, the chip seal surface will be repaired as needed. If chip sealed surfaces are upgraded to asphalt, the asphalt surfaces will be inspected annually.

Drainage Monitoring

OU-1 and OU-2 drainage areas will be monitored as needed to inspect for debris blocking catch basin grates owned by PG&E. All debris will be removed and properly disposed. PG&E will notify DTSC and the City of Brisbane regarding any blockage and damage to the drainage channels.

Irrigation and Landscape Monitoring and Maintenance

The sprinkler system timer is located on the west side of the Operations Building. The irrigation system for the berm shall be inspected quarterly for malfunctions and leaks.

A PG&E representative will inspect the planted areas annually for brown or dying plants, overly damp areas (as a sign of leaks in the irrigation system), and weed growth. The planter wells will be checked to make sure that the rock has not washed out of the planters and that soil is not exposed. If any rock has washed out, it will be raked back into the planters or tree wells.

If plants show signs of deterioration, or if the irrigation system leaks, a landscape irrigation firm will be contracted to make repairs to the irrigation system.

If plants show signs of deterioration, or if the irrigation system leaks, a landscape irrigation firm will be contracted to make repairs to the irrigation system.

Groundwater Monitoring

Starting with Monitoring Program Event 29, groundwater will be sampled on an annual basis from monitoring wells S1, S2, S6, F4, and F9. In addition, one sample will be collected from each segment of the interceptor trench annually. The samples collected from the monitoring wells and trench segments will be analyzed for total PAHs. The samples from monitoring well S1 and the interceptor trench will also be analyzed for purgeable aromatics.

Water levels will be monitored on an annual basis using monitoring wells D1, F1, F2, F4, F5, F7, F8, F9, F10b, F12, and S1 through S9. The interceptor trench will also be monitored as required for compliance with the SFPOTW discharge permit as described below. The locations of the wells to be monitored in this program and the locations of the interceptor trench and sumps are shown on Figure1.

Interceptor Trench Monitoring

Routine monitoring of the interceptor trench will include:

- Checking the operability of the pumps quarterly.
- Recording the total flow from each pump on a quarterly basis.
- Semi-annual monitoring of the water levels in the trench well points and in the monitoring wells.
- Water quality monitoring of the interceptor trench effluent as required by the SFPOTW discharge permit. Monitoring will be performed quarterly for the analytes required in the permit.

Periodic and routine maintenance will be performed to keep the trench operating as designed. Routine maintenance of the pumps and flow meters will be performed at the frequency recommended by the manufacturer. Periodic maintenance, including replacement of pumps and other mechanical components, cleaning of the sumps, and cleaning of the trench drain pipe, will be performed as necessary.

Fencing

A PG&E representative will periodically, at least yearly, inspect the perimeter fence to check for holes or other damage to the fence. If damage is found, PG&E will make required repairs.

GUIDELINES FOR EXCAVATIONS AT FORMER MANUFACTURED GAS PLANT SITES

Prepared by:

Manufactured Gas Plant Project
Robert C. Doss, Project Manager

September 1991
Revision 3

EXHIBIT B

GUIDELINES FOR EXCAVATIONS
AT FORMER MANUFACTURED GAS PLANT SITES

TABLE OF CONTENTS

Section — Page

1.0 OVERVIEW 1
1.1 INTRODUCTION 1
1.2 BACKGROUND 1
1.3 GAS PLANT RESIDUES 1

2.0 GENERAL RESPONSIBILITIES AND APPROVALS 2
2.1 APPLICABILITY 2
2.2 RESPONSIBILITIES 2
2.3 WORK PLAN PREPARATION 2
2.4 PRE-EXCAVATION TESTING 3
2.5 UNDERGROUND TANK WORK AT FORMER MANUFACTURED GAS PLANT SITES 3
2.6 EMERGENCY WORK 3
2.7 EXCAVATION ADJACENT TO FORMER MANUFACTURED GAS PLANT SITES 3
2.8 AGENCY CONTACTS 3
2.9 SITE RUNOFF CONTROL 4

3.0 PRE-EXCAVATION TESTING 5

4.0 EXCAVATION AT FORMER MANUFACTURED GAS PLANT SITES WHERE NO RESIDUE IS KNOWN OR ANTICIPATED 6

5.0 EXCAVATION AT FORMER MANUFACTURED GAS PLANT SITES WHERE RESIDUE IS KNOWN OR ANTICIPATED 7

6.0 UNDERGROUND TANK WORK AT FORMER MANUFACTURED GAS PLANT SITES 9

7.0 EMERGENCY WORK AT FORMER MANUFACTURED GAS PLANT SITES 10

8.0 EXCAVATION WORK ADJACENT TO FORMER MANUFACTURED GAS PLANT SITES 11

9.0 RUNOFF CONTROL 12

10.0 ADDITIONAL CONSIDERATIONS 13
10.1 POTENTIAL COSTS 13
10.2 TRANSFER OF OWNERSHIP 13
10.3 SAFETY PRECAUTIONS 13
10.4 TRAINING 13

11.0 INFORMATION AND ASSISTANCE 15

LIST OF ATTACHMENTS

ATTACHMENT 1 - Historic Manufactured Gas Plant Sites

ATTACHMENT 2 - PG&E Excavation Work Plan and Site Safety Plan for Excavations at Former Manufactured Gas Plant Sites

GUIDELINES FOR EXCAVATIONS
at
FORMER MANUFACTURED GAS PLANT SITES

1.0 OVERVIEW

1.1 INTRODUCTION

The Company currently has facilities that are located on properties once used for the manufacturing of gas (see Attachment 1). Experience at certain of these facilities has shown that deposits of residues from these former operations may exist at some of these properties.

Some of the constituents in gas plant residues are classified as hazardous. For this reason, these guidelines have been established to provide procedures for managing any excavations or soil disturbance activities on or adjacent to these properties. Safety issues related to gas plant residues are addressed in Attachment 2. A generic site safety plan and instructions for preparing and approving a site safety plan for excavation at a former manufactured gas plant site are also included in Attachment 2.

"Excavation", in these guidelines, refers to any disturbance of surface or subsurface soil. "Adjacent to" means the properties and streets (or other public rights-of-way) that abut the property or properties containing a former manufactured gas plant site (Attachment 1).

1.2 BACKGROUND

Manufactured gas plants (MGPs) were operated by public utilities and private businesses before natural gas became readily available. These plants produced gas from coal and/or oil, and produced coal tar, lampblack, and other residues as by-products. By-product residues may still be buried at some of these sites.

Some of the chemical compounds in these residues may pose a potential health or environmental risk as they have been defined as hazardous under various Federal and State regulations. Because of this potential risk, these guidelines must be followed whenever Company employees, PG&E-contractors, or non-contracted persons (outside PG&E) undertake any excavation activity on or adjacent to those PG&E-owned sites listed in Attachment 1.

1.3 GAS PLANT RESIDUES

Gas plant residues are composed primarily of lampblack and coal tar materials. Residues are usually black or dark gray and often have a characteristic hydrocarbon odor. They may be dry and crumbly, oily, or tar-like. Concentrated deposits of this material are generally readily detectable visually and by odor.

2.0 GENERAL RESPONSIBILITIES AND APPROVALS

2.1 APPLICABILITY

These guidelines apply to all Company personnel, personnel working under contract to PG&E, and non-contracted (outside) personnel working on PG&E-owned properties. These guidelines apply when working on or adjacent to the former manufactured gas plant sites listed in Attachment 1. In addition to these guidelines, all applicable safety and engineering precautions concerning excavation, trenching, and earthwork procedures should be followed.

2.2 RESPONSIBILITIES

The operating department or Region responsible for the excavation work is responsible for complying with these guidelines. However, while work is physically underway, the management on-site supervisor has the primary responsibility for ensuring that these guidelines are adhered to.

The operating department or Region responsible for the work is responsible for all costs incurred in complying with these guidelines, including those costs related to monitoring at the site, and the proper handling and disposal of hazardous wastes generated as a result of the excavation.

2.3 WORK PLAN PREPARATION

A work plan (Attachment 2) describing the need and the scope of work involving the proposed excavation must be submitted to the Manufactured Gas Plant Project Manager, Environmental Services Department with a copy sent to the Vice-President of General Services at least 30 days in advance of the formal job authorization process (i.e., job estimate), except in cases of emergency excavations, routine (non-leaking) underground storage tank work, and excavations adjacent to former manufactured gas plant sites (Sections 7.0 and 8.0). If this deadline cannot be met, the operating department should contact the Manufactured Gas Plant Project Manager to arrange for an alternative deadline for work plan submittal and approval.

As stated above, cases not requiring work plan submittal and approval include emergency excavations, routine underground storage tank work, and excavations adjacent to former MGP sites. Routine underground tank work is defined as underground storage tank work where only unaffected, imported fill would be disturbed during the excavation activities. Prior to initiation of excavation activities at these sites, the Environmental Services Department will be notified of the site work as soon as is possible. This will provide coordination with the Company's Manufactured Gas Plant Project and help ensure that appropriate work procedures, safety precautions, and agency notifications are made.

In addition to the work plan, a site safety plan (Attachment 2) should be prepared and submitted with the work plan to the Manufactured Gas Plant Project Manager. The Manufactured Gas Plant Project Manager will coordinate the review and approval of these plans with the Vice-President of General Services and other appropriate Company departments (e.g., the Safety, Health and Claims Department).

For small-scale excavations (less than 5 cubic yards) for recurring projects such as installation or removal of poles, installation and removal of fence posts and gates, patch paving where only the pavement base will be affected, etc., the Environmental Coordinator shall be contacted prior to initiation of the work in lieu of preparing a work plan and site safety plan. For these projects, the Environmental Coordinator will be

responsible for ensuring the that appropriate work procedures and safety precautions are followed, and for notifying the Company's Manufactured Gas Plant Project of the small-scale excavation.

Approval of the work plan, in writing, by the Vice President - General Services must be obtained before excavation (including core samples and test borings) is undertaken at any site listed in Attachment 1. This is in addition to the normally required job authorization.

Attempts should be made to locate the excavation in an area which is unlikely to contain gas plant residue. A historical evaluation of the site should be conducted prior to work plan preparation in an attempt to determine the locations most likely to contain (or not contain) gas plant residues. The Manufactured Gas Plant Project Team (Section 11.0) should be contacted for assistance in this area. The size of any necessary excavation should be minimized (in both surface area and depth). The work plan should also address reasonable alternatives to the proposed action, including a no-action alternative.

2.4 PRE-EXCAVATION TESTING

Pre-excavation testing should be performed in accordance with Section 3.0. Pre-excavation testing is not required in the case of routine underground storage tank work, emergency work, small-scale recurring excavations (as defined in Section 2.3), or excavations adjacent to former manufactured gas plant sites as specified in Section 3.0.

2.5 UNDERGROUND TANK WORK AT FORMER MANUFACTURED GAS PLANT SITES

Underground tank work at sites listed in Attachment 1 should be handled in accordance with Section 6.0.

2.6 EMERGENCY WORK

Emergency work at sites listed in Attachment 1 should be handled in accordance with Section 7.0.

2.7 EXCAVATION ADJACENT TO FORMER MANUFACTURED GAS PLANT SITES

Excavation work at locations adjacent to the sites listed in Attachment 1 should be handled in accordance with Section 8.0.

2.8 AGENCY CONTACTS

- State and Federal agency contacts concerning releases, spills, or similar situations on a former manufactured gas plant site are to be coordinated through the Manufactured Gas Plant Project Team, or if team members are unavailable and cannot be reached (Section 11.0), by a Environmental Coordinator. In no case, however, shall any agency notification legally required be deferred due to the unavailability of Manufactured Gas Plant Project Team members or Environmental Coordinators. The Manufactured Gas Plant Project Team is to be notified as soon as possible following notification of any agency contacts.

- Local agency contacts are to be coordinated through the Environmental Coordinator. The Manufactured Gas Plant Project Team is to be notified as soon as possible following notification of any agency contacts.

2.9 SITE RUNOFF CONTROL

Water runoff which could potentially transport gas plant residues off-site should be handled in accordance with Section 9.0.

3.0 PRE-EXCAVATION TESTING

This section applies to all excavation work at the sites listed in Attachment 1, with the exception of emergency excavations, routine (non-leaking) underground tank work, and small-scale recurring work. Pre-excavation testing is not required at excavation sites adjacent to former manufactured gas plant sites unless there is evidence to suggest that gas plant residues are also located adjacent to the former manufactured gas plant.

- A proposed pre-excavation subsurface testing program should be described in the excavation work plan. The number and location of samples should be identified in the work plan. Test borings should extend no further than two feet below the proposed excavation depth.

- Each site will be evaluated by the Manufactured Gas Plant Project Team at the time the work plan is submitted so that a recommendation regarding pre-excavation testing can be made to the Vice President - General Services.

- Any waiver of pre-excavation testing must be approved in writing by the Manufactured Gas Plant Project Manager as part of the work plan approval process.

- The area to be excavated should be clearly defined, preferably by staking, prior to commencement of testing. All known underground facilities and/or obstructions should also be identified and clearance from Underground Services Alert (USA) obtained.

- Upon approval of the excavation work plan, test borings should be conducted by or under the supervision of either PG&E's Technical and Ecological Services Department (TES), a member of the Manufactured Gas Plant Project Team, an environmental coordinator, or any qualified alternative consultant.

- Visual examination of the cored material, coupled with air monitoring for volatile organic compounds (using appropriate air monitoring equipment such as a photoionization detector), should be used during drilling of the test borings. Laboratory analysis of samples taken from the borings should be performed to determine if residues are present. This determination will be used to assess the manner in which the excavation should proceed. Soil samples are to be analyzed for polynuclear aromatic hydrocarbons (PNAs) by either U.S. Environmental Protection Agency (EPA) Method 8270 or 8310, lead, mercury and arsenic by EPA Method 200.7, and cyanide using EPA Method 335.2. If petroleum hydrocarbon compounds are observed in a soil boring by visual observation or odor detection, at least one soil sample from that boring should be analyzed for total petroleum hydrocarbon compounds by EPA Method 8015. Copies of all analytical results should be sent to the Manufactured Gas Plant Project for record keeping.

- If residues are found during the test borings, the operating department and/or Region must evaluate the need for the work and the impact of the residues on project cost and schedule. All wastes generated during the test borings and subsequent excavations must be managed in accordance with the procedures outlined in Sections 4.0 and 5.0. In addition, the operating department or Region is responsible for the proper disposal of the excavated material. The Environmental Services Department or Environmental Coordinator is available to provide assistance in this matter.

4.0 EXCAVATION AT FORMER MANUFACTURED GAS PLANT SITES WHERE NO RESIDUE IS KNOWN OR ANTICIPATED

If no residue is found during the pre-excavation test borings or if testing is waived, the excavation work may proceed normally upon approval of the work plan using the following guidelines:

1. All excavation activities performed by PG&E employees shall be supervised by a management on-site supervisor or his/her designated representative, who has the authority to stop work if residues are encountered.

2. All excavation activities performed by a contractor shall be overseen by a PG&E management on-site supervisor or his/her designated representative, who has the authority to stop work if residues are encountered. All contractor procedures shall conform to these guidelines.

3. If required, dust-control measures should be employed during excavation. This can usually be accomplished by wetting the area with a fine mist of water in a manner which does not create runoff.

4. A site safety plan shall be implemented in all cases should residues be confirmed. Implementation of the site safety plan includes the use of personal protective clothing and equipment, and air monitoring of the work zone area and/or the excavation.

If residue is discovered during the excavation, the following steps will be taken:

1. The excavation work shall be temporarily suspended so that any impact on the project due to the discovery of residue can be evaluated. All excess soils generated from the excavation activities shall be covered by polyethylene sheeting/tarp and actions to minimize dust or odor generation from the excavation shall be implemented.

2. The Manufactured Gas Plant Project Team shall be notified.

3. The Environmental Coordinator shall be contacted to assist in project evaluation, waste disposal arrangements, notifications, and arrangements for Safety, Health and Claims and TES services.

4. Excavated material which contains gas plant residue and which is not to be reused must be assumed to be a hazardous waste and managed according to the provisions of Section 5.0.

5. The excavation shall proceed following the guidelines set forth in Section 5.0.

5.0 EXCAVATION AT FORMER MANUFACTURED GAS PLANT SITES WHERE RESIDUE IS KNOWN OR ANTICIPATED

If residues are found in pre-excavation test borings (Sections 2.0 and 3.0) or are suspected to be present for other reasons, the excavation work should proceed upon approval of the work plan using the following guidelines.

- Excavation work must proceed in accordance with the approved Site Safety Plan to determine the proper precautionary worker safety measures to be employed during excavations performed by Company personnel.

- Construction personnel (PG&E and/or contractor) are to be informed of the potential nature of the subsurface material. PG&E employees should be advised of any changes in normal work procedures prior to commencement of excavation activity. Contractors should be informed that gas plant residue may be present and should be advised of the same safety precautions that PG&E recommends to its own employees. Non-construction PG&E personnel at the site should be informed of the potential nature of the subsurface material, and given a contact point for additional information.

- State and Federal agency notifications will be coordinated through the Manufactured Gas Plant Project Team (Section 11.0).

- All excavation performed by PG&E employees shall be supervised by a management on-site supervisor or his/her designated representative to ensure that proper safety precautions are employed.

- All excavation performed by a contractor shall be overseen by a PG&E management on-site supervisor or his/her designated representative.

- All personal protective clothing and equipment listed in the Site Safety Plan (Section 3.0) appropriate to the work shall be utilized. Work shall be performed in accordance with work practices given in the Site Safety Plan (Section 6.0).

- Dust-control measures must be employed during excavation. This can usually be accomplished by wetting the area with a fine mist of water in a manner which does not create runoff.

- Excavated material which contains gas plant residue intermixed with soil and is suitable for reuse (and thus is not a waste) may be returned to the hole from which it was taken without testing, provided it is covered with at least one to two feet of clean fill (two feet preferred).

- If the excavated material is to be temporarily stockpiled on-site, it must be placed in a secured area, isolated by a barrier, and covered and underlain with waterproof tarps. If there is any possibility of water runoff from the stockpiled material, appropriate measures, such as dikes, berms, or roll-off boxes must be employed to contain the runoff (Section 9.0, Runoff Control).

- Excavated material which contains gas plant residues and which is not to be reused must be assumed to be a hazardous waste unless it has been analyzed by a State-certified laboratory (for PNAs, lead, mercury, arsenic, and cyanide) and determined to be non-hazardous. For assistance in sampling, contact your Environmental Coordinator. For information on how to properly manage hazardous waste, consult your Environmental Coordinator or the Company *Hazardous Waste Manual*.

- In no case shall excavated material, which has been tested and shown to be a hazardous waste, remain on-site for more than 90 days following commencement of the excavation. Such material must be transported by a registered hazardous waste hauler to an EPA- and State-approved disposal site, accompanied by a uniform hazardous waste manifest. During temporary storage of such material on-site pending disposal, the accumulation area should be cordoned-off and posted with hazardous waste warning signs (visible from all directions and bilingual, where necessary).

6.0 UNDERGROUND TANK WORK AT FORMER MANUFACTURED GAS PLANT SITES

Underground tank testing, leak response and closure activities should be performed according to procedures outlined in PG&E's *Underground Tank Manual.*

Work plan preparation and approval, pre-excavation testing, and advance notifications are not required for routine underground tank work, for installation of monitoring systems (such as the TLS-250), or for tank removal/replacement which involves excavation in what is anticipated to be clean backfill. Routine underground tank work is defined as underground storage tank work where only unaffected, imported fill would be disturbed during the excavation activities.

The Manufactured Gas Plant Project Team should receive a copy of all local agency transmittal letters (not test reports) summarizing the testing results for tanks located at any site listed in Attachment 1.

If a tank leak is confirmed based on precision test data or upon excavation of the tank, the Manufactured Gas Plant Project Team should be notified as soon as possible prior to performing soil borings or other soil disturbance work. TES should be contacted to conduct a preliminary subsurface investigation before proceeding with any closure or remedial action activities.

The Environmental Coordinator will contact the local permitting agency if field testing indicates leakage may have occurred from the tank.

A Manufactured Gas Plant Project Team member will make the necessary State and Federal agency notifications if field testing indicates leakage may have occurred from the tank. Local agency contacts for a leaking underground tank are to be coordinated by the Environmental Coordinator. The Manufactured Gas Plant Project Team will be notified as soon as possible following any agency contact.

The Environmental Coordinator will coordinate with a Manufactured Gas Plant Project Team member any actions to further characterize the site, or if necessary, to prepare a remedial action plan for the tank leak at the site.

7.0 EMERGENCY WORK AT FORMER MANUFACTURED GAS PLANT SITES

This section is intended to allow for an expedited approach when dealing with emergency work on sites identified in Attachment 1. "Emergency work" means unanticipated excavation work that must be done immediately to correct a hazardous condition or restore service to customers, and for which alternatives that avoid excavation are not feasible.

- Excavation work shall proceed in accordance with the procedures in Section 5.0, with the exception that the work plan, pre-excavation testing and evaluation by Safety, Health and Claims are not required. However, a management employee must be on-site to supervise the work and insure that the following guidelines and the safety procedures contained in Attachment 2 are followed.

- The following individuals and departments must be contacted as soon as possible by the on-site supervisor:

  1. Project safety personnel;

  2. Any Manufactured Gas Plant Project Team Member (Section 11.0);

  3. The Industrial Hygiene Section of Safety, Health, and Claims (Section 11.0); or

  4. The Environmental Coordinator.

- Protective clothing and equipment is listed in the generic Site Safety Plan (Attachment 2). A supply of protective clothing and equipment should be kept on hand for emergency situations.

- Employees should be on the alert for abrupt changes in color and/or odor of excavated soil. If tar or dark gray to black soil is encountered, protective overalls, hood or hard hat, shoe covers, and impermeable gloves should be worn for any activities that require close or direct contact with the soil. Respiratory protection should also be used if it is necessary to enter the trench or excavation.

8.0 EXCAVATION WORK ADJACENT TO FORMER MANUFACTURED GAS PLANT SITES

A. The work plan and pre-excavation testing requirements described in Sections 2.0 and 3.0 are required where there is evidence which suggests that gas plant residues are also on the property adjacent to the former manufactured gas plant.

B. If there is no evidence of gas plant residues on the property adjacent to the former manufactured gas plant, the work plan and pre-excavation testing described in Sections 2.0 and 3.0 are not required for excavation work adjacent to former manufactured gas plant sites. However, the following individuals and departments must be verbally notified within 48 hours of commencement of planned excavation work adjacent to the sites listed in Attachment 1 prior to beginning the work (this applies to excavations on both PG&E and franchised property):

1. Project safety personnel;

2. The Manufactured Gas Plant Project Manager (Section 11.0);

3. The Industrial Hygiene Section of Safety, Health and Claims (Section 11.0); and

4. The Environmental Coordinator.

Written notification of the planned excavation work should follow the verbal notification within 5 days of commencement of excavation activities.

C. In emergency work situations adjacent to manufactured gas plant sites, prior notification of the above is not required. However, a management employee must be on-site to supervise the work and to ensure that the guidelines and the safety procedures contained in Attachment 2 are followed. Normal work procedures should be followed.

D. If residue or material suspected to be residue is discovered during the excavation, the following steps shall be taken:

1. Except in emergency work situations (Section 7.0), the excavation work shall be temporarily suspended so that the impact to the project due to discovery of residue can be evaluated.

2. Excavated material which contains gas plant residue and which is not to be reused must be assumed to be a hazardous waste and managed according to the provisions of Section 5.0.

3. Contact any Manufactured Gas Plant Project Team member (Section 11.0).

4. Refer to the generic Site Safety Plan and/or contact the Industrial Hygiene Section of Safety, Health and Claims regarding proper safety procedures and protective clothing (Section 11.0).

5. Notify the Environmental Coordinator.

6. The excavation shall proceed as described in Section 5.0, keeping the following in mind:

   a. In no case shall excavated gas plant residue be left unsecured on-site (Section 5.0).

   b. The Environmental Coordinator should be contacted to determine how excess excavated gas plant residues in soils and/or water are to be removed from the site.

9.0 RUNOFF CONTROL

This section is intended to provide guidance in cases where water runoff has the potential to transport gas plant residues off-site and/or into waterways. Such situations include, but are not limited to, rainfall flooding or a waterline break while an excavation is underway.

These guidelines are to be used where no other water runoff control measures, such as SPCC Plan Secondary Containment, are in place at a site. Existing procedures for runoff control, if adequate (i.e., if they contain runoff on-site), should be followed whenever possible.

- The on-site supervisor responsible for the job has primary responsibility for determining the appropriate runoff control measures and ensuring that they are implemented in a timely manner.

- All reasonable attempts should be made to contain water runoff on-site through the use of dikes, berms, or other appropriate means. If clean material is unavailable, excavated material may be used to form the berms, provided that containment is complete (i.e., no berm material is washed away).

- If runoff cannot be fully contained on-site, or in the interim before adequate measures are in place to prevent runoff off-site, use berms of clean absorbent, not excavated material, to minimize runoff. These berms can also serve to filter out suspended material before water leaves the site.

- Samples of the contained runoff shall be collected by TES or a qualified individual and sent to a State-certified laboratory for analysis. At a minimum, water samples should be analyzed for polynuclear aromatic hydrocarbon compounds (PNAs), lead, mercury, arsenic, and cyanide. Runoff should remain on-site (in storage tanks, if necessary) pending receipt of analytical results. The Facility Hazardous Waste Coordinator, with the assistance of the Departmental or Environmental Coordinator, is responsible for determining how the accumulated runoff is to be removed from the site.

- The possibility of disposal of the water into the local sewer system should be investigated through the local sanitation district office or department of public works once the test results have been received.

- In the event that there is a discharge or suspected discharge of material which may contain gas plant residue off-site, the Manufactured Gas Plant Project Team (Section 11.0) shall be notified immediately. The Manufactured Gas Plant Project Team will coordinate notification of the appropriate State or Federal agencies of the release.

- If other members of the Manufactured Gas Plant Project Team are unavailable, the Manufactured Gas Plant Project Manager (Section 11.0) shall be notified. The Project Manager shall make the required agency notifications. Notification of the appropriate Company personnel shall be made as soon as practicable upon knowledge of the discharge or release.

10.0 ADDITIONAL CONSIDERATIONS

10.1 POTENTIAL COSTS

The potential cost of a complete subsurface investigation of the affected area and the possible development and implementation of a remedial action plan, including excavation and off-site disposal of material that may be classified as a hazardous waste, are the responsibility of the sponsoring department and should be considered in the evaluation of a proposed project. The high cost of hazardous waste disposal (currently $200 to $300 per cubic yard) may have a major impact on the economic viability of the proposed work. Installation of permanent structures or facilities on these sites is to be avoided if there is a reasonable alternative.

10.2 TRANSFER OF OWNERSHIP

Since some residues may exist at former manufactured gas plant sites, any transfer of title, leasing, rental, or similar transaction regarding the PG&E property that is identified as a former manufactured gas plant site should be undertaken with the express approval and guidance of the Vice President - General Services, the Manufactured Gas Plant Project, and the Law Department.

10.3 SAFETY PRECAUTIONS

Many of the chemical compounds found in gas plant residues are commonly found in other materials and locations, such as cigarette tars, asphalt products, barbecues, fireplaces, automobile exhaust, motor oils, etc. Some of these compounds, however, are classified as hazardous. For this reason, these guidelines have been established to provide procedures for managing any excavations or soil disturbance activities on or adjacent to these properties. Brief exposure to these chemical compounds will not generally pose any significant health risk, however, exposure to lampblack, coal tar, and other gas plant residues should be avoided. Safety issues related to gas plant residues are addressed in Attachment 2. A generic site safety plan and instructions for preparing and approving a site safety plan for excavation at a former manufactured gas plant site are also included in Attachment 2.

10.4 TRAINING

All PG&E personnel working on-site will have participated in Company Hazard Communication Training, First Aid Training, Respirator Training and Fit Testing, and Facility Environmental Emergency Plan Training. In addition, sufficient training to comply with 29CFR1910.120 will be give in areas such as safe work practices; nature of anticipated hazards; handling emergencies; safe use of field equipment; handling, storage, and transportation of hazardous materials; use, care, and limitations of personal protective equipment; and safe sampling techniques. The above training can be satisfied by specific courses given by qualified trainers, by PG&E-required training, or by a combination of the two. Contact the Environmental Coordinator for further information on available courses.

Those personnel who may be exposed above Permissible Exposure Limits (PELs) for substances on-site or who may be required to wear respirators must receive a minimum of 40 hours of OSHA-standardized training followed by 3 days of on-site experience under the direct supervision of a trained, experienced supervisor, prior to conducting unsupervised work at an excavation where gas plant residues have been found.

Those on-site personnel who will not be exposed above the PELs and will not be required to wear respirators must receive a minimum of 24 hours of training followed by one day of supervised on-site experience. On-site supervisors must receive training equivalent to the personnel that they supervise plus an additional 8 hours on such topics as the health and safety program, personal protective equipment program, spill prevention program, air monitoring, etc.

It is the responsibility of the Site Safety Officer to ensure that all personnel are properly trained, that all those who will wear negative pressure respirators are currently fit-tested, and that personnel are trained in the use of the specific protective clothing and equipment that will be used. The Site Safety Officer, with the assistance of the Health and Safety Officer, will hold a safety briefing prior to the start of work as well as daily on-site briefings. See Attachment 2 for further guidance on determination of proper personal protective equipment and work practices.

11.0 INFORMATION AND ASSISTANCE

For additional information and assistance, contact:

Manufactured Gas Plant Project Team (Environmental Services Department)

Ms. Marti Coffman Steiner	PG&E 223-2520 PT&T (415)973-2520
Mr. Robert Doss	PG&E 223-7601 PT&T (415)973-7601
Mr. Darrell Klingman (MPG Program Manager)	PG&E 223-0902 PT&T (415)973-0902

ATTACHMENT 1

HISTORIC MANUFACTURED GAS PLANT SITES

The following is a list of former manufactured gas plant sites that are located within PG&E's service area. Those sites marked with an asterisk (*) are owned (in whole or in part) by PG&E.

Redwood Region: Debora Fudge - Environmental Coordinator

Benicia	East H and East Second Streets.
* Eureka	14th Street and Railroad Ave.
Eureka	1st, H, 2nd, and I Streets.
Eureka	2nd, 3rd, G and H Streets.
Healdsburg	SE corner of East and North Streets.
Healdsburg	Matheson and NW Pacific Railroad.
Mendocino	Near Talmage State Hospital.
Napa	Cross and Elm Streets.
Napa	5th between Main and Brown Streets.
Napa	South Oak, North Oak and Cedar Drives.
* Petaluma	First and D Streets (Petaluma Substation A).
Petaluma	Between Main Street and Petaluma River, near Martha Street.
* St. Helena	Main and Pope Streets.
* San Rafael	3rd and Lindaro Streets (Redwood Regional Offices, San Rafael Service Center, & Substation complex).
San Rafael	Between 4th and Julia Streets near A Street.
Santa Rosa	1st and B Streets.
Santa Rosa	5th and Mendocino Streets.
Ukiah	Leslie between Perkins and Peach Streets
Vallejo	Maryland between Sonoma and Marin Streets.
Vallejo	Foot of Maine Street.

ATTACHMENT 1 (continued)

Sacramento Valley Region: Mark S. Hays - Environmental Coordinator

• Chico	2nd and Cherry Streets (PG&E's Building Maintenance Department).
Chico	Vicinity of 3rd and Broadway Streets.
• Colusa	2nd and Main Streets (Colusa Service Center and Substation).
Grass Valley	Idaho-Maryland Road near Hwy. 49.
Grass Valley	Main, Auburn, Stewart, and Bank Streets.
* Marysville	4th and A Streets (Marysville Service Center and Substation).
Marysville	2nd and B Streets.
Nevada City	Coyote Street and near Main Street.
Oroville	Huntoon and Safford Streets.
Oroville	Montgomery and Downer Streets.
Placerville	Spring and Colona Streets.
Red Bluff	Oak and Rio Streets.
• Redding	South and Center Streets (District Regulator Set).
• Sacramento	Front and T Streets.
Sacramento	Jibboom near I Street.
Sacramento	Foot of Broadway near Sacramento River.
• Willows	E. Wood and Colusa Streets (Willows Service Center).
Woodland	4th and Main Streets.
Yreka	North and Main Streets (outside service territory).

ATTACHMENT 1 (continued)

San Joaquin Valley Region: William J. Frazier - Environmental Coordinator

Bakersfield	20th between P and Q Streets.
Coalinga	S. Louisiana, E. Houston, and E. Sacramento Streets.
Columbia	Gold Street.
Fowler	W. 8th Street near Fresno Street.
• Fresno	N. Thorne Ave. and S.P. Railroad ROW (Fresno Gas Load Center).
• Fresno	F and Mariposa Streets.
Jackson	Water and Main Streets.
Jackson	Middle Fork Jackson Creek and Broadway Street.
Lodi	S. Sacramento and Spruce Streets.
Lodi	Main and Locust Streets.
• Madera	South E. and East 9th Streets (Madera Pole Yard).
• Merced	West 15th and L Streets (Merced Service Center).
Modesto	9th and C Streets.
• Oakdale	J Street and Bryan Ave. (Oakdale Service Center).
• Selma	North and Sylvia Streets (Selma Service Center).
Sonora	NE corner of Shepard Street and Lyon Streets.
• Stockton	Center and Hazelton Streets (Stockton Gas Service Center and Substation Department).
• Tracy	Franklin Ave. and East Grant Line Road (Tracy Service Center and Substation).
Turlock	Golden State Hwy. and F Street.

Mission Trail Region: Rudy Promani - Environmental Coordinator

Agnews	Montegue Expressway, Lafayette Streets and Nelson Drive (State Hospital).
Gilroy	Sixth and Railroad Streets.
• Hollister	Sixth and Sally Streets (Hollister Service Center).
Los Gatos	Elm Street and Santa Cruz Avenue.
• Monterey	Del Monte and Figueroa Streets (Monterey Substation).
Monterey	Del Monte and Southern Pacific Railroad intersection.
• Salinas	Soledad and E. Lake Streets (District Regulator Set).
• San Luis Obispo	Higuera and Walker Streets.
San Luis Obispo	Dana and Nippomo Streets.
San Jose	N. Montgomery and St. John Streets (San Jose Service Center and Gas Load Center).
San Jose	3rd and E. San Fernando Streets.
Santa Clara	Benton and Railroad Avenue.
Santa Cruz	N. Pacific and River Streets.
• Watsonville	Walker and Front Streets (Watsonville Service Center).
• Watsonville	Main near 5th Street.

ATTACHMENT 1 (continued)

Golden Gate Region: Michael Bennett - Environmental Coordinator

Redwood City	East Marshall, Washington, and Broadway Streets.
* San Francisco	Illinois and 23rd Streets (Potrero Power Plant).
* San Francisco	Maryland and 23rd Streets (adjacent to Potrero Power Plant).
* San Francisco	Bay and Buchannan Streets (Marina Substation).
* San Francisco	Stevenson between 5th and 6th Streets (Station T steam plant).
San Francisco	1st and Howard Streets.
San Francisco	Market and New Montgomery Streets.
San Francisco	Columbus between Leavenworth and Hyde.
San Francisco	King and 2nd Street.
San Francisco	Townsend near 3rd Street.
San Francisco	Beach, Powell, Jefferson, and Mason Streets.
San Francisco	Fillmore, Bay, Steiner, and Francisco Streets.
San Francisco	9th and Brannan Streets.
* Daly City	Geneva and Schwerin Streets (Martin Station Service Center).

East Bay Region: Loretta Altshuler - Environmental Coordinator

Martinez	Marina Vista and Mill Streets.
* Oakland	1st and Market Streets (Oakland Gas Load Center).
Oakland	First and Washington Streets.
Pittsburg	Near E. 3rd and Columbia Streets.
San Leandro	Alvardo and St. John Streets.
Livermore	O Street near Railroad right-of-way.

ATTACHMENT 2

PG&E
EXCAVATION WORK PLAN
AND
SITE SAFETY PLAN
for Excavations at
Former Manufactured Gas Plant Sites

Prepared by:

Technical and Ecological Services
Environmental Services Department
Safety, Health and Claims Department

September 1991

INSTRUCTIONS FOR SUBMITTAL OF EXCAVATION WORK PLAN AND SITE SAFETY PLAN FOR APPROVAL:

1. Please read entire form before filling it out completely.

2. Pages that need to be filled in are the following two pages (Excavation Work Plan), and pages 1, 2, 3, and 4 of the Site Safety Plan.

3. Submit completed Excavation Work Plan and Site Safety Plan to the Manufactured Gas Plant Project Manager, with a copy to the Vice-President of General Services, for approval.

4. Retain a copy of the Work Plan and Site Safety Plan for your records.

5. Call your Environmental Coordinator or the Manufactured Gas Plant Project Team if you have any questions. (See Section 11.0 of the Excavation Guidelines).

SUBMITTAL FORM
EXCAVATION WORK PLAN
FORMER MANUFACTURED GAS PLANT SITES

Site: Date:

Description of Proposed Work (attach sketch showing location). Use additional sheets if necessary. _____

_____

_____

_____

_____

_____

_____

_____

_____

Alternatives Reviewed (including no action). Use additional sheets if necessary.

_____

_____

_____

_____

_____

Submitted by: (Name) Print _____

Signature _____ Phone No._____

Reviewed by: (Name) Print _____
Manufactured Gas
Plant Project Signature _____ Date:_____
Team

Approved by: (Name) Print _____
Vice-President,
General Services Signature _____ Date:_____

(Note: The above approval is only for authorization to excavate within the gas plant site; the physical work must be approved through the normal job authorization process.)

Potential Routes of Exposure: Inhalation, ingestion, skin absorption ☐ ☐ ☐

Levels of Protection Anticipated: (Table 1)

Level D (Overalls, gloves, goggles, rubber boots or PVC boot covers): ☐

Level C (Level D plus half-mask respirator): ☐

Level C2 (Level D plus full-mask respirator and no goggles): ☐

Physical Hazards: (Circle all that apply)

Buried utilities, trenches, slips, trips, falls, equipment operation, overhead equipment, energized equipment

U.S.A. Dig to be Notified? (1-800-642-2444)

Yes ☐ No ☐

If not, why? _____

_____

_____

Circumstances Prompting Air Monitoring:

Excessive Dusts ☐ Volatile Organic Compounds ☐

Air Monitoring Equipment Anticipated:

Ram-1 (dusts) ☐

Photovac TIP (VOCs) ☐

NIOSH PCAM 184 Sampling Train (PNAs) ☐

Location of nearest phone from work zone(s): _____

_____

_____

_____

_____

_____

_____

PG&E
SITE SAFETY PLAN
for Excavations at
Former Manufactured Gas Plant Sites

TABLE OF CONTENTS

		Page
1.0	**BACKGROUND**	1
	1.1 PURPOSE	1
	1.2 PREVIOUS SITE INVESTIGATIONS	1
	1.3 PROJECT DESCRIPTION	1
2.0	**PROJECT HAZARD EVALUATION**	4
	2.1 POTENTIAL HAZARDS	4
	2.2 CHEMICAL HAZARDS	4
	2.2.1 **Polynuclear Aromatic Hydrocarbon Compounds**	4
	2.2.2 **Volatile Organic Compounds**	5
	2.2.3 **Metals**	5
	2.2.4 **Oil and Grease**	5
	2.2.5 **Cyanide**	5
	2.3 PHYSICAL HAZARDS	6
	2.3.1 **Excavation Hazards**	6
	2.3.2 **Heat Stress**	6
	2.3.3 **Confined and Enclosed Spaces**	7
3.0	**PERSONAL PROTECTIVE EQUIPMENT**	8
4.0	**ROLES AND RESPONSIBILITIES**	12
	4.1 PROJECT MANAGER	12
	4.2 ON-SITE PROJECT COORDINATOR	12
	4.3 SITE SAFETY OFFICER (PRIMARY)	12
	4.4 HEALTH AND SAFETY OFFICER	12
	4.5 QUALITY CONTROL OFFICER - ALTERNATIVE SITE SAFETY OFFICER	12
	4.6 OFF-SITE CONSTRUCTION MANAGER	13
	4.7 ENVIRONMENTAL SERVICES/ ENVIRONMENTAL COORDINATORS	13
	4.8 TECHNICAL AND ECOLOGICAL SERVICES	13
	4.9 GOVERNMENT AGENCIES	13
	4.10 CREW MEMBERS	13

TABLE OF CONTENTS

		Page
5.0	EMERGENCY RESPONSE PROCEDURES	14
	5.1 EMERGENCY PROCEDURES	14
	5.2 EMERGENCY COMMUNICATIONS PROTOCOL	14
6.0	WORK PRACTICES	15
	6.1 WORK ZONES	15
	6.2 DUST SUPPRESSION	15
	6.3 AIR MONITORING	16
	6.4 DECONTAMINATION	16
	6.5 WASTE HANDLING	17
7.0	TRAINING	20
8.0	MEDICAL SURVEILLANCE	21

LIST OF ACRONYMS USED IN THIS DOCUMENT

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirator
BZ	Breathing Zone
CGI	Combustible Gas Indicator
CPR	Cardiopulmonary Resuscitation
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
EZ	Exclusion Zone
FID	Flame Ionization Detector
HSO	Health and Safety Officer
IDLH	Immediately Dangerous to Life and Health
LEL	Lower Explosive Limit
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PID	Photoionization Device
PM	Project Manager
PNA	Polynuclear Aromatic Hydrocarbon Compounds
PPE	Personal Protective Equipment
PPM	Parts Per Million
REL	Recommended Exposure Limits
SSO	Site Safety Officer
STEL	Short-Term Exposure Limit
SZ	Support Zone

LIST OF ACRONYMS USED IN THIS DOCUMENT (Continued)

TLV	Threshold Limit Value
TWA	Time-Weighted Average
VOC	Volatile Organic Compound

1.0 BACKGROUND

1.1 PURPOSE

The purpose of this Site Safety Plan is to assign responsibilities, and to establish personal protection standards, safety procedures, and monitoring requirements that may be implemented during PG&E's excavation activities at former manufactured gas plant sites.

The provisions of the plan are mandatory for all workers during excavation work. It is the responsibility of all workers involved in the project to contact their supervisor and request clarification of any questions regarding the Site Safety Plan before beginning any work on the project.

This Site Safety Plan is designed to provide ample protection to excavation workers and the public from potential chemical exposures and other injuries during the project. Site conditions will be monitored according to the procedures outlined in Sections 2.0 and 6.0 of this plan.

1.2 PREVIOUS SITE INVESTIGATIONS

Describe any previous investigations conducted at the site and the results of any sampling conducted: _____

1.3 PROJECT DESCRIPTION

Date Prepared: _____
Site Name/Location: _____
Proposed Dates of Work: _____
Objective of Work: _____

Anticipated or Possible Contaminants:

- ☐ PNAs
- ☐ VOCs
- ☐ Oil and Grease
- ☐ Metals
- ☐ Cyanide
- ☐ Unknown

Land Use of Area the Surrounding Site:

- ☐ Industrial
- ☐ Commercial
- ☐ Residential

Anticipated Waste Types:

- ☐ Solids
- ☐ Sludges
- ☐ Liquids

Primary Emergency Contacts:

Ambulance:	911 or _____
Fire Department:	911 or _____
Poison Control:	911 or _____
Police:	911 or _____

Name, address, phone number, and two routes to/of nearest hospital. (You must include a map with the shortest route highlighted.)

PG&E Contacts:
(Complete to the extent known)

Title	Contact	Telephone

Site Safety Officer _____

Excavation Project Manager _____

Construction Manager _____

Project Manager _____

Environmental Coordinator _____

Supervisor, Construction Manager _____

Other PG&E contacts (if necessary) _____
(i.e., Quality Control Officer)

Employees' and Contractors' acknowledgement of Site Safety Plan briefing.
(To be completed immediately prior to starting work)

Employee/Contractor	Signature and Date

2.0 PROJECT HAZARD EVALUATION

2.1 POTENTIAL HAZARDS

Substance	Range of Soil Concentrations Measured or Expected	Potential Routes of Entry
Polynuclear Aromatic Hydrocarbon Compounds (PNAs)	_____	Skin Absorption Inhalation Ingestion
Volatile Organic Compounds	_____	Inhalation Skin Absorption
Metals	_____	Inhalation Ingestion
Oil and Grease	_____	Ingestion Skin Absorption
Cyanide	_____	Ingestion

The following additional hazards are anticipated on site: Overhead and buried utilities, equipment operation, possible groundwater intrusion, trenching, slips, falls, trips, heat stress, noise, and possible confined spaces.

2.2 CHEMICAL HAZARDS

The chemical hazards associated with excavations at former manufactured gas plant sites are due to residues often remaining from gas manufacturing processes. Possible hazards result from potential contact with polynuclear aromatic hydrocarbons (PNAs), volatile organic compounds (VOCs), cyanide, metals, and oil and grease. These chemical compounds may be present in soils in the form of solids or sludge, or in groundwater encountered during excavation.

Following is a summary of the toxicological hazards for PNAs, VOCs, metals, oil and grease, and cyanide. OSHA PELS given are Final Limits under revised 29CFR1910.1000, effective 9/1/89. The proper selection of skin and respiratory protection, which is critical to prevent exposure, is addressed later in this document. These selections should be reevaluated as additional sampling information becomes available.

2.2.1 Polynuclear Aromatic Hydrocarbon Compounds (PNAs)

Polynuclear aromatic hydrocarbon compounds (PNAs) may pose an inhalation and/or skin absorption hazard. These compounds include specific species that are known skin carcinogens when exposed to bare skin for long periods. Inhalation exposure to airborne PNAs can, in some circumstances, increase the risk of respiratory cancer, again, with long term exposure. However, PNAs have relatively low vapor pressures, which reduce risk of inhalation. PNAs can be an inhalation hazard if airborne dust is contaminated with PNAs, or if PNAs are subjected to enough heat to cause significant vaporization.

The OSHA PEL for total PNAs (designated "coal tar pitch volatiles") is 0.2 mg/m^3 (8-hr time-weighted average [TWA]). Because PNAs are comprised of many individual compounds, there are individual PELs, threshold limit values (TLVs), and recommended exposure limits (RELs) for some of these compounds. The PEL for naphthalene is 50 mg/m^3. The American Conference of Government Industrial Hygienists (ACGIH) has designated benzo(a)pyrene and chrysene as suspected human carcinogens, category A2. National Institute for Occupational Safety and Health (NIOSH) has an REL for coal tar pitch volatiles of 0.1 mg/m^3. NIOSH has also designated chrysene as an occupational carcinogen.

2.2.2 Volatile Organic Compounds (VOCs)

VOCs commonly associated with petroleum hydrocarbon compounds include benzene, toluene, ethylbenzene, and xylenes (BTEX). Ingestion of BTEX can occur through inadequate decontamination procedures or poor personal hygiene. BTEX is also readily absorbed through the skin and readily volatilize. Short-term inhalation/absorption of BTEX has been known to cause fatigue, drowsiness, vomiting, and headaches. Long-term exposure to BTEX is known to increase the risk of cancer, liver failure, and leukemia. The OSHA PELs (8-hr TWA) are 1 ppm for benzene, 100 ppm for ethylbenzene, 100 ppm for toluene, and 100 ppm for xylenes. The OSHA short term (15 minute) exposure limits (STELs) for BTEX are 5 ppm for benzene, 150 ppm for toluene, 125 ppm for ethylbenzene, and 150 ppm for xylenes. NIOSH set a REL for benzene at 0.1 ppm (8-hr TWA), and a STEL for benzene at 1 ppm.

2.2.3 Metals

Metals often found on-site include lead, arsenic, and mercury. Accidental ingestion of metals may occur through inadequate decontamination procedures or personal hygiene practices. Inhalation of metals can occur if contaminated dust becomes airborne during excavation. Dermal contact, particularly to the eyes, is also of concern because of possible irritation reactions.

2.2.4 Oil and Grease

Oil and grease exposure can cause skin irritation or dermatitis. While oil mist presents an inhalation hazard which may target the respiratory system or skin, a mist form is not anticipated in this setting. The OSHA PEL for mineral oil mist is 5 mg/m^3 (8hr-TWA). Dermatitis may be a sign of overexposure to either oil and grease or PNAs. Ingestion of oil and grease can occur through inadequate decontamination procedures or poor personal hygiene

2.2.5 Cyanide

Cyanides are readily absorbed via inhalation, ingestion and skin absorption. The nervous system is the major target organ in cyanide poisoning. Symptoms of chronic exposure to cyanide in humans and laboratory animals include enlargement of the thyroid gland which is through to result from an iodine imbalance caused by thiocyanate, the principal metabolite of cyanide. Symptoms of cyanide exposure (as HCN) include weakness, headaches, confusion, nausea, vomiting, incoordination, skin and eye irritation, and slow, gasping respiration.

2.3 PHYSICAL HAZARDS

Potential physical hazards associated with this work include eye and skin contact hazards during excavation, tripping, falling, or slipping during project work, noise, excavation cave-ins, and possibly heat stress due to the wearing of impermeable protective clothing.

2.3.1 Excavation Hazards

A physical survey of the site must be conducted in an attempt to locate the various utility lines and pipes which may be present. Boring logs that may have been prepared during pre-excavation testing adjacent to the proposed work area(s) may be used to evaluate potential subsurface conditions and will be shared with personnel performing the work. All overhead and underground lines will be identified and all conductive equipment, booms, poles, lines, or any other conductive objects will be kept at least 10 feet away from any excavation procedures.

All excavations 5 feet or greater in depth will be shored, sloped, or benched to prevent cave-in in accordance with the PG&E *Excavation Safety Manual* and CAL/OSHA regulations. In addition, all open excavations shall be inspected daily by a "competent person". These inspections shall be maintained, in writing, at the work site and will be available for review at all times.

Face shields, safety glasses and/or goggles, and hearing protection may be required in the event unidentified obstructions are encountered during the project. Noise levels will be monitored, if necessary, by the On-Site Project Coordinator to determine if hearing protection is required.

2.3.2 Heat Stress

Use of impermeable protective clothing limits the ability of the body to cool itself by evaporation of perspiration. Therefore, even in mild weather, and especially in hot weather, heat stress is a potential problem. The Site Safety Officer will inform all personnel wearing protective clothing (and others as necessary) of the signs, symptoms and hazards of heat stress. These include minor symptoms such as heat rash and heat cramps, or severe effects such as heat exhaustion and heat stroke. Heat rash is a skin irritation resulting from prolonged contact with wet clothing. It can be prevented by allowing the skin to dry completely during rest periods and by showering at the end of the work day.

Heat cramps, heat exhaustion, and heat stroke all result from the excessive loss of body fluids and electrolytes. The symptoms of heat cramps are spasms in the abdomen or limbs. Heat exhaustion results from more severe dehydration. Symptoms include pale, clammy skin, profuse perspiration, weakness, headache, and nausea. Heat stroke is a life-threatening condition that occurs when the body's temperature-regulating system no longer functions properly. Symptoms include hot, dry skin; a high fever (often 105°F or more); dizziness; nausea; rapid pulse; and unconsciousness. Brain damage and death may follow if the body temperature is not reduced. All personnel should be familiar with the symptoms of heat stress and appropriate first aid and precautionary measures. The proper work regime, including rest in a cool, shaded place, adequate fluid intake, and electrolyte replacement, are vital in the prevention of heat stress.

For workers wearing impermeable protective clothing in ambient temperatures of 75 degrees F and above, the following work/rest regimen should be followed:

- 75 degrees to 80 degrees F - 15 minutes of rest per every 2 hours of work.
- 80 degrees to 85 degrees F - 15 minutes of rest per every 1.5 hours of work.
- above 85 degrees F - 15 minutes of rest every 1 hour of work.

This regimen may require rescheduling work to cooler periods of the day. The use of cooling ice vests can extend work periods. The use of direct, personal heat-stress dosimeters may also extend work periods by giving a more accurate indication of tolerance times.

2.3.3 Confined and Enclosed Spaces

A "confined space" is defined as a space that has both of the following conditions concurrently:

(1) Restricted access and egress that would make removal of an incapacitated person difficult; and

(2) Insufficient ventilation to remove or correct dangerous air contamination or oxygen deficiency. Dangerous air contamination is considered to be the Immediately Dangerous to Life or Health (IDLH) level of a contaminant, or greater than 20 percent of the Lower Explosive Limit (LEL) of a flammable or combustible substance. Oxygen deficiency is considered to be an oxygen concentration of less than 19.5 percent, by volume.

Presence of condition (1) alone makes the space an "enclosed space."

If enclosed or confined spaces are present, testing and entry procedures as specified in the PG&E *Accident Prevention Rulebook (APR)* and the PG&E Gas Operations *Confined and Enclosed Space Policy and Procedures* shall be followed.

3.0 PERSONAL PROTECTIVE EQUIPMENT

Four levels of protective clothing ensembles (Levels A, B, C, and D) are designated to be used for different levels of hazards. Level D is the least protective and Level A is the most protective. Based on evaluation of potential hazards, we anticipate that personal protective equipment may not be required unless obvious discoloration of the soils or odor is detected.

The personal protective equipment (PPE), listed in Tables 1 and 2, are available should the Health & Safety Officer (HSO) determine it is warranted. The use of Level A or B PPE is not anticipated for this project. For this project, regular work attire consisting of coveralls, heavy boots, and work gloves, etc., is required.

Level D PPE is intended for use when contact with gas plant residues is anticipated (See Table 1 for reference). Level C PPE is intended for use when exposure to VOCs or airborne contaminated dust is anticipated. If air purifying respirators are required, the cartridges specified in Table 2 shall be used. These are the appropriate cartridges for use with the involved substances and concentrations that may be anticipated. All personnel using air purifying respirators must be currently fit-tested for the respirator that they use, and must be trained in respirator use according to the PG&E *Respirator Manual*.

No changes to the specified levels of protection shall be made without the approval of the Site Safety Officer (SSO) and the Health and Safety Officer (HSO). Table 3 provide decision criteria for selection and up-grading of PPE.

TABLE 1
PROTECTIVE CLOTHING LEVELS

Item	Safety Equipment Guide Reference (March 1991 Edition)
LEVEL D:	
• Tyvek coveralls	p. A-4
• NBR (Sol-Vex) outer gloves	p. B-7
• Rubber surgical inner gloves (optional)	p. B-13
• Safety shoes and PVC boot covers, or rubber boots (if properly decontaminated)	p. A-14
• Safety glasses/goggles/face shield, when warranted	p. D-1 - D-13, D-28 - D-30
• Hard hat/cap	p. C-1, C-2
LEVEL C:	
• Half-mask, air-purifying respirator (e.g. MSA Comfo II)	See Table 2
• Combination organic vapor/acid gas/ HEPA particulate cartridges plus	See Table 2
• Level D	
LEVEL C2:	
• Full-face, air-purifying respirator	See Table 2
• Combination organic vapor/acid gas/HEPA	See Table 2
• Level D (except safety glasses/goggles or shield)	
OPTIONS:	
• Hearing Protection (ear plugs or muffs)	Section G
• For welding--Dura-Kev Flash Suit w/Airline Respirator	p. A-13

TABLE 2
RESPIRATOR INFORMATION

Manufacturer	Cartridge/Facepiece	Size & Type	M&S Code	Safety Equip. Guide Ref.
HALF-MASK RESPIRATORS:				
MSA	Comfo II Rubber	small	20-6938	F-9
MSA	Comfo II Rubber	medium	20-6584	F-9
MSA	Comfo II Rubber	large	20-6940	F-9
MSA	Comfo II Silicone	small	20-8904	F-9
MSA	Comfo II Silicone	medium	20-8905	F-9
MSA	Comfo II Silicone	large	20-8906	F-9
MSA	Comfo Elite Silicone	small	03-1642	F-10
MSA	Comfo Elite Silicone	medium	03-1643	F-10
MSA	Comfo Elite Silicone	large	03-1644	F-10
Glendale	Glenaire MX/PF 9500	(one size)	01-6556	F-13
U. S. Safety	200	small	01-6581	F-5
U. S. Safety	200	medium	01-6580	F-5
U. S. Safety	200	large	01-6579	F-5
Protech	1482	small	20-6070	F-7
Protech	1482	medium	20-8907	F-7
Protech	1482	large	20-8908	F-7
FULL-FACE RESPIRATORS:				
MSA	Ultra-Twin	small	20-8706	F-19
MSA	Ultra-Twin	medium	20-7027	F-19
MSA	Ultra-Twin	large	20-8707	F-19
U. S. Safety	151	medium	20-7519	F-21
CARTRIDGES:				
MSA	GMA-H	Organic Vapors, Acid Gases, HEPA filter	20-7573	F-11
Glendale	C23-50	Organic Vapors, Acid Gases, HEPA filter	01-6563	F-14
U. S. Safety	158-T-46	Organic Vapors, Acid Gases, HEPA filter	20-7582	F-6
Protech	G104-G208	Organic Vapors, Acid Gases, HEPA filter	20-8631	F-8

TABLE 3

DECISION CRITERIA FOR SELECTION AND UPGRADING OF PERSONAL PROTECTIVE EQUIPMENT

AGENT(S)	MONITORING INSTRUMENT	DECISION LEVEL	REQUIRED PROTECTION
Dust	RAM	< 1.0 mg/m^3 during work	Level D*
Dust	RAM	> 1.0 mg/m^3 during work	Level C
Hydrogen Sulfide	Detector Tube or H_2S Monitor	< 10 ppm	Level D*
Hydrogen Sulfide	Detector Tube or H_2S Monitor	> 10 ppm	Level B or leave area
Organics (Volatile)	Hnu or OVA	< 5 ppm above background	Level D*
Organics (Volatile)	Hnu or OVA	5 - 10 ppm above background	Level C
Organics (Volatile)	Hnu or OVA	> 50 ppm above background	Level C2 or leave area
Radiation	Radiation Survey Meter	0.1 - 1.0 mR/h	Level D*
Radiation	Radiation Survey Meter	1.0 - 2.5 mR/h	Level C
Radiation	Radiation Survey Meter	> 2.5 mR/h	Leave area
Combustible Gas	Combustible Gas Indicator	< 20% LEL	Level D*
Combustible Gas	Combustible Gas Indicator	> 20% LEL	Leave area
Oxygen	Oxygen Monitor	> 19.5 %	Level D*
Oxygen	Oxygen Monitor	< 19.5 %	Level B or leave area

* Level D or minimum work attire as determined by SSO/HSO.

4.0 ROLES AND RESPONSIBILITIES

The following personnel have key responsibilities and authority for site safety and health matters. Primary personnel responsible for the day-to-day management of the excavation activities are the Project Manager, the On-Site Project Coordinator, and the Site Safety Officer. Please note, however, that any one person on a project may fill more than one of the following roles (for example, the Project Manager may also act as the Site Safety Officer).

4.1 PROJECT MANAGER

The Project Manager (PM) is responsible for overall coordination of design and construction work. The Project Manager may act as Site Safety Officer if no contamination exposure is anticipated or if he/she is properly trained to identify and address potential hazards.

4.2 ON-SITE PROJECT COORDINATOR

The On-Site Project Coordinator (OPC) is responsible for coordinating the day-to-day project activities occurring at a site. The On-Site Project coordinator may also act as Site Safety Officer if no contamination exposure is anticipated or if he/she is properly trained to identify and address potential hazards.

4.3 SITE SAFETY OFFICER (PRIMARY)

A person will be designated as the primary Site Safety Officer (SSO) for work in areas found to be contaminated. This person will provide technical guidance regarding the establishment of the exclusion zones, support zones, contamination reduction, and command post locations; will institute decontamination procedures; and will have the authority to stop work on-site in the event of a violation of the Site Safety Plan or any other act that threatens personnel health or safety. Work can be resumed only after corrective measures have been taken and approved by the Site Safety Officer in consultation with the On-Site Project Coordinator and/or Site Safety Officers Supervisor. This person will also be responsible for all air sampling, when necessary.

4.4 HEALTH AND SAFETY OFFICER

The Health and Safety Officer's (HSO) responsibilities include review and approval of the Site Safety Plan and any subsequent changes to the plan. He/she will be available for consultation with the Site Safety Officer, Project Manager or On-Site Project Coordinator during the first phase of the work. If warranted, this person will conduct site safety audits to ensure the Site Safety Plan is being implemented correctly.

4.5 QUALITY CONTROL OFFICER - ALTERNATIVE SITE SAFETY OFFICER

The quality control (QC) officer will be responsible for auditing the implementation of all phases of the Site Safety Plan and communicating any discrepancies to the Primary Site Safety Officer. He/she will be responsible for arranging for lab work, observing soils removed during the excavations, analyses of soil samples if required, stockpile tracking forms, manifests, etc. He/she will provide a written report documenting the implementation of all phases of the Site Safety Plan and the operating procedures. The QC officer will be responsible for verifying the establishment of the work zones, overseeing decontamination procedures, managing the waste generated during the project to ensure appropriate storage and disposition of all waste material. He/she is also

responsible for making disposal arrangements in consultation with a contractor. He/she will assume the responsibilities of the Primary Site Safety Officer in his/her absence and will communicate any discrepancies to the Health and Safety Officer. The only exception will be air monitoring, which will be deferred to the Health and Safety Officer.

4.6 OFF-SITE CONSTRUCTION MANAGER

The off-site construction manager will be the key contact for technical questions on the construction portion of the job and will coordinate necessary arrangements to ensure the Site Safety Plan is being properly implemented. This person is responsible for ensuring that all procedures pertaining to physical hazards are followed throughout the project.

4.7 ENVIRONMENTAL SERVICES/ENVIRONMENTAL COORDINATORS

These people can be contacted for technical guidance on environmental concerns such as waste handling, interpretation of analytical results, etc. One or the other MUST be contacted if the job is shut down for environmental reasons. They are responsible for keeping each other apprised of job progress and, if necessary, the appropriate regulatory agencies. They will be responsible for spot checking the record keeping and stockpile management on a periodic basis.

4.8 TECHNICAL AND ECOLOGICAL SERVICES

Technical and Ecological Services (TES) can be contacted for technical guidance on waste handling, interpretation of analytical data, and other technical matters as required.

1.	Rich McCurdy	PG&E 251-5303/PT&T	415-866-5303
2.	Jeri Pollock	PG&E 251-5575/PT&T	415-866-5575
3.	Bryan Nicholson	PG&E 251-5477/PT&T	415-866-5477

4.9 GOVERNMENT AGENCIES

The California Environmental Protection Agency, the California Department of Health Services, the California Regional Water Quality Control Board, and the local County and City Public or Environmental Health Departments are agencies with which we maintain communications. If agency notification is required, the Environmental Coordinator or the Environmental Services contact shall be notified immediately and they will make the appropriate agency notification. In no case, however, should any agency notification legally required be deferred due to unavailability of Manufactured Gas Plant Project Team members or Environmental Coordinators

4.10 CREW MEMBERS

Responsible for donning/doffing personal protective equipment in accordance with the Site Safety Plan and instructions given by the Site Safety Officer and in his absence the On-site Project Coordinator.

5.0 EMERGENCY RESPONSE PROCEDURES

5.1 EMERGENCY PROCEDURES

If an injury occurs, take the following steps:

1. Prevent further injury.
2. Initiate first aid and get medical attention for the injured immediately.
3. Notify Site Safety Officer and On-Site Project Manager.

In the event that an emergency develops on-site, such as hazardous material spill or exposure problem, the following emergency procedures should be followed:

1. The Site Safety Officer will direct personnel to the appropriate evacuation routes and will make all project personnel aware of these routes prior to the first on-site activities.
2. In the event a member of the field crew experiences any adverse health effects or symptoms of exposure while on site, the entire field crew shall immediately halt work and act according to the instructions given by the Site Safety Officer.
3. The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the evacuation of the field team and re-evaluation of the hazard and the level of personal protection required.
4. Notify appropriate parties.

One of two designated routes to the nearest Medical Center will be used in the case of an emergency or the need for immediate medical treatment. The Site Safety Officer will determine if an ambulance is required or if the person(s) requiring medical aid can be transported by PG&E personnel.

5.2 EMERGENCY COMMUNICATIONS PROTOCOL

The following visual signals will be used as emergency communications signals:

- Hands clutching throat: out of air/can't breath
- Hands on top of head: need assistance
- Thumbs up: OK/I'm alright/I understand
- Thumbs down: no/negative
- Grip partner's wrist/both hands around partner's waist: leave area immediately

6.0 WORK PRACTICES

This section contains the procedures that will be followed during the excavation work in the event gas plant residues are encountered during any portion of the project.

- Work Zone
- Dust Suppression
- Air Monitoring
- Decontamination
- Waste Handling (including procedures for handling clean soils)

6.1 WORK ZONES

The work zones described in this section are designed to prevent the transfer of potentially hazardous materials to off-site locations by workers or equipment. There will be three work zones established at the job site if necessary: the exclusion zone, the contaminant reduction zone, and the support zone. The zones will be separated by barrier tape or other methods to clearly delineate the zone boundaries.

Exclusion Zone (EZ)

This is the area where excavation activities are taking place and is considered to be potentially contaminated. Real-time air monitoring of worker breathing zones for particulates and volatile organic compounds will take place in this zone. Proper protective clothing and equipment must be worn by all personnel working in this area. The Site Safety Officer, in conjunction with this plan, will determine the level of protective clothing required.

Contaminant Reduction Zone (CRZ)

This area is located immediately outside the exclusion zone and is used for the decontamination of personnel and equipment. Protective clothing, such as coveralls and gloves, and disposable equipment, are to be removed and placed in drums. Non-disposable equipment and protective clothing (i.e., boots) are to be washed and rinsed in this zone.

Support (or clean) Zone (SZ)

The support zone is considered to be uncontaminated. No contaminated equipment shall enter this zone. While wearing of protective gear is not required in this zone, it should be readily available in case of emergencies. All equipment and materials are stored and maintained in this zone.

6.2 DUST SUPPRESSION

Dust suppression measures will be used when visual or instrumental indications of dust levels indicate their necessity. A fine water spray will be used to wet soils, as necessary, using only enough water to provide dust control, so as to minimize runoff.

6.3 AIR MONITORING

Air monitoring of excavation activities will be implemented to screen ambient air concentrations of particulates in the work zone, if required by the Site Safety Officer. In addition, other equipment will be used, as appropriate, to measure oxygen levels, combustible gas, noise, and temperature in the exclusion zone.

The Site Safety Officer is responsible for establishing daily ambient background air concentrations and for ensuring that all equipment is properly calibrated prior to initiating field activities. The SSO will monitor worker breathing zones at an interval judged appropriate by the SSO for dust and volatile organic vapors. The results will be logged. Personal, integrated samples for PNAs and volatile organic vapors will be collected by the SSO and HSO at appropriate intervals to characterize worker exposure.

Ambient air monitoring will be performed, when warranted, according the following methods:

- Real-time measurement of dust in the work zone: This will be performed by using a RAM-1, or similar instrument. If the measured concentration of dust exceeds 1.0 mg/m^3, employees in the work area will don respirators (see Section 3.0) and dust suppression measures (Section 6.2) will be implemented.

- Real-time management of volatile organic compounds in the work zone: This will be performed by using an organic vapor analyzer utilizing a flame ionization or photoionization detector. If concentrations of volatile organic compounds exceed 5 ppm above the ambient background concentration, employees will don respirators (Section 3.0) and dust suppression measures (Section 6.2) will be implemented.

- Time-weighted average of PNAs in particulates measured at upwind and downwind locations: This will be performed using a low-volume particle collector at each of the two locations in accordance with NIOSH Method 5506 or 5575.

The Site Safety Officer will establish ambient background concentrations of particulates.

6.4 DECONTAMINATION

Employees exiting the exclusion zone and equipment used in the exclusion zone must follow the decontamination procedures as outline below if contamination has been encountered.

- Personnel Decontamination Procedure:

  - Remove disposable booties (if applicable) and place in drum for disposal.

  - Wash boots with detergent solution and rinse with clean water.

  - Wash outer gloves in detergent solution and rinse in clean water. Remove outer gloves and place into plastic bag for later reuse or place in drum for disposal.

  - Remove outer disposal coveralls and place in drum for disposal.

- At end of shift, remove respirator (if used) and place filters or cartridges into drum. Place the respirator into a separate bag for later cleaning and disinfection. Respirators must be disinfected daily according to the procedures in the PG&E *Respirator Manual*.

- Remove inner gloves (if used) and place in drum for disposal.

- Remove rubber boots (or other work boots) and place in storage area. Don street shoes.

- Thoroughly wash hands and face.

Equipment Decontamination Procedures:

All equipment which comes into the exclusion zone or in contact with potentially contaminated soils or water shall be cleaned prior to and after each use on the project. Decontamination will consist of combinations of hot water cleaning and/or detergent wash, water rinse, isopropyl rinse (if necessary), and distilled water rinse (if necessary). All rinsate generated from decontamination activities shall be placed in appropriate containers. Drums containing solid waste and drums containing rinsate must be closed hand-tight, properly labeled, and placed in a pre-designated drum storage area at the end of each work day. Proper disposal methods for these materials are provided in the Waste Handling Section (Section 6.5).

6.5 WASTE HANDLING

1. **Quality Control Officer Responsibilities:**

The Quality Control Officer is responsible for monitoring the excavated material to ensure that contaminated material is not inadvertently categorized as clean fill. The Site Safety Officer or Quality Control Officer must check or have arranged to check the soil periodically for signs of gas plant residues or other unsuspected contaminants or hazards (chemical or physical). For this purpose, "check" is intended to mean a visual inspection or actual measurement using applicable monitoring equipment, whichever is necessary. The Quality Control Officer shares the responsibilities with the Project Manager for limiting the release of materials off-site. This includes measures to prevent the generation of dust and the volatilization of chemicals causing odors. The Quality Control Officer is responsible for assuring that hazardous wastes, including soil and protective clothing and equipment, are handled properly.

2. **Employee Responsibilities:**

Employees are responsible for proper waste handling practices, as directed by the Site Safety Officer.

3. **Proper Management of Contaminated Soils:**

In the event contaminated soils are encountered during excavation, the following procedures will be followed:

- The material removed as a result of excavation will be segregated based on visual observations and/or air monitoring readings as follows: apparently clean soil, apparently contaminated soil; and potentially contaminated soil.

- These soils will be stockpiled on polyethylene sheeting/tarp. Each pile will be kept covered with polyethylene sheeting or other suitable synthetic membrane. The sheeting must be a minimum of 4 millimeters or 0.16 inches thick. The sheeting shall be secured over the piles with tires, sandbags or other appropriate weights. The weight shall be spaced at approximately 10-foot centers on top of the sheeting. The Project Manager and/or Quality Control Officer shall monitor the covered piles each working day to make sure the sheeting is secured.

- Runoff from the piles shall be prevented by placing berms made of clean fill or other material around each pile.

- Dust suppression measures should be implemented during excavation and stockpiling of soils to minimize dust generation.

4. **Proper Management of Excavated Soils Determined to be Clean:**

Soils resultant from the project are assumed to not contain gas plant residue when the assumption is based upon previous analytical data.

- The excavated soil will be visually inspected for the presence of gas plant residues. Clean soil will be placed back in the excavation. Apparently contaminated soil will be placed on polyethylene sheeting and covered. The Environmental Coordinator or Technical and Ecological Services will then be notified regarding disposal of these soils.

5. **Decontamination Solutions and Rinsewaters:**

Wastewaters generated from decontamination of protective clothing and equipment will be stored in a type 17C, 55-gallon drum. All drums will be stored as if they were hazardous waste in a fenced, posted, and secured area. At the end of the project, the contents of each liquid containing drum will be analyzed prior to disposal. The results of the analysis will determine the proper disposal method of the wastewater. The Quality Control Officer will arrange for sampling and proper disposal of wastewaters.

6. **Groundwater Handling Procedures:**

Groundwater may be encountered during the excavation. This water will be contained in Baker tanks or 55-gallon drums if removal from the excavation is required. The water will be sampled in accordance with the discharge requirements for the local sanitary sewer system and will include analysis for PNAs. If the water exceeds the discharge restrictions, arrangements will be made to dispose of it properly.

7. **Protective Clothing and Disposal Equipment:**

Protective suits and clothing will be issued each day as necessary. Disposable suits and equipment will be placed in plastic storage bags and placed in a type 17C, 55-gallon open top drum at the end of each working day. The drums containing protective clothing and disposal equipment will be stored as hazardous waste in a fenced, posted and secure area. At the end of the project, the drums will be transported and disposed of at an approved disposal facility.

7.0 TRAINING

All PG&E personnel working on or in the excavation will have participated in Company Hazard Communication Training, First Aid Training, Respirator Training and Fit Testing, and Facility Environmental Emergency Plan Training. In addition, sufficient training to comply with 29CFR1910.120 will be give in areas such as safe work practices; nature of anticipated hazards; handling emergencies; safe use of field equipment; handling, storage, and transportation of hazardous materials; use, care, and limitations of personal protective equipment; and safe sampling techniques. The above training can be satisfied by specific courses given by qualified trainers, by PG&E-required training, or by a combination of the two.

Those personnel who may be exposed above Permissible Exposure Limits (PELs) for substances or who may be required to wear respirators must receive a minimum of 40 hours of OSHA-standardized training followed by 3 days of on-the-job experience under the direct supervision of a trained, experienced supervisor, prior to conducting unsupervised work at an excavation where gas plant residues have been found.

Those personnel who will not be exposed above the PELs and will not be required to wear respirators must receive a minimum of 24 hours of training followed by one day of supervised on-the-job experience. Excavation project supervisors must receive training equivalent to the personnel that they supervise plus an additional 8 hours on such topics as the health and safety program, personal protective equipment program, spill prevention program, air monitoring, etc.

It is the responsibility of the Site Safety Officer to ensure that all personnel are properly trained, that all those who will wear negative pressure respirators are currently fit-tested, and that personnel are trained in the use of the specific protective clothing and equipment that will be used. The Site Safety Officer, with the assistance of the Health and Safety Officer, will hold a safety briefing prior to the start of work as well as daily on-site briefings.

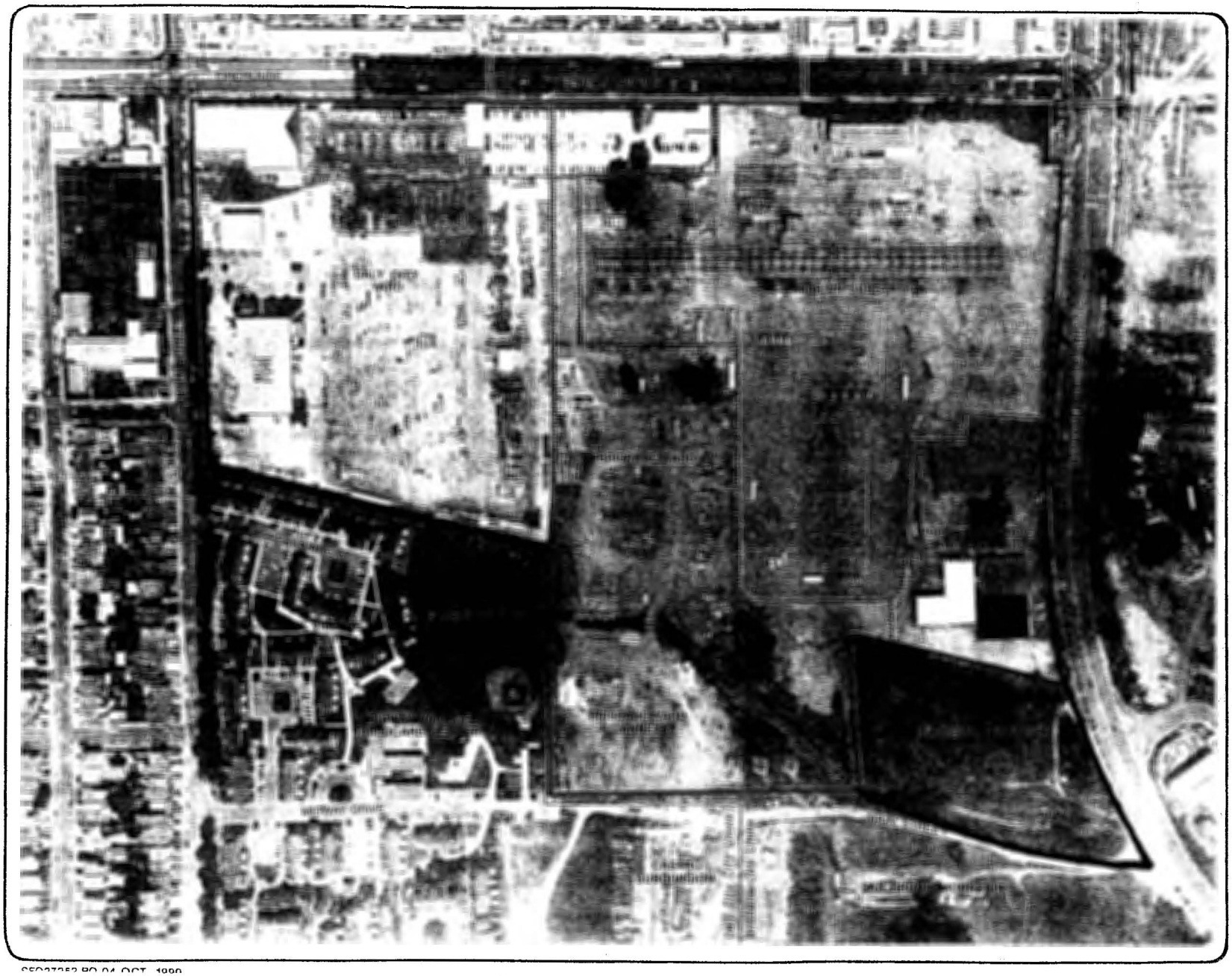
8.0 MEDICAL SURVEILLANCE

PG&E provides a pre-employment physical examination to determine any limitations to work that a person will perform. Medical exams are also given periodically to those personnel exposed to asbestos or arsenic above regulatory limits, and audiometric exams are given to those personnel exposed to high noise levels.

In compliance with 29CFR1910.120, any employee who may be exposed to hazardous chemicals above their Permissible Exposure Limit for more that 30 days per year or who may wear a respirator for more that 30 days per year must undergo medical examinations at the following times:

- Prior to assignment,
- At least every 12 months,
- As soon as possible after signs or symptoms of an overexposure to a hazardous substance, and
- At termination or reassignment to an area where the employee would not be covered if there has not been an examination in the last six months.

If an employee feels he/she has been overexposed to a hazardous substance or has otherwise been injured, a DWC-1 form and a Company form, "Report of Industrial Injury to Employee" (Pink Slip) should be filled out and the employee should consult with a physician if necessary. The work-relatedness of the situation will then be determined by the Workers Compensation Section of the Safety, Health and Claims Department.



LEGEND

PG&E PROPERTY BOUNDARY

GEOGRAPHIC BOUNDARIES WITHIN PG&E PROPERTY

CITY LIMITS

N

0 100 200

SCALE IN FEET

Figure 1
SITE MAP
Martin Service Center
and Levenson Property

SF037252.PO.04 OCT. 1990

EXHIBIT C

Martin Service Center Operation and Maintenance Costs

Chip Seal	$23,600/yr.
Groundwater Monitoring, Well Repairs, and Reporting	$16,000/yr
Trench Monitoring, O&M, Permitting, and Reporting	$55,000/yr
OU-1 Maintenance/Repair	$1,000/yr
Five year Review	$4,000/yr
Bayshore Sanitary District Sewer Service Charge	$10,000/yr
DTSC Oversight Costs	$5,000/yr
Total Yearly Cost	$114,600
Net Present Value for Thirty Years @ 9.12% Interest Rate and 3.0% Inflation Rate	$1,587,331

EXHIBIT D

ATTACHMENT D

Soil Management Plan (2017)

Haley & Aldrich, Inc.
2033 N. Main Street
Suite 309
Walnut Creek, CA 94596
925.949.1012

15 June 2017
File No. 128523-007

California Environmental Protection Agency
Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, California 94710

Attention: Ms. Jessica Tibor

Subject: Soil Management Plan
Pacific Gas and Electric Company
Martin Service Center/Daly City MGP
3004 Geneva Avenue
Daly City, California

Dear Ms. Tibor:

Haley & Aldrich, Inc. (Haley & Aldrich) is pleased to submit this revised Soil Management Plan (SMP) to the Department of Toxic Substances Control (DTSC) on behalf of Pacific Gas and Electric Company (PG&E) for PG&E's Martin Service Center (Site). This SMP was prepared to outline plans for the management of potentially contaminated shallow soil at the Site during future excavation activities with the goal of reducing the potential for human or environmental exposure to manufactured gas plant (MGP) waste residues. Please contact the undersigned should you have any questions regarding this SMP.

Sincerely yours,
HALEY & ALDRICH, INC.

Jessica Ely
Senior Project Manager

Vincent Tilotta, PE
Senior Engineer

Enclosures

cc: Pacific Gas and Electric Company; Melitta Rorty
Pacific Gas and Electric Company; William White

\\WNC\Common\36891_PG&E_Martin Service Center\SMP\REVISED SMP\DCMGP_RevisedSMP_Text_20170615_HAI_Final.docx

HALEY ALDRICH

www.haleyaldrich.com

REPORT ON

SOIL MANAGEMENT PLAN
PACIFIC GAS AND ELECTRIC COMPANY
MARTIN SERVICE CENTER/DALY CITY MGP
3004 GENEVA AVENUE
DALY CITY, CALIFORNIA

by Haley & Aldrich, Inc.
Walnut Creek, California

For Pacific Gas and Electric Company
San Ramon, California

File No. 128523-007
June 2017

Table of Contents

Page

List of Figures iii

1. Introduction 1

2. Background 2

2.1 SITE HISTORY AND DESCRIPTION 2
2.2 PREVIOUS INVESTIGATIONS 2
2.2.1 Site Soil 2
2.2.2 Site Groundwater Monitoring 3

3. Health Risk Exposure Routes 4

4. Mitigation Measures 5

4.1 REMEDIAL ACTION SELECTION AND IMPLEMENTATION 5
4.2 OPERATION AND MAINTENANCE 5

5. Management of MGP Impacted Soil 7

5.1 SOIL 7
5.1.1 Soil Handling, Excavation, and Disposal Procedures 7
5.1.2 Criteria for Soil Reuse/Disposal 8

6. Additional Considerations for Project Specific Plans 10

References 1

List of Figures

Figure No.	Title
1	Site Location Map
2	Site Map
3	Extent of Known MGP Impacts
4	Site Operable Units

1. Introduction

At the request of Pacific Gas and Electric Company (PG&E), Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this revised Soil Management Plan (SMP) as a guideline for handling disturbed soil for future planned activities at PG&E's Martin Service Center at 3004 Geneva Avenue, Daly City, California (Site; Figures 1 and 2). This SMP may be used to develop project-specific plans. Project-specific work plan shall be submitted to Department of Toxic Substances Control (DTSC) for approval before each new project. The site-specific work plan shall include a list of work activities, locations, depths of excavation, a work schedule, and site maps showing any planned soil stockpile and/or dewatering tank locations.

Martin Service Center is a former manufactured gas plant (MGP) site and activities that may disturb subsurface soil are under the Department of Toxic Substances Control (DTSC) oversight. Areas of known MGP impacts have been documented across a large portion of the Site (CH2M HILL, 2001) (Figure 3). MGP-impacted soils are managed in-place under a cap composed of asphalt, concrete, and/or chipseal. A land use restriction is recorded for this Site which includes a requirement that capped soils are not disturbed without approval of a health and safety plan and an SMP by DTSC (DTSC and PG&E, October 17, 2002). This SMP outlines the handling of soil from future excavations within the known and possible MGP-impacted areas of the Site and complies with DTSC guidelines.

This SMP was prepared to mitigate exposure of MGP-impacted soils to Site and vicinity workers and to ensure that all proposed work complies with DTSC's requirements for the Site. Work performed at the Site will adhere to a site-specific health and safety plan (HASP). The HASP shall be prepared in accordance with the Operations and Maintenance Agreement executed January 6, 1995 between PG&E and DTSC (Docket No. HAS-94/95-010) and provided to DTSC.

This SMP contains a summary of the investigation activities conducted, identifies chemicals detected in soil at the Site, and assesses exposure routes that may generate a health risk for Site occupants or Site workers. This SMP also provides a summary of mitigation measures that are protective of human health under the proposed on-Site current land use. In general, these mitigation measures include requirements for maintaining adequate cover (cap) over soil at the Site.

2. Background

2.1 SITE HISTORY AND DESCRIPTION

The Site is located at 3004 Geneva Avenue in Daly City, California. The Site covers approximately 52 acres. The Site is bounded to the north by Geneva Avenue; to the west by Schwerin Street; to the east by Bayshore Boulevard; and to the south by Midway Village housing, Bayshore Park, and Main Street.

The Site is divided into several sections, including Daly City Yard, Brisbane Yard, Brisbane Yard Annex, Martin Substation, Levinson North Parcel, and the building located at 2850 Bayshore Blvd, Brisbane that was formerly the PSEA Clubhouse/Records Center and is now used as office and warehouse space for PG&E's General Construction Gas and Corporate Real Estate (Figure 2).

From 1905 to 1916, an MGP operated on the Site at the current location of the PG&E Martin Service Center. Residual waste associated with the MGP operations, including lampblack and tar, is known to exist locally in the Site fill and on adjacent areas to the south and west. Previous environmental investigations conducted at the Site indicate that such waste variably exists under much of the Site to depths up to 16 feet below ground surface (bgs).

Since the 1980s, DTSC has overseen environmental characterization, monitoring, and remedial action activities for the Site as the lead environmental regulatory agency. After subsurface characterization results showed that the soil and groundwater had contaminant concentrations above acceptable DTSC criteria, environmental controls were implemented. The controls include the installation of concrete, asphalt, and chip seal caps, a network of monitoring wells, and a groundwater interceptor trench, in addition to requiring off-site disposal of certain soil and groundwater and cap integrity monitoring. The State Water Resources Control Board (SWRCB) administers storm water control requirements for the Site.

The Site is currently developed with a PG&E service center, substation, and associated structures, office spaces, storage buildings, and paved parking lots. An undeveloped wetland extends through the southern portion of the Site.

2.2 PREVIOUS INVESTIGATIONS

Results of soil sampling performed at the Site (CH2M Hill, 1987, 1988, 1990, 2003 and PG&E, 1986) indicate the presence of the following constituents of potential concern (COPCs): total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), cyanide, and metals including arsenic, cadmium, chromium, lead, nickel, and mercury. These reports along with the analytical results of samples can be viewed on the DTSC Envirostor website[1].

2.2.1 Site Soil

Multiple soil investigation and characterization reports were prepared between 1987 and 2003. Data from the 1988 soil characterization report indicated that soil on portions of the Site was impacted with

[1] http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=41360100

PAHs from MGP residues from 3 to 12 feet bgs, depending on the thickness of the overlying fill, with concentrations of total PAHs up to 6,951 milligrams per kilogram (mg/kg) (CH2M HILL, 1988). Total phenol concentrations in the soil samples ranged from 0.6 to 300 mg/kg and were detected in 11 out of the 25 borings. Benzene, toluene, ethylbenzene and xylenes (BTEX) concentrations ranged from 0.1 to 13.4 mg/kg. BTEX was detected in 7 of the 25 borings. The maximum concentration of cyanide was 7.11 mg/kg. Cyanide was detected in 16 of the borings, including 3 of the borings where field observations did not indicate the presence of MGP residues. Areas containing known MGP impacts in soils are shown in Figure 3.

2.2.2 Site Groundwater Monitoring

The 1988 Site Characterization Report noted groundwater contamination in the artificial fill zone, the shallow zone and the deep zone (CH2M HILL, 1988). PAHs were detected in groundwater on the Site above RWQCB Environmental Screening Levels (ESLs) beginning in 1987. Annual groundwater monitoring was performed between 1987 and 2011, with a final groundwater monitoring event occurring in 2015. A groundwater interceptor trench designed to prevent offsite migration of PAHs was installed in 2002.

PAHs were not detected on the Site in concentrations above RWQCB ESLs between 2008 and 2015 (Haley & Aldrich, 2015). The groundwater monitoring program was discontinued and the groundwater interceptor trench was taken offline on December 31, 2015 with DTSC approval.

3. Health Risk Exposure Routes

TPH, VOCs, PAHs, cyanide, and metals including arsenic, cadmium, chromium, lead, nickel, and mercury were detected in Site soil above applicable environmental screening levels and regional background levels. All other COPCs in soil present on the Site were below applicable environmental screening levels.

A risk assessment report was prepared to evaluate potential impacts to public and environmental health (CH2M HILL, 1991). This report concluded that the most significant potential risk to public health was direct exposure to PAH-contaminated soil and the most significant potential risk to environmental health was the offsite migration of PAHs in groundwater. The subsequent remedial action plan (CH2M HILL, 1993a) indicated that mitigating these risks could be accomplished most effectively using limited capping, grading and groundwater control.

The Site was divided into two Operable Units (OU-1 and OU-2, Figure 4). OU-1 includes the areas where the potential existed for contact with surface soil containing PAHs. These areas are on the western portion of the Site, including the bermed area along the southern boundary of the Daly City Yard and the Schwerin Street Strip. OU-2 encompasses the eastern portion of the Site and addresses the potential routes of PAH transport by surface water and groundwater. It includes the drainage ditch, storm drain and groundwater flowing offsite to the east. A second remedial action plan (CH2M HILL, 1998a) was prepared to address the potential additional risks of the Bayshore Storm Drain Improvement Project (BSDIP), and added the management and disposal of excavated soil from the BSDIP to the remedy for OU-2.

Groundwater monitoring between 2008 and 2015 indicated that groundwater at the Site is no longer impacted with MGP residues above ESLs; therefore, direct exposure to MGP-impacted soils is presently considered the primary potential health risk exposure route for the Site.

4. Mitigation Measures

The following sections summarize the remedial actions selected and implemented at the Site as well as the operation and maintenance (O&M) of the remedies.

4.1 REMEDIAL ACTION SELECTION AND IMPLEMENTATION

Because of the complexity and variation of the contamination at the Site, DTSC organized the work into two operable units, OU-1 and OU-2, addressing specific areas where action was appropriate. OU-1 includes areas on the western portion of the Site, where the potential exists for contact with surface soil containing PAHs, including the bermed area along the southern boundary of the Daly City Yard and a strip of land between Schwerin Street and the Daly City Yard. OU-2 includes areas on the eastern portion of the Site and addresses potential routes of PAH transport by surface water and groundwater, including the drainage ditch, storm drain and groundwater flowing off-site to the east.

The results of the 1991 risk assessment (CH2M HILL, 1991) indicated that soil in OU-2 did not pose a significant risk to human health via the dermal contact pathway. Direct exposure to COPCs in the soil was unlikely because access to the Site was controlled by a fence around the property. Also, most soil is covered by concrete, asphalt, or clean fill, which limited potential contact with soil containing COCs. The Remedial Action Plan (RAP) for OU-1 (CH2M HILL, 1993a) was approved by DTSC in June 1993. The Remedial Design and Implementation Plan (RDIP) (CH2M HILL, 1993b) for OU-1 was approved in December 1993. A revised RAP for OU-2 was completed in July 1998 (CH2M HILL, 1998a) and DTSC approved a modified RAP for OU-2 in September 2000.

On 28 June 1991, PG&E entered into a Consent Order with the State Department of Health Services (DHS) and the RWQCB. The objective of the Consent Order was to ensure that any release or threatened release of a hazardous substance (as defined in section 25316 of the California Health and Safety Code) to the air, soil, surface water, or groundwater at or from the Site is thoroughly investigated and appropriate remedial actions are taken.

Additionally, a land use restriction was approved by DTSC and filed by PG&E in 2002 at the San Mateo County Recorder's Office (DTSC and PG&E, 2002). The land use restriction limits the use of the Site to industrial, utility, commercial or office space use, and prohibits the future development of the Site for health clinics, schools, daycare centers or senior citizen facilities. The land use restriction also prohibits drilling for water for drinking or irrigation purposes, raising of food, and bans activities that disturb capped soils without approval of a health and safety plan and an SMP by DTSC.

4.2 OPERATION AND MAINTENANCE

Operation and maintenance (O&M) activities as well as monitoring of the remediation systems are being conducted at the Site with DTSC oversight. O&M activities are being conducted in accordance with the following DTSC-approved documents:

- Revised Operations and Maintenance Plan for Martin Service Center Operable Unit 1 (The Daly City Yard Berm Cap and Schwerin Street Strip Capped Areas) and Operable Unit 2 (Brisbane Yard and Annex Cap and Interceptor Trench) (PG&E, 2005).

- 2015 Fourth Five-year Review Report for PG&E Martin Service Center, Daly City, CA. (Haley & Aldrich, 2015).

Current O&M and compliance monitoring reporting requirements are described below.

In accordance with the O&M Plan, PG&E representatives conducted a monthly inspection of the cap, drainage ditch, and irrigation system during the first year after construction (CH2M HILL, 1994). After the first year, the inspection schedule decreased to once every three months and included annual inspection of perimeter fencing. The current O&M Plan (revised in 2005) addresses a corrective action procedure, landscape monitoring, and an irrigation schedule (PG&E, 2005).

Chip seal surfaces are inspected semi-annually for deterioration and, if found to be deteriorated, worn, or damaged sufficiently to allow significant dust generation, the chip seal surface is repaired as needed.

A PG&E representative periodically (at least annually) inspects the perimeter fence to check for holes or other damage. If damage is found, PG&E makes the necessary repairs (PG&E, 2005).

Annual reports will be submitted; which include the completed annual and semiannual Site activities. The report will also include anticipated work for the next year.

Groundwater monitoring will be competed every five years in accordance to the DTSC approved plan to reduce groundwater monitoring across the Site as stipulated in the 2015 Fourth Five-year Review Report for PG&E Martin Service Center (Haley & Aldrich, 2015).

5. Management of MGP Impacted Soil

In the event of future excavation and/or soil movement at the Site, appropriate precautions and controls should be instituted to protect workers and the environment from exposure to COPC concentrations as documented herein. The COPC concentrations may be presumed to extend across the entire Site (including under any hardscape areas).

The following sections describe procedures to be used to identify and/or manage soil containing residual chemical concentrations that could potentially be encountered on the Site during and after Site development or maintenance activities.

5.1 SOIL

As previously discussed, based on investigation to date, MGP residues containing TPH, VOCs, PAHs, cyanide, and metals including arsenic, cadmium, chromium, lead, nickel, and mercury are the COPCs that have been documented at the Site.

Multiple soil investigation and characterization reports between 1987 and 2003 indicated that soil on portions of the Site was impacted with PAHs from MGP residues from 3 to 12 feet bgs, depending on the thickness of the overlying fill, with total PAH concentrations up to 6,951 milligrams per kilogram (mg/kg) (CH2M HILL, 1988).

The following risk management measures should be implemented before, during, and after any work is conducted that will penetrate below the surface cap outlined in Section 4 and into native soil and/or fill.

5.1.1 Soil Handling, Excavation, and Disposal Procedures

Soil in the Site was previously sampled for characterization. Soil in an area encompassing the southern portion of the Site has known MGP impacts (Figure 3). Soil disturbed within the area of known MGP impacts is assumed to be hazardous, and shall be handled appropriately as described below. Soil disturbed on the Site outside of the area of known MGP impacts should be handled as hazardous material if MGP impacts are observed during excavation. Excavated soil from outside of the area of known impacts should be observed by a professional qualified to identify MGP impacts. The environmental professional shall identify the potential presence of MGP-impacted soil by observing staining, odors, or the identification of MGP residues within the disturbed area.

Excavated soil from inside of the area of known MGP impacts, or suspected of containing MGP residues, shall be contained at the Site on either a 10-mil plastic sheet, in a roll-off bin, or in a Department of Transportation-rated drum until profiled and accepted for disposal. Excavation soil will be segregated based on visual observation of MGP residues. Soil will be stored in a secure location within the Site, which will be identified on project-specific work plans. The soil will be sampled and profiled for removal from the Site to an approved waste disposal facility. All individuals working in the excavation or with the excavation soil should be 40-Hour HAZWOPER trained.

Soil samples shall be collected in laboratory-provided containers as required by the receiving disposal facility. A four-point composite soil sample shall be collected from the excavated soil stockpile. All soil

samples shall be immediately placed on ice and transported to a State of California certified laboratory under chain of custody protocol for the following analyses:

1. VOCs by United States Environmental Protection Agency (EPA) Method 8260B;
2. CAM 17 metals and cyanide by EPA method 600/7400 series;
3. Total Extractable Petroleum Hydrocarbons by EPA Method 8015B;
4. Semivolatile Organic Compounds by EPA Method 8270 Selective Ion Monitoring (SIM);
5. Benzene Toxicity Characteristic Leaching Procedure (TCLP);
6. Lead Soluble Threshold Limit Concentration (STLC); and
7. Lead (TCLP).

A completion report with all permits, chains of custody, field forms, waste manifests, and laboratory analytical data shall be submitted to DTSC following the completion of each project as specified in the project-specific work plan.

5.1.2 Criteria for Soil Reuse/Disposal

All excavated soil from inside the area of known MGP impacts shall be removed for disposal at an off-Site disposal facility. Soil excavated from outside the area of known MGP impacts may be reused on the site based on the following Soil Reuse Criteria table.

Soil may be reused at the Site only if analytical results from its corresponding composite soil sample analysis are below its corresponding commercial/industrial limit, as shown below. These criteria are based on DTSC-Modified Screening Levels [2] (DTSC-SLs) established by DTSC in the Human Health Risk Assessment (HHRA) Note 3, and Environmental Screening Levels[3] (ESLs) established by the San Francisco Bay Regional Water Quality Control Board (RWQCB) for screening for environmental concerns at sites with contaminated soil and groundwater. The criteria are appropriate for this Site because the property is a restricted commercial/industrial site. ESLs were used for analytes for which a corresponding DTSC-SLs was not identified to be established. ESLs for direct exposure human health risk for commercial/industrial site were selected over more conservative groundwater leaching ESLs because the soil that is potentially being reused onsite is going to be placed in its excavation of origin, and years of groundwater monitoring indicate that groundwater migrating offsite is no longer a viable exposure pathway for COPCs at the Site (Haley & Aldrich, 2015). Any soil imported onto the Site for use as backfill will be subject to the same screening levels as soil reused onsite. All analytical data for imported soil will be submitted to DTSC.

[2] 2016. California Department of Toxic Substances Control, *Human Health Risk Analysis Note 3.* June 2016. (Table 1 (DTSC Recommended Screening Levels for Soil *industrial/commercial use))*.

[3] 2016. California Regional Water Quality Control Board, San Francisco Region. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater, Interim Final. February* 2016. ((Direct Exposure Human Health Risk Levels, Table S1 (shallow soil for industrial/commercial use)*).*

SOIL REUSE CRITERIA		
Analyte	Limit (in Milligrams per kilogram)	Source
ACENAPHTHENE	45,000	ESL
ANTHRACENE	230,000	ESL
ANTIMONY	470	ESL
ARSENIC	0.36	DTSC-SL
BARIUM	220,000	ESL
BENZO(a)ANTHRACENE	2.9	ESL
BENZO(b)FLUORANTHENE	2.9	ESL
BENZO(k)FLUORANTHENE	29	ESL
BENZO(a)PYRENE	0.29	ESL
BERYLLIUM	210	DTSC-SL
CADMIUM	7.3	DTSC-SL
CHROMIUM III	170,000	DTSC-SL
CHROMIUM VI	6.2	ESL
CHRYSENE	260	ESL
COBALT	350	ESL
COPPER	47,000	ESL
DIBENZO(a,h)ANTHTRACENE	0.29	ESL
FLUORANTHENE	30,000	ESL
FLUORENE	30,000	ESL
INDENO(1,2,3-cd) PYRENE	2.9	ESL
LEAD	320	DTSC-SL
MERCURY	4.5	DTSC-SL
METHYLNAPHTHALENE (total 1- & 2-)	3,000	ESL
MOLYBDENUM	5,800	ESL
NAPHTHALENE	14	ESL
NICKEL	11,000	ESL
PYRENE	23,000	ESL
SELENIUM	5,800	ESL
SILVER	1,500	DTSC-SL
THALLIUM	12	ESL
TOTAL PETROLEUM HYDROCARBONS - diesel range	1,100	ESL
TOTAL PETROLEUM HYDROCARBONS - motor oil range	140,000	ESL
VANADIUM	1,000	DTSC-SL
ZINC	350,000	ESL

If the result for any analyte exceeds its corresponding limit, the impacted soil must be disposed of at an acceptable off-site disposal facility. Soil designated for off-site disposal may require additional chemical analysis to meet specific requirements set forth by the receiving disposal facility.

6. Additional Considerations for Project Specific Plans

This SMP may be used to develop project-specific plans, however some of the requirements for project-specific plans may vary due to the circumstances of each individual project. The following list contains additional items that may be included in project-specific plans to help expedite the DTSC review process.

- Information for best management practices regarding stockpile management, storm-water runoff, odor suppression, and dust and noise mitigation and monitoring;
- Traffic plan and decontamination protocols for trucks entering and leaving the Site;
- A plan for dewatering, groundwater storage, analysis and disposal; and
- A quality assurance/quality control plan for all samples collected.

A project-specific HASP shall be developed by the contractor preforming the work. This HASP shall include the following:

- A plan for sudden emergencies;
- Contingencies for when unknown or unexpected contamination is encountered, including procedures to evaluate these materials and DTSC notification;
- Procedures for containing accidental releases during work activities;
- Utility procedures, including the Underground Service Alert protocol; and
- Project-specific hazards and mitigation procedures.

References

California Department of Toxic Substances Control (DTSC) and Pacific Gas & Electric Company (PG&E). 2002. *Covenant to Restrict Use of Property.* Environmental Restriction. (Re: PG&E Martin Service Center Brisbane and Daly City). Online: http://www.envirostor.dtsc.ca.gov/regulators/deliverable_documents/3047818839/SMBR_DEED_41360100.pdf. 17 October.

California Department of Toxic Substances Control (DTSC). 2016. (Table 1 (DTSC Recommended Screening Levels for Soil *industrial/commercial use)). Human Health Risk Analysis Note 3.* June.

California Regional Water Quality Control Board - San Francisco Bay Region (RWQCB). 2016. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Interim Final.* February 2016.

CH2M HILL. 1988. *Final Site Characterization Report Volume I; Daly City Former Manufactured Gas Plant, Pacific Gas and Electric.* November.

CH2M HILL. 1991. *Human Health and Environmental Risk Assessment Report. PG&E Daly City Manufactured Gas Plant Site*. August.

CH2M HILL. 1993a. Remedial Action Plan: *PG&E Martin Service Center Former Manufactured Gas Plant Site (Operable Units 1 and 2).* June.

CH2M HILL. 1993b. *Remedial Design and Implementation Plan: PG&E Martin Service Center Site OU-1, Daly City Yard Berm and Schwerin Street Strip.* 17 December.

CH2M HILL. 1994. *Final Construction Report PG&E Martin Service Center Site OU-1 Daly City Yard Berm and Schwerin Street Strip.* December.

CH2M HILL. 1998a. F*inal Revised Remedial Action Plan. PG&E Martin Service Center Former Manufactured Gas Plant – Operable Unit 2.* July.

CH2M HILL. 1998b. *Draft Remedial Design and Implementation Plan. PG&E Martin Service Center Former Manufactured Gas Plant – Operable Unit 2.* August.

CH2M HILL. 2001. *Final Five-Year Review Report for PG&E Martin Service Center; Operable Unit 1.* March.

CH2M HILL. 2002a. *Construction Completion Report: PG&E Martin Service Center Former Manufactured Gas Plant: Operable Unit 2.* April.

CH2M HILL. 2002b. *Operations and Maintenance Plan for Martin Service Center Operable Unit 1 and Operable Unit 2.* August.

CH2M HILL. 2003. *Remediation Completion Report Landscape Strip Remediation PG&E Martin Service Center Former Manufactured Gas Plant Site.* May.

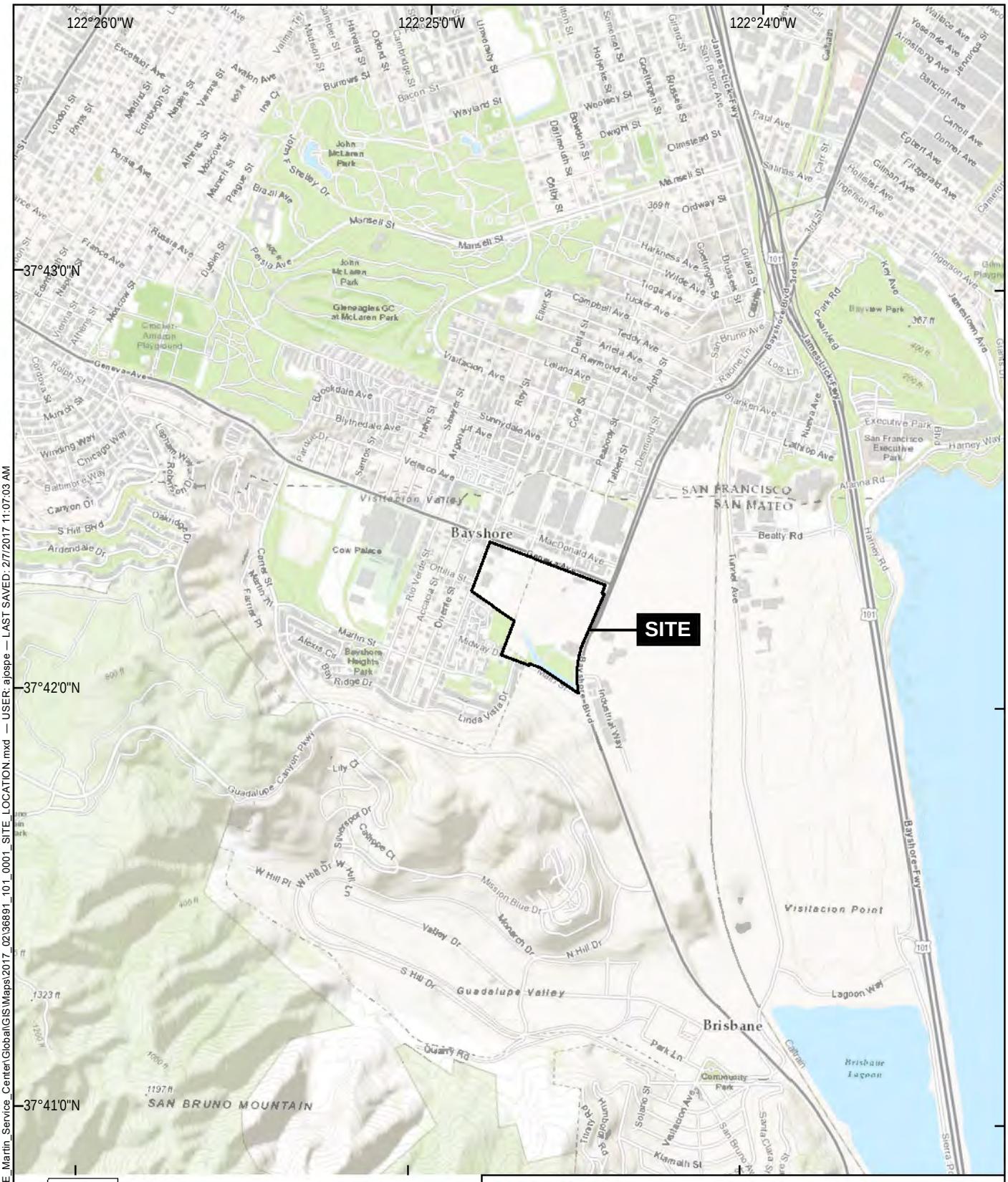
ENV America Incorporated. 2008. *Site Health and Safety Plan, Pacific Gas and Electric Company Martin Service Center.* January.

Haley & Aldrich. 2012. Proposal to Reduce Groundwater Sampling and Groundwater Level Monitoring at Pacific Gas and Electric Company's Martin Service Center. 12 March.

Haley & Aldrich. 2015 *Fourth Five-year Review Report for PG&E Martin Service Center, Daly City, CA*. 30 October.

Pacific Gas and Electric Company (PG&E). 2005. *Revised Operations and Maintenance Plan for Martin Service Center Operable Unit 1 (The Daly City Yard Berm Cap and Schwerin Street Strip Capped Areas) and Operable Unit 2 (Brisbane Yard and Annex Cap and Interceptor Trench).* 12 October.

FIGURES



GIS FILE PATH: \\oak\common\36891_PGE_Martin_Service_Center\Global\GIS\Maps\2017_02\36891_101_0001_SITE_LOCATION.mxd — USER: ajospe — LAST SAVED: 2/7/2017 11:07:03 AM

MAP SOURCE: ESRI
USGS QUAD: SAN FRANCISCO SOUTH
SITE COORDINATES: 37°42'12"N, 122°24'39"

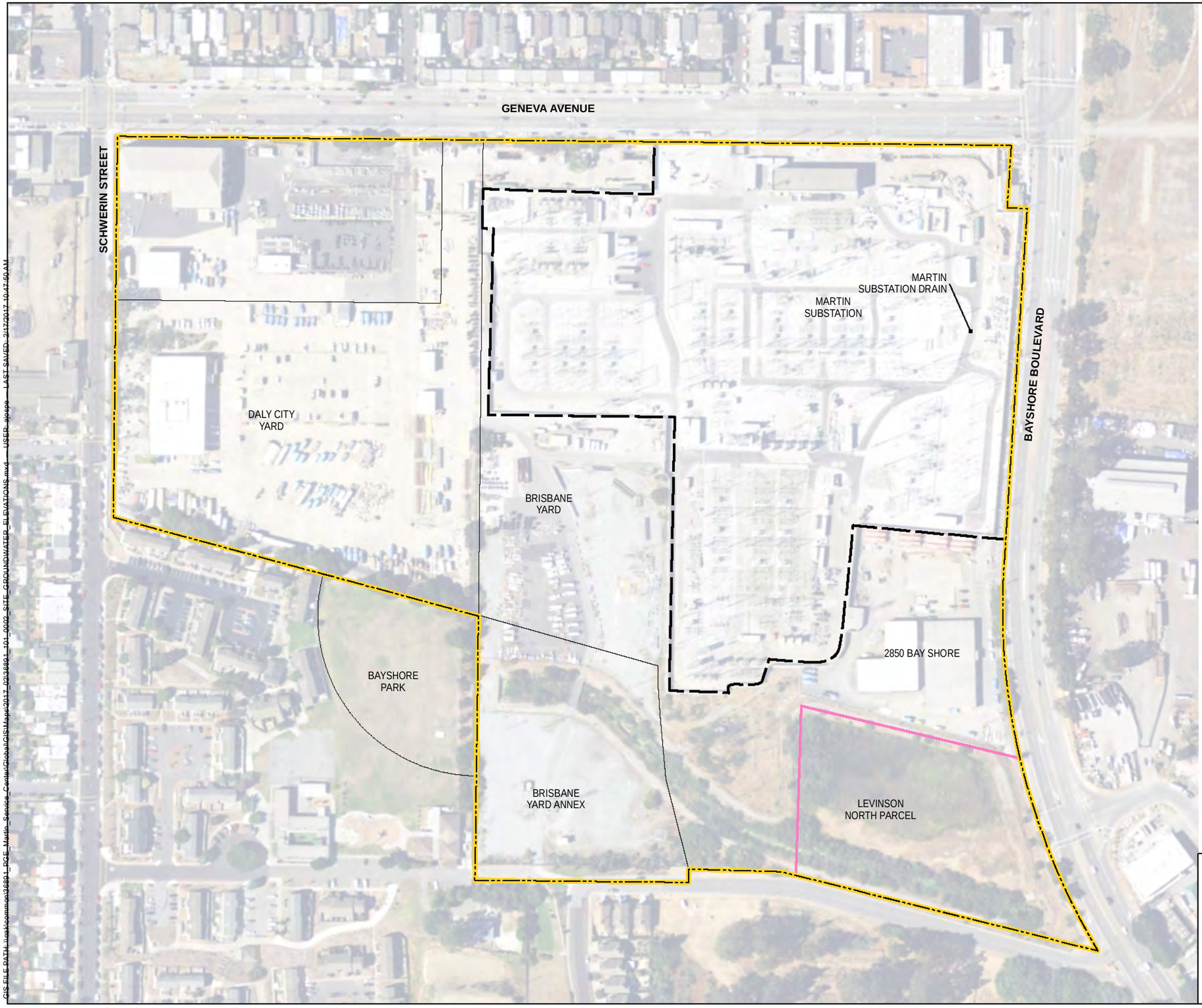
HALEY ALDRICH

PACIFIC GAS AND ELECTRIC COMPANY
MARTIN SERVICE CENTER
FORMER MANUFACTURED GAS PLANT SITE
DALY CITY AND BRISBANE, CALIFORNIA

SITE LOCATION MAP

APPROXIMATE SCALE: 1 IN = 2000 FT
JUNE 2017

FIGURE 1



LEGEND

- LEVINSON NORTH PARCEL
- PG&E PROPERTY BOUNDARY
- GEOGRAPHIC BOUNDARY WITHIN PG&E PROPERTY
- PARCEL

NOTES

1. AERIAL IMAGERY SOURCE: ESRI

0 200 400
SCALE IN FEET

HALEY ALDRICH

PACIFIC GAS AND ELECTRIC COMPANY
MARTIN SERVICE CENTER
FORMER MANUFACTURED GAS PLANT SITE
DALY CITY AND BRISBANE, CALIFORNIA

SITE MAP

JUNE 2017

FIGURE 2

GIS FILE PATH: \\oak\common\36891_PGE_Martin_Service_Center\Global\GIS\Maps\2017_0936891_101_0002_SITE_GROUNDWATER_ELEVATIONS.mxd — USER: ajcapp — LAST SAVED: 2/17/2017 10:47:50 AM

GENEVA AVENUE

SCHWERIN STREET

BAYSHORE BOULEVARD

MARTIN SUBSTATION DRAIN

MARTIN SUBSTATION

DALY CITY YARD

BRISBANE YARD

BAYSHORE PARK

BRISBANE YARD ANNEX

LEGEND

- PG&E PROPERTY BOUNDARY
- GEOGRAPHIC BOUNDARY WITHIN PG&E PROPERTY
- PARCEL
- EXTENT OF KNOWN MANUFACTURED GAS PLANT (MGP) IMPACTS

NOTES

1. EXTENT OF KNOWN MGP IMPACTS SOURCE: CH2M HILL, 1988, FINAL SITE CHARACTERIZATION REPORT VOLUME I, DALY CITY FORMER MANUFACTURED GAS PLANT, PACIFIC GAS AND ELECTRIC, NOVEMBER

2. AERIAL IMAGERY SOURCE: ESRI

N

0 200 400

SCALE IN FEET

HALEY ALDRICH

PACIFIC GAS AND ELECTRIC COMPANY (PG&E)
MARTIN SERVICE CENTER
FORMER MANUFACTURED GAS PLANT SITE
DALY CITY AND BRISBANE, CALIFORNIA

EXTENT OF KNOWN MGP IMPACTS

JUNE 2017

FIGURE 3

GIS FILE PATH: \\oak\common\136801_PGE_Martin_Service_Center\Global\GIS\Maps\2017_04\136801_101_0002_SITE_GROUNDWATER_ELEVATIONS.mxd — USER: ajcapp — LAST SAVED: 3/13/2017 4:20:15 PM

GENEVA AVENUE

SCHWERIN STREET

BAYSHORE BOULEVARD

MARTIN SUBSTATION DRAIN

MARTIN SUBSTATION

DALY CITY YARD

BRISBANE YARD

BAYSHORE PARK

BRISBANE YARD ANNEX

LEGEND

- OU-1 AREA
- OU-2 AREA
- PG&E PROPERTY BOUNDARY
- GEOGRAPHIC BOUNDARY WITHIN PG&E PROPERTY
- PARCEL

NOTE

AERIAL IMAGERY SOURCE: ESRI

0 200 400

SCALE IN FEET

PACIFIC GAS AND ELECTRIC COMPANY (PG&E)
MARTIN SERVICE CENTER
FORMER MANUFACTURED GAS PLANT SITE
DALY CITY AND BRISBANE, CALIFORNIA

SITE OPERABLE UNITS

JUNE 2017

FIGURE 4

GIS FILE PATH: \\oakcommon\36801_PGE_Martin_Service_Center\Global\GIS\Maps\2017_04\36801_101_0002_SITE_GROUNDWATER_ELEVATIONS.mxd — USER: ajcapo — LAST SAVED: 3/13/2017 4:20:15 PM

ATTACHMENT E

Voluntary Cleanup Agreement for Crystal Springs Pipeline No. 1. Replacement (2000)

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

In the Matter of:	)	Docket No. _____
	)	
Martin Service Center	)	Voluntary Cleanup Agreement
	)	
Project Proponent	)	Health and Safety Code
City & County of San	)	Section 25355.5 (a)(1)(C)
Francisco, SFWD	)	
_____	)	

I.
INTRODUCTION.

1.1 Parties. The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) enters into this Voluntary Cleanup Agreement (Agreement) with City and County of San Francisco, Public Utilities Commission, San Francisco Water Department (Proponent).

1.2 Site. The property which is the subject of this Agreement (Site) is located at intersection of Geneva Avenue and Bayshore Boulevard, in Daly City, Ca. Site is part of PG&E property known as Martin Service Center. A diagram of the Site and a location map are attached as Exhibit A and Exhibit B.

1.3 Jurisdiction. This Agreement is entered into by DTSC and Proponent pursuant to Health and Safety Code (H&SC) section 25355.5(a)(1)(C). This section authorizes DTSC to enter into an enforceable agreement with Proponents to oversee the characterization and cleanup of a Site.

1.4 Purpose. The purpose of this Agreement is for the Proponent to remove existing 44-inch diameter steel pipe; install new 48-inch diameter steel pipe and venturi meter at the same location; construct a concrete vault around the venturi meter; related excavation, backfill and removal of soil from project site under the oversight of DTSC. The purpose of this Agreement is also for DTSC to obtain reimbursement from the Proponent for DTSC's oversight costs.

II.
BACKGROUND

2.1 Ownership. The Site is owned by Pacific Gas & Electric Co. The proponent has an easement for a water line through the site.

2.2 Substances Found at the Site. Owner, PG&E has conducted various investigations and sampling at the site. Reports, containing the results of environmental media sampling conducted at the Site, indicate that the site is contaminated with polynuclear aromatic hydrocarbons (PNAs). DTSC has indicated that the PNAs are the only substances of significant concern.

2.3 Physical Description. The pipeline easement, where work is to be conducted, is 50 feet wide and runs approximately north- south through the site. This area is very flat, level ground with overhead electrical improvements on either side of the easement.

2.4 Site History. PG&E operated a "manufactured gas" plant, historically called the Martin Gas Plant, in the northern portion of the site between 1906 and 1913. In the process of manufacturing gas, the plant generated hydrocarbon residues consisting of lampblack (a powdered carbon) and tars, some of which were sold, recycled or disposed of on site. Chemical compounds associated with the lampblack and tar include polynuclear aromatic hydrocarbons (PNAs) and to a lesser degree, volatile organic compounds (VOCs) such as benzene, toluene, xylene and ethylbenzene are typically found in trace levels in oil gassification residues.

The Martin plant was dismantled in 1916, after which the property remained undeveloped for many years. During World War II, the Federal Housing Authority (FPHA, which later became HUD) acquired the site where the plant was located. In 1944, FPHA graded the area and constructed Navy housing over it. During site grading and construction activities, soil from the former gas plant property was moved, spread around and used as fill material.

More details about the site history can be obtained from PG&E.

III.

AGREEMENT

3.0 IT IS HEREBY AGREED THAT DTSC will provide review and oversight of the

response activities conducted by the Proponent in accordance with the Scope of Work contained in Exhibit C. The Proponent shall conduct the activities in the manner specified herein and in accordance with the schedule specified in Exhibit C. All work shall be performed consistent with H&SC section 25300 et seq., as amended; the National Contingency Plan (40 Code of Federal Regulations (CFR) Part 300), as amended; U.S. EPA and DTSC Superfund guidance documents regarding site investigation and remediation.

3.1 Scope of Work and DTSC Oversight. DTSC shall review and provide Proponent with written comments on all Proponent deliverables as described in Exhibit C (Scope of Work) and other documents applicable to the scope of the project. DTSC shall provide oversight of field activities, including sampling and remedial activities, as appropriate. DTSC's completion of activities described above shall constitute DTSC's complete performance under this Agreement.

3.2 Additional Activities. Additional activities may be conducted and DTSC oversight provided by amendment to this Agreement or Exhibits hereto in accordance with Paragraph 3.17. If DTSC expects additional oversight costs to be incurred related to these additional activities, it will provide an estimate of the additional oversight cost to the Proponent.

3.3 Agreement Managers. Barbara J Cook, Chief, Northern California Coastal Cleanup Operations is designated by DTSC as its Manager for this Agreement. Tasso Mavroudis, Project Manager for the pipeline replacement project, is assigned by the Proponent as Manager for this Agreement. Each Party to this Agreement shall provide at least ten (10) days advance written notice to the other of any change in its designated manager.

3.4 Notices and Submittals. All notices, documents and communications required to be given under this Agreement, unless otherwise specified herein, shall be sent to the respective parties at the following addresses in a manner that produces a record of the sending of the notice, document or communication such as certified mail, overnight delivery service, facsimile transmission or courier hand delivery service:

3.4.1 To DTSC:

Barbara J Cook, P.E.
Attn: Alfred Wanger
Department of Toxic Substances Control

Northern Cal Coastal Cleanup Operations
700 Heinz Ave, Suite 200
Berkeley, CA 94708

3.4.2 To the Proponent:

Tasso Mavroudis, P.E.
Project Manager
Utilities Engineering Bureau
1155 Market Street, 5th Fl; San Francisco, CA 94103

3.4.3 To the Property Owner:

PG&E
Attn: Nick Goultas
275 Industrial Road
San Carlos, CA 94070

3.5 DTSC Review and Approval. If DTSC determines that any report, plan, schedule or other document submitted for approval pursuant to this Agreement fails to comply with Health or safety or the environment, DTSC may (a) Return comments to the Proponent with recommended changes; or (b) Modify the document as deemed necessary and approve the document as modified.

3.6 Communications. All DTSC approvals and decisions made regarding submittals and notifications will be communicated to the Proponent in writing by DTSC's Agreement Manager or his/her designee. No informal advice guidance, or suggestions or comments by DTSC regarding reports, plans, specifications, schedules or any other writings by the Proponent shall be construed to relieve the Proponent of the obligation to obtain such written approvals.

3.7 Endangerment during Implementation. In the event DTSC determines that any activity (whether or not pursued in compliance with this Agreement) may pose an imminent or substantial endangerment to the health and safety of people on the Site or in the surrounding area or to the environment, DTSC may order the Proponent to stop further implementation of this Agreement for such period of time as may be needed to abate the endangerment.

3.8 Payment. The Proponent agrees to pay (1) all cost incurred by DTSC in association with preparation of this Agreement and for review of documents submitted prior to the effective date of the Agreement, and (2) all costs incurred by DTSC in providing oversight pursuant to this Agreement, including review of the documents described in Exhibit C and associated documents, and in providing oversight of field activities. An estimate of DTSC's oversight costs is attached as Exhibit D. It is understood by the parties that Exhibit D is an estimate and cannot be relied upon as the final cost figure. DTSC will bill the Proponent quarterly. Proponent agrees to make payment within sixty (60) days of receipt of DTSC's billing. Such billings will reflect any amounts that have been advanced to DTSC by the Proponent.

3.8.1 In anticipation of services to be rendered, Proponent shall make an advance payment of $ 2,900 to DTSC. That payment shall be made no later than ten (10) days after this Agreement is fully executed. If the Proponent's advance payment does not cover all costs payable to DTSC under this paragraph, Proponent agrees to pay the additional costs within sixty (60) days of receipt of a bill from DTSC.

3.8.2 If any bill is not paid by the Proponent within sixty (60) days after it is sent by DTSC, the Proponent may be deemed to be in material default of this Agreement.

3.8.3 All payments made by the Proponent pursuant to this Agreement shall be by a check made payable to the "Department of Toxic Substances Control", and bearing on its face the project code for the site and the docket number of this Agreement. Payment shall be sent to:
Department of Toxic Substances Control

Accounting/Cashier
400 P Street, 4th Floor
P. O. Box 806
Sacramento, California 95812-0806

A photocopy of the check shall be sent concurrently to DTSC's Agreement Manager.

3.8.4 If the advance payment exceeds DTSC's actual oversight costs, DTSC will provide an accounting for expenses and refund the difference within one hundred-twenty (120) days after termination of this Agreement in accordance with Paragraph 3.18. In no other case

shall the Proponent be entitled to a refund from DTSC or to assert a claim against DTSC for any amount paid or expended under this Agreement.

3.9 Condition Precedent. It is expressly understood and agreed that DTSC's receipt of the advance payment described in Paragraph 3.8.1. is a condition precedent to DTSC's obligation to provide oversight, review and/or comment on documents.

3.10 Record Retention. DTSC shall retain all cost records associated with the work performed under this Agreement for such time periods as may be required by applicable state law. The Proponent may request to inspect all documents which support DTSC's cost determination in accordance with the Public Records Act, government Code section 6250 et seq.

3.11 Project Coordinator. The work performed pursuant to this Agreement shall be under the direction and supervision of a qualified project coordinator, with expertise in hazardous substance site cleanup. The Proponent shall submit: a) the name and address of the project coordinator; and b) in order to demonstrate expertise in hazardous substance site cleanup, the resume of the coordinator. The Proponent shall promptly notify DTSC of any change in the identity of the Project Coordinator. All engineering and geological work shall be conducted in conformance with applicable state law, including but not limited to, Business and Professions Code sections 6735 and 7835.

3.12 Access. Proponent shall provide, and/or obtain access to the Site and offsite areas to which access is necessary to implement this Agreement. Such access shall be provided to DTSC's employees, contractors, and consultants at all reasonable times. Nothing in this paragraph is intended or shall be construed to limit in any way the right of entry or inspection that DTSC or any other agency may otherwise have by operation of any law. DTSC and its authorized representatives shall have the authority to enter and move freely about all property at the Site at all reasonable times for purposes including, but not limited to: inspecting records, operating logs, sampling and analytic data, and contracts relating to this Site; reviewing the progress of the Proponent in carrying out the terms of this Agreement; conducting such tests as DTSC may deem necessary; and verifying the data submitted to DTSC by the Proponent.

3.13 Sampling, Data and Document Availability. When requested by DTSC, the Proponent shall make available to DTSC, and shall provide copies of, all data and information concerning contamination at the Site, including technical records and contractual documents,

sampling and monitoring information and photographs and maps, whether or not such data and information was developed pursuant to this Agreement.

3.14 Notification of Field Activities. The Proponent shall inform DTSC at least seven (7) days in advance of all field activities pursuant to this Agreement and shall allow DTSC and its authorized representatives to take duplicates of any sample collected by the Proponent pursuant to this Agreement.

3.15 Notification of Environmental Condition. The Proponent shall notify DTSC's Agreement Manager immediately upon learning of any condition posing an immediate threat to public health or safety or the environment. Within seven (7) days of the onset of such a condition, the Proponent shall furnish a report to DTSC, signed by the Proponent's Agreement Manager, setting forth the events, which occurred, and the measures taken in the response thereto.

3.16 Preservation of Documentation. The Proponent shall maintain a central repository of the data, reports, and other documents prepared pursuant to this Agreement. All such data, reports and other documents shall be preserved by the Proponent for a minimum of six (6) years after the conclusions of all activities carried out under this Agreement. If DTSC requests that some or all of these documents be preserved for a longer period of time, the Proponent shall either comply with that request, deliver the documents to DTSC, or permit DTSC to copy the documents prior to destruction. The Proponent shall notify DTSC in writing at least ninety (90) days prior to the expiration of the six-year minimum retention period before destroying any documents prepared pursuant to this Agreement. If any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the six year period, the related records shall be retained until the completion and resolution of all issues arising therefrom or until the end of the six-year period, which ever is later.

3.17 Amendments. This Agreement maybe amended or modified solely upon written consent of all parties. Such amendments or modifications may be proposed by any party and shall be effective the third business day following the day the last party signing the amendment or modification sends its notification of signing to the other party. The parties may agree to a different effective date.

3.18 Termination for Convenience. Except as otherwise provided in this Paragraph,

each party to this Agreement reserves the right unilaterally to terminate this Agreement for any reason. Termination may be accomplished by giving a thirty (30) day advance written notice of the election to terminate this Agreement to the other Party. In the event that this Agreement is terminated under this Paragraph, the Proponent shall be responsible for DTSC costs through the effective date of termination.

3.19 Exhibits. All exhibits attached to this Agreement are incorporated herein by this Reference.

3.20 Time Period. Unless otherwise specified, time periods begin from the date this Agreement is fully executed, and "days" means calendar days. "Business days" means all calendar days that are not weekends or official State holidays.

3.21 Proponent Liabilities. Nothing in this Agreement shall constitute or be considered a satisfaction or release from liability for any condition or claim arising as a result of Proponent's past, current, or future operations. Nothing in this Agreement is intended or shall be construed to limit the rights of any of the parties with respect to claims arising out of or relating to the deposit or disposal at any other location of wastes or substances removed from the Site.

3.22 Government Liabilities. The State of California (State) shall not be liable for any injuries or damages to persons or property resulting from acts or omissions by the Proponent or by related parties in carrying out activities pursuant to this Agreement, nor shall the state of California be held as a party to any contract entered into by the Proponent or its agents in carrying out the activities pursuant to this Agreement.

3.23 Third Party Actions. In the event that the Proponent is a party to any suit or claim for damages or contribution relating to the Site to which DTSC is not a party, the Proponent shall notify DTSC in writing within ten (10) days after service of the complaint in the third-party action. Proponent shall pay all costs incurred by DTSC relating to such third-party actions, including but not limited to responding to subpoenas.

3.24 Reservation of Rights. DTSC and the Proponent reserve the following rights.

3.24.1 DTSC reserves its right to pursue cost recovery under the Comprehensive Environmental Response, Compensation and Liability act of 1980 (CERCLA), as amended, Health and Safety Code section 25360, and any other applicable section of the law.

3.24.2 Nothing in this Agreement is intended or shall be construed to limit or preclude DTSC from taking any action authorized by law or equity to protect public health and safety or the environment and recovering the costs thereof.

3.24.3 Nothing in this Agreement shall constitute or be construed as a waiver of the Proponent's rights, (including any covenant not to sue or release) with respect to any claim, cause of action, or demand in law or equity that the Proponent may have against any "person", as defined in Section 101(21) of CERCLA, or Health and Safety Code section 25319, that is not a signatory to this Agreement.

3.24.4 By entering into this Agreement, Proponent does not admit to any fact, fault or liability under any statute or regulation.

3.25 Compliance with Applicable Laws. Nothing in this Agreement shall relieve the Proponent from complying with all applicable laws and regulations, and the Proponent shall conform all actions required by this Agreement with all applicable federal, state and local laws and regulations.

3.26 California Law. This Agreement shall be governed, performed and interpreted under the laws of the State of California.

3.27 Severability. If any portion of this Agreement is ultimately determined not to be enforceable, that portion will be severed from the Agreement and the severability shall not affect the enforceability of the remaining terms of the Agreement.

3.28 Parties Bound. This Agreement applies to and is binding, jointly and severally, upon each signatory and its officers, directors, agents, receivers, trustees, heirs, executors, administrators, successors, and assigns, and upon any successor agency of the State of California that may have responsibility for and jurisdiction over the subject matter of this Agreement. No change in the ownership or corporate or business status of any signatory, or of the facility or Site shall alter any signatory's responsibilities under this Agreement.

3.29 Effective Date. The effective date of this Agreement is the date when this Agreement is fully executed.

3.30 Representative Authority. Each undersigned representative of the parties to this Agreement certifies that she or he is fully authorized to enter into the terms and conditions of this Agreement and to execute and legally bind the parties to this Agreement.

3.31 Counterparts. This Agreement may be executed and delivered in any number of

counterparts, each of which when executed and delivered shall be deemed to be an original, but such counterparts shall together constitute one and the same document.

Barbara J Cook — Date: 3/29/2000

Barbara J Cook, P. E., Chief
Northern California Coastal Cleanup Operations
Department of Toxic Substances Control

Michael E Quan — Date: 3/23/00

Michael E Quan, Manager
Utilities Engineering Bureau

Approved as to form

Ron H. — Date: 3/23/00

Deputy City Attorney
City and County of San Francisco

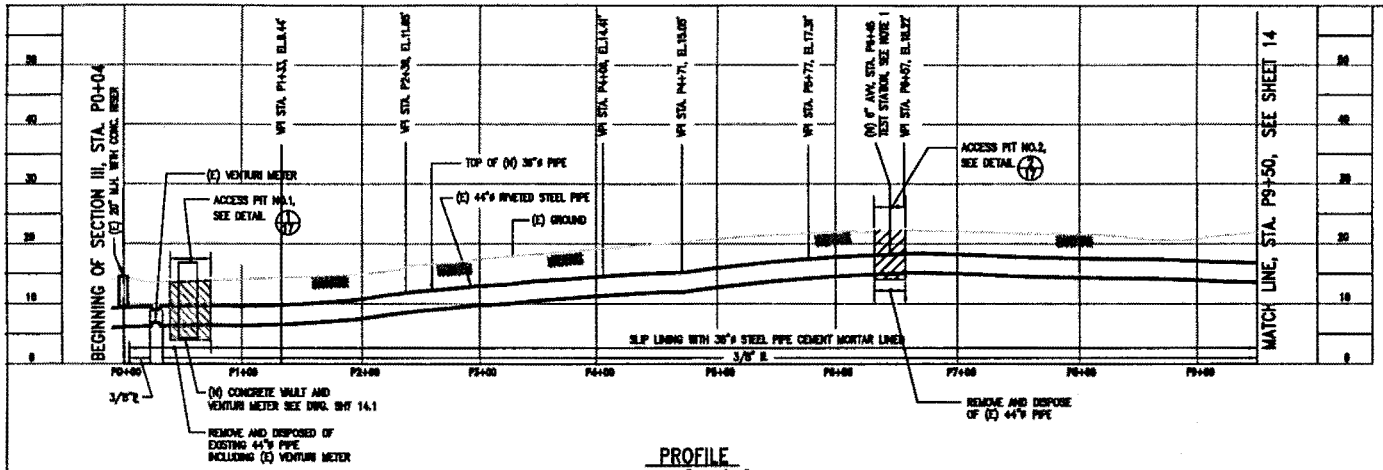
EXHIBITS

A - Site Diagram

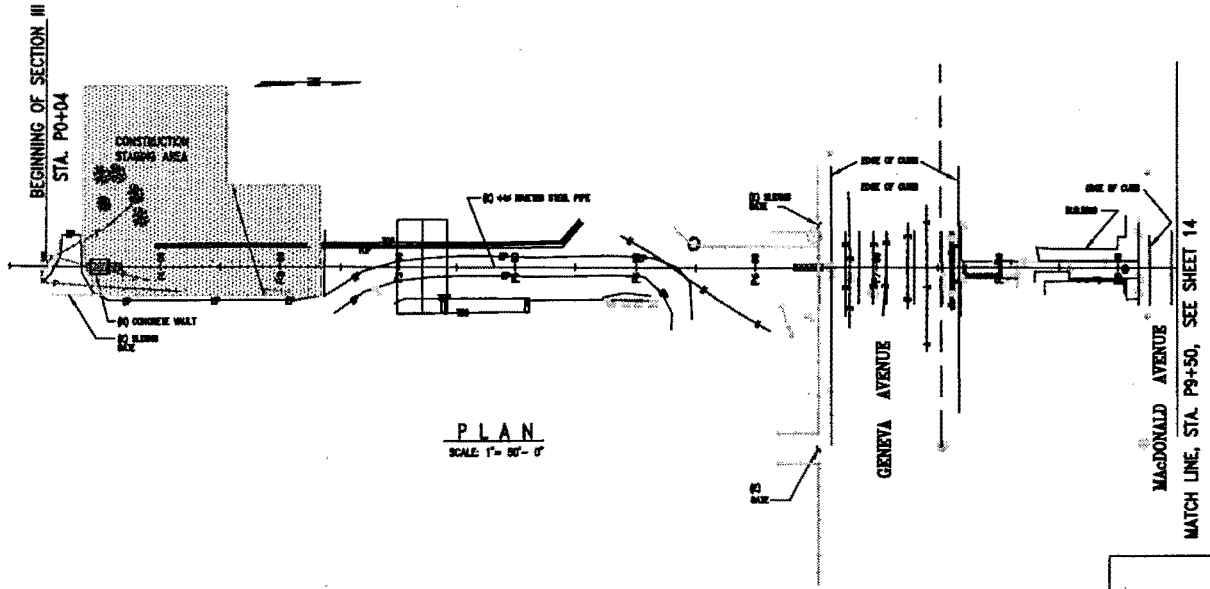
B - Site Location Map

C - Scope of Work, Cost Estimate and Schedule

D. DTSC Cost Estimate



PROFILE
SCALE: HOR. 1" = 50'-0"
VERT. 1" = 10'-0"



PLAN
SCALE: 1" = 50'-0"

NOTES:

1. THE STEEL PIPE LINER SHALL BE BELL AND SPIGOT WITH INSIDE FULL CIRCUMFERENTIAL WELD.
2. INSERT 36"ø STEEL PIPE ONE 20 FEET SECTION AT A TIME TO DESIGN LOCATION.
3. FOR CORROSION CONTROL TEST STATION AND INSULATED FLANGE JOINT, SEE DRAWING E-6183.1, E-6183.2.

CONTRACT NO. WD - 2184

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
UTILITIES ENGINEERING BUREAU

CRYSTAL SPRINGS PIPELINE NO.1 REPLACEMENT

PLAN AND PROFILE

SECTION III FROM STA. P0+04 TO STA. P9+50

ELEVATION DATUM

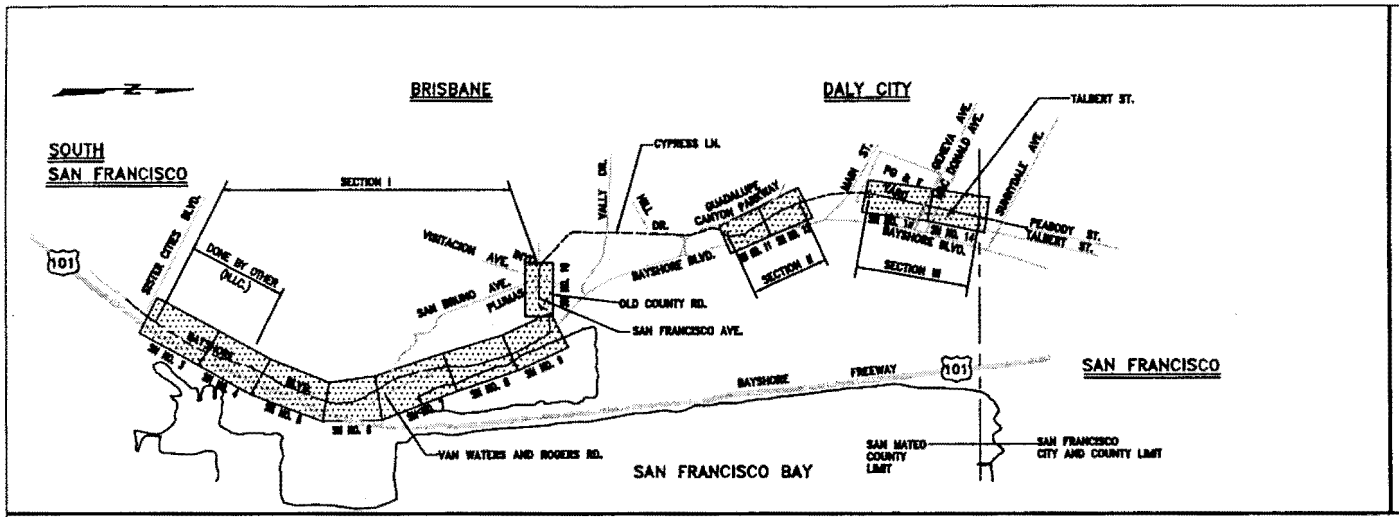
REVISIONS

SHEET 13

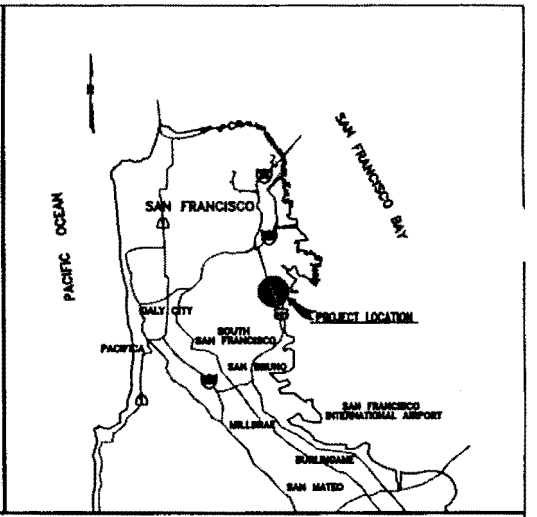
E - 6165

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3 4

PLOT: E
SCALE: 1=1
SIZE: 36.24
COLOR: Mo
RED .030
YELLOW .010
GREEN .010
CYAN .005
BLUE .020
MAGENTA .010
WHITE .010
GRAY .005



LOCATION MAP
N.T.S.



VICINITY MAP
N.T.S.

LIST OF DRAWINGS

SHEET No.	DRAWING No.	TITLE
1	E- 8153	VICINITY MAP, LOCATION MAP AND LIST OF DRAWINGS
2	E- 8154	ABBREVIATIONS, LEGEND AND GENERAL NOTES
3	E- 8155	PLAN AND PROFILE–SECTION I FROM STA. 0+00 TO STA. 12+50 (NOT IN CONTRACT)
4	E- 8156	PLAN AND PROFILE–SECTION I FROM STA. 12+50 TO STA. 25+00
5	E- 8157	PLAN AND PROFILE–SECTION I FROM STA. 25+00 TO STA. 37+50
6	E- 8158	PLAN AND PROFILE–SECTION I FROM STA. 37+50 TO STA. 50+00
7	E- 8159	PLAN AND PROFILE–SECTION I FROM STA. 50+00 TO STA. 63+00
8	E- 8160	PLAN AND PROFILE–SECTION I FROM STA. 63+00 TO STA. 76+00
9	E- 8161	PLAN AND PROFILE–SECTION I FROM STA. 76+00 TO STA. 87+00
10	E- 8162	PLAN AND PROFILE–SECTION I FROM STA. 87+00 TO STA.97+95.37
11	E- 8163	PLAN AND PROFILE–SECTION II FROM STA. M0+27 TO STA. M11+75
12	E- 8164	PLAN AND PROFILE–SECTION II FROM STA. M11+75 TO STA. M18+63
13	E- 8165	PLAN AND PROFILE–SECTION III FROM STA. P0+04 TO STA. P9+50
14	E- 8166	PLAN AND PROFILE–SECTION III FROM STA. P9+50 TO STA. P17+17.77
15	E- 8167	PROPOSED TRAFFIC ROUTING–SECTION I FROM STA. 11+00 TO STA. 33+00
16	E- 8168	PROPOSED TRAFFIC ROUTING–SECTION I FROM STA. 34+00 TO STA. 86+00
17	E- 8169	SECTION III, ACCESS PIT EXCAVATION AND PIPE CONNECTION DETAILS
18	E- 8170	LOCATIONS OF PIPELINE TO BE REMOVED, REPLACED OR ABANDONED AND BULKHEAD
19	E- 8171	STEEL PIPE AND SEWER LATERAL DETAILS
20	E- 8172	STANDARD STEEL PIPE FIELD JOINT DETAILS
21	E- 8173	PIPELINE APPURTENANCE DETAILS AND SCHEDULE
22	E- 8173.1	AIR AND VACUUM VALVE ASSEMBLY, PLAN, ELEVATION AND DETAIL
23	E- 8174	NOZZLE LAYOUT AND DETAILS
24	E- 8175	STANDARD METAL COVER DETAILS FOR MANHOLE RISERS
25	E- 8176	27–INCH FRAME GRATING AND COVER FOR MANHOLES IN PAVED ROAD AND STREET
26	E- 8177	STANDARD MISCELLANEOUS METAL WORK FOR MANHOLE RISERS
27	E- 8178	PIPE ENCASEMENT DETAILS
28	E- 8179	BLOW–OFF AT STA.10+35, 1–INCH TEST TAP AND REDUCER DETAILS (NOT IN CONTRACT)
29	E- 8180	VENTURI METER INSTALLATION
30	E- 8181	ELECTRICAL PLAN, DIAGRAMS, LEGEND AND NOTES
31	E- 8182	ELECTRICAL DETAIL, SECTIONS, AND SHEET NOTES
32	E- 8183.1	CORROSION CONTROL SYSTEM DIAGRAM
33	E- 8183.2	TEST STATIONS
34	E- 8183.3	UTILITY CROSSING AND MISCELLANEOUS DETAILS
35	E- 8183.4	INSTALLATION OF RECTIFIERS
36	E- 8183.5	INSTALLATION OF DEEP WELL ANODE

CONTRACT NO. WD–2184

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
UTILITIES ENGINEERING BUREAU

CRYSTAL SPRINGS PIPELINE NO.1 REPLACEMENT

VICINITY MAP, LOCATION MAP AND LIST OF DRAWINGS

ELEVATION DATUM

REVISIONS

SHEET 1 OF

E-6153

PLOT: E
SCALE: 1=1
SIZE: 36,24
COLOR: No.
RED .003
YELLOW .015
GREEN .012
CYAN .008
BLUE .028
MAGENTA .013
WHITE .019
GRAY .009

FILENAME: G:\BR8881\CSBROAD\DETAIL\CS1-MAPS.DWG(MS-VIEW 1)

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3 4

EXHIBIT C
SCOPE OF WORK

Existing Data The Owner of the site (PG&E) has submitted all background information, sample analysis results, environmental assessment reports and any other pertinent information to the hazardous waste management and/or release, characterization and cleanup of the site. DTSC has reviewed the information, identified areas and media of concern and determined the work required to remediate the site.

SFWD Project: SFWD has a pipeline easement, traversing roughly north to south, through the PG&E property. The 44-inch diameter Crystal Springs Pipeline No 1, which is more than 100 years old, is located in this easement and will be replaced under this project. To minimize impact to the site, new steel pipe, 36-inch diameter, will be installed by sliplining it within the existing pipe. Project work includes:

1. Installation of approximately 1000 lf of 36-inch diameter steel pipe by sliplining through the existing 48-inch steel pipe.
2. Excavation and backfill two access pits, as shown on the drawings. The access pits will be used to facilitate sliplining of the new pipe. The northernmost access pit will be backfilled using native material.
3. At the southern access pit, a venturi meter will be installed and housed in a concrete vault. Excess material will be tested and disposed off appropriately.
4. Testing, disinfection and other related work to bring pipe into service.

Health and Safety Plan: Contractor shall prepare and submit a Health and Safety Plan in accordance with California Code of Regulations, Title 8, Section 5192 and DTSC guidance. The plan shall cover all measures, including contingency plans, which will be taken during field activities to protect the health and safety of the workers at the site and the general public from exposure to hazardous waste, substances or materials. The Health and Safety Plan shall describe the specific personnel, procedures and equipment to be utilized.

SCHEDULE

It is estimated that work within the PG&E yard will take approximately two months and will take place within the overall project schedule, which presently extends from February 2000 to December 2000. Contractor will schedule the work within the PG&E yard according to his overall project schedule.

SAN FRANCISCO WATER DEPARTMENT PIPELINE REPLACEMENT PROJECT
PG&E MARTIN SERVICE CENTER
Cost Estimate For Voluntary Cleanup Agreement

Title	Projected Date	Project Manager	Supervisor	Industrial Hygiene	Public Participation	Toxicology	Legal	Geologist	Miscellaneous Staff	Clerical
Classification		HSS/HSE	SHSE/SHSS	AIH	Specialist	Staff Toxicologist	Staff Counsel	HSEG		WPT
Tasks:										
Agreement Preparation/Negotiation		10	4				2			
Work Notice/Fact Sheet		4	1		12					
Health and Safety Plan		4	1	15						
Implementation Report		6	1							
Total No. Hours/Class		24	7	15	12		2			
Total No. Hours	60									
Hourly Rate/Class		$93	$119	$98	$91		$133			
Costs/Class		$2,232	$833	$1,470	$1,092		$266			
Total Costs	$5,893									

APPENDIX K
ELECTRIC AND MAGNETIC FIELDS INFORMATION

PAGE INTENTIONALLY BLANK

APPENDIX K
ELECTRIC AND MAGNETIC FIELDS INFORMATION

Recognizing that there is public interest and concern regarding potential health effects from exposure to electric and magnetic fields (EMFs), this environmental impact report (EIR) appendix provides information regarding EMFs associated with electric utility lines and the associated potential effects of the San Francisco Public Utilities Commission's PG&E Power Asset Acquisition Project (proposed project) as they relate to public health and safety. Currently, the State of California has not adopted exposure limits for power-frequency electric or magnetic fields. Therefore, this EIR does not consider EMFs in the context of the California Environmental Quality Act (CEQA) for determination of environmental impacts, because there are no defined or adopted CEQA standards for defining health risks from EMFs associated with electric utility facilities. However, the California Public Utilities Commission (CPUC), in Decision 06-01-042 (CPUC 2006a) affirmed a low-cost and no-cost policy to reduce EMF exposure from new utility transmission and substation projects. In addition, CPUC also adopted rules and policies to improve utility design guidelines for reducing EMFs (CPUC 2006b). AECOM has prepared field management plans for the project variant which are included as attachments.[1] The following EMF information is presented to allow for an understanding of the issue by the public and decision makers.

The discussion of EMF presented in this draft EIR is based on the following technical reports that are incorporated herein:

- EMF Design Guidelines for Electrical Facilities, PG&E, July 2006 (Attachment 1)
- Preliminary Field Management Plan for PG&E Asset Acquisition Project, Variant – Underground Transmission Line for the New City Substation at Daly City Yard, AECOM, November 5, 2024 (Attachment 2)
- Field Management Plan for PG&E Asset Acquisition Project, Variant-New City Substation at Daly City Yard, AECOM, September 19, 2024 (Attachment 3)

K.1 Defining EMFs

EMFs are distinct phenomena that occur both naturally and as a result of human activity across a broad spectrum. Naturally occurring EMFs are caused by atmospheric conditions and Earth's geomagnetic field. The fields caused by human activity result from technological application of the electromagnetic spectrum for uses such as communications; appliances; and the generation, transmission, and local distribution of electricity. EMFs are vector quantities that have the properties of direction and amplitude (field strength).

EMFs of power lines have the additional property of frequency, which is determined by the rate at which electric and magnetic fields change their direction each second. The hertz (Hz) is the unit of frequency. For

[1] Although the proposed Martin Substation separation would involve the installation of two new transformers on new foundations, the new transformers would be installed to achieve two interconnected utility systems—one serving San Francisco and one serving PG&E's remaining customers in San Mateo County—and would not be installed to achieve an increased rated capacity. Therefore, a field management plan is not required for the Martin Substation separation consistent with CPUC's EMF Design Guidelines for Electrical Facilities (CPUC 2006a). Similarly, the distribution components of the project would not require a field management plan because distribution line construction and design standards already incorporate magnetic field reduction measures for distribution lines (CPUC 2006a).

power lines in the United States, the frequency of change is 60 times per second, leading to the designation "60 Hz power."

Electric power flows across transmission systems from generating sources to serve electrical loads within the community. The power flowing over a transmission line is determined by the transmission line voltage and the current. The higher the voltage level of the transmission line, the lower the amount of current needed to deliver the same amount of power. For example, a 115,000-volt (115-kilovolt [kV]) transmission line with 200 amperes of current would transmit approximately 40,000 kilowatts, whereas a 230 kV transmission line requires only 100 amperes of current to deliver the same 40,000 kilowatts.

K.1.1 Electric Fields

Electric fields from power lines are created whenever the lines are energized, with the strength of the field dependent directly on the voltage of the line creating it. Electric field strength is typically described in units of kilovolt per meter. Electric field strength attenuates (gets weaker) rapidly as the distance from the source increases.

Electric fields are reduced at many receptors, because they are effectively shielded by most objects or materials such as trees or houses and are distorted by any object that is within the electric field, including the human body. Even trying to measure an electric field with electronic instruments is difficult, because the devices themselves can alter the levels recorded. Determining an individual's exposure to electric fields requires the understanding of many variables, including the electric field itself, how effectively a person is grounded, and a person's body surface area within the electric field.

Electric fields in the vicinity of high-voltage power lines can be strong enough to cause phenomena similar to the static electricity that can be experienced on a dry winter day, or with clothing just removed from a clothes' dryer, and may result in electric discharges when touching long metal fences, pipelines, or large vehicles.

K.1.2 Magnetic Fields

Magnetic fields from power lines are created whenever current flows through power lines at any voltage. The strength of the field is directly dependent on the current in the line. Magnetic field strength is typically measured in milligauss (mG). Similar to electric field strength, magnetic field strength attenuates rapidly with distance from the source. Magnetic fields penetrate most substances and are essentially unaffected by buildings, trees, and other entities, except those made with a ferromagnetic metal. Consequently, unlike electric fields, magnetic fields are not shielded by most objects or materials.

K.1.3 Comparison of Electric and Magnetic Fields

The nature of electric and magnetic fields can be illustrated by considering a household appliance. When the appliance is energized by being plugged into an outlet but not turned on, in that no current would be flowing through it, an electric field would be generated around the cord and appliance, but no magnetic field would be present. If the appliance is switched on, the electric field would still be present, and a magnetic field would be created. The electric field strength is directly related to the magnitude of the voltage from the outlet, and the magnetic field strength is directly related to the magnitude of the current flowing in the cord and appliance.

K.2 EMF Sources at the Project Site

EMF exposure to the public in developed areas varies over a range of field intensities and durations due to sources in the home and work environments, electric power distribution, and, infrequently, from proximity to transmission lines.

The proposed project is located within urban areas of San Francisco, Daly City, and Brisbane. There are existing aboveground and underground electric utilities within the project vicinity that are sources of EMF. The project proposes to reconfigure and partition the existing PG&E Martin Substation into two interconnected utility systems—one serving San Francisco and one serving PG&E's remaining customers in San Mateo County. The project variant proposes to construct a new substation at the site adjacent to the existing Martin Substation (Daly City Yard) instead of implementing the Martin Substation separation. This includes installing new incoming transmission lines from Martin Substation to the new substation and outgoing transmission and distribution lines from the new substation to the existing distribution system serving customers in San Francisco. PG&E's Martin Substation in Daly City is an existing source of EMFs.

K.3 Scientific Background and Regulations Applicable to EMF

K.3.1 EMF Research

For more than 30 years, researchers have questioned the potential effects that EMFs from power lines have had on the environment. Early studies focused primarily on interactions with the electric fields from power lines. The subject of magnetic field interactions began to receive additional public attention in the 1980s as research increased. A substantial amount of research investigating both electric and magnetic fields has been conducted over the past several decades; however, much of the body of national and international research regarding EMFs and public health risks remains contradictory or inconclusive.

Extremely low frequency fields are known to interact with biological tissues by inducing electric fields and currents. The electric currents induced by extremely low frequency fields commonly found in the environment are normally much lower than the strongest electric currents naturally occurring in the body, such as those that occur due to the beating of the heart.

Research related to EMFs is easily grouped into three general categories: cellular level studies, animal and human experiments, and epidemiological studies. Epidemiological studies have provided mixed results, with some studies showing an apparent relationship between magnetic fields and health effects, whereas other similar studies do not. Laboratory studies and studies investigating a possible mechanism for health effects (mechanistic studies) provide little or no evidence to support this link.

Since 1979, public interest and concern specifically regarding magnetic fields from power lines has increased. The origin of this increase in concern has generally been attributed to publication of the results of a single epidemiological study (Wertheimer and Leeper 1979). This study observed an association between the wiring configuration on electric power lines outside of homes in greater Denver, Colorado area, and the incidence of childhood cancer. Since the publication of that study, many epidemiological, laboratory, and animal studies regarding EMFs have been conducted.

Research on ambient magnetic fields in homes and buildings in several western states found average magnetic field levels within rooms where appliances were turned off to be approximately 1 mG; in a room with appliances in use, the measured values ranged from 9 to 20 mG (Severson et al. 1988; Silva et al. 1988). Within 12 inches of the appliances or closer, field values are higher, as shown in **Table 1**. This table provides typical sources and levels of magnetic field exposure to the general public from appliances typical for the time at which the measurements were made.

Table 1 Magnetic Field from Household Appliances

	Magnetic Field (mG)	
Appliance	*12-Inch Distance*	*Maximum*
Electric range	3-30	100-1,200
Electric oven	2-25	10-50
Garbage disposal	10-20	850-1,250
Refrigerator	0.3-3	4-15
Clothes washer	2-30	10-400
Clothes dryer	1-3	3-80
Coffee maker	0.8-1	15-250
Toaster	0.6-8	70-150
Crockpot	0.8-1	15-80
Iron	1-3	90-300
Can opener	35-250	10,000-20,000
Mixer	6-100	500-7,000
Blender, popper, food processor	6-20	250-1,050
Vacuum cleaner	20-200	2,000-8,000
Portable heater	1-40	100-1,100
Fans/blowers	0.4-40	20-300
Hair dryer	1-70	60-20,000
Electric shaver	1-100	150-15,000
Color TV	9-20	150-500
Fluorescent fixture	2-40	140-2,000
Fluorescent desk lamp	6-20	400-3,500
Circular saws	10-250	2,000-10,000
Electric drill	25-35	4,000-8,000

SOURCE: Gauger 1985.

NOTES: mG = milligauss

K.3.2 Methods to Reduce EMFs

EMF levels from transmission lines can be reduced in three primary ways: shielding, field cancellation, or increasing the distance from the source. Shielding, which reduces exposure to electric fields, can be actively accomplished by placing trees or other physical barriers along the transmission line right-of-way. Shielding also results from existing structures the public may use or occupy along the line. Electric fields can be substantially reduced by most building materials, but common materials do not effectively shield magnetic fields.

Instead, some environmental magnetic fields can be reduced either by cancellation or by increasing distance from the source. Cancellation is achieved in two ways. A transmission line circuit consists of three phases, requiring three separate wires (conductors) on a transmission tower. The configuration of these three conductors can reduce magnetic fields. First, when the configuration places the three conductors closer together, interference, or cancellation, of the fields from each wire is enhanced. This technique has practical limitations because of the potential for short circuits if the wires are placed too close together. There are also worker safety issues to consider if spacing is reduced. Second, in instances where there are two circuits (more than three phase wires), cancellation can be accomplished by arranging phase wires from different circuits near each other.

In underground lines, the three phases are typically much closer together than in overhead lines because the cables are insulated (coated). The distance between the source of fields and the public can be increased by either placing the wires higher above ground, burying underground cables deeper, or by increasing the width of the right-of-way. These methods can prove effective in reducing fields, because field strength drops rapidly with distance.

K.3.3 Scientific Panel Reviews

Numerous panels of expert scientists have convened to review the data relevant to the question of whether exposure to power-frequency EMFs are associated with adverse health effects. These evaluations have been conducted to advise governmental agencies or professional standard-setting groups. On behalf of the CPUC, the California Department of Health Services (DHS) completed a comprehensive review of existing studies related to EMFs from power lines and potential health risks (Neutra et al. 2002). This risk evaluation was undertaken by three DHS staff scientists. Each of these scientists is identified in the review results as an epidemiologist, and their work took place from 2000 to 2002. The results of this review, “An Evaluation of the Possible Risks from Electric and Magnetic Fields (EMFs) From Power Lines, Internal Wiring, Electrical Occupations, and Appliances,” were published in June 2002. The conclusions contained in the executive summary are provided as follows (Neutra et al. 2002):

- To one degree or another, all three of the DHS scientists are inclined to believe that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig’s disease (Amyotrophic lateral sclerosis), and miscarriage.
- They strongly believe that EMFs do not increase the risk of birth defects or low birth weight.
- They strongly believe that EMFs are not universal carcinogens, given that there are a number of cancer types that are not associated with EMF exposure.

- To one degree or another, they are inclined to believe that EMFs do not cause an increased risk of breast cancer, heart disease, Alzheimer's disease, depression, or symptoms attributed by some to sensitivity to EMFs. However, all three scientists had judgments that were "close to the dividing line between believing and not believing" that EMFs cause some degree of increased risk of suicide.
- For adult leukemia, two of the scientists are "close to the dividing line between believing or not believing" and one was "prone to believe" that EMFs cause some degree of increased risk.

The report indicates that the DHS scientists are more inclined to believe that EMF exposure increased the risk of the listed health problems than the majority of the members of scientific committees that have previously convened to evaluate the scientific literature. With regard to why the DHS review's conclusions differ from those of other recent reviews, the report states (Neutra et al. 2002):

> The three DHS scientists thought there were reasons why animal and test tube experiments might have failed to pick up a mechanism or a health problem; hence, the absence of much support from such animal and test tube studies did not reduce their confidence much or lead them to strongly distrust epidemiological evidence from statistical studies in human populations. They therefore had more faith in the quality of the epidemiological studies in human populations and hence gave more credence to them.

In addition to the DHS group and earlier evaluations for the U.S. Congress (mentioned below) and various scientific bodies, several expert panels drew on international scientific expertise over a range of specialties to evaluate the scientific literature and its uncertainties regarding the level of health risk posed by EMFs (for example, SCENIHR 2015). Although conclusions differed in the manner of summarizing health risks for some key areas, particularly childhood leukemia, scientific panels, including those cited below concerning international and national guidelines, have not been able to reach consensus on what level of magnetic field exposure from power lines, if any, may constitute a health risk.

K.3.4 Policies, Standards, and Regulations

Several counties, states, and local governments have adopted or considered regulations or policies related to EMF exposure. The reasons for these actions have been varied; in general, however, the actions can be attributed to addressing public reaction to and perception of EMFs as opposed to responding to the findings of any specific scientific research. Currently, California has not adopted exposure limits for power frequency electric or magnetic fields. Following is a summary of the guidelines and regulatory activity regarding EMFs.

INTERNATIONAL GUIDELINES

International organizations have published recommended standards and guidelines for EMF exposures. The standards and guidelines, including the Institute of Electrical and Electronics Engineers (IEEE) standard C95.1-2019, International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines of 2010, and Comité Européen de Normalisation Électrotechnique (CENELEC) 50527-1:2010, specify EMF exposure limits to protect individuals from adverse health effects. According to these standards, the limit for magnetic field exposure for persons in unrestricted environments is 9,040 mG based on IEEE, 2,000 mG based on ICNIRP, and 1,000 mG based on CENELEC (AECOM 2024a).

NATIONAL GUIDELINES

Although the U.S. Environmental Protection Agency has conducted investigations into EMFs related to power lines and health risks, no national standards have been established. There have been a number of studies sponsored by the U.S. Environmental Protection Agency, the Electric Power Research Institute, and other institutions. Several bills addressing EMFs have been introduced at the congressional level and have provided funding for research; however, no bill has been enacted that would regulate EMF levels.

The 1999 National Institute of Environmental Health Sciences report to Congress suggested that the evidence supporting EMF exposure as a health hazard was insufficient to warrant aggressive regulatory actions. The report suggested passive measures to educate the public and regulators on means aimed at reducing exposure. The report also suggested that the power industry continue its practice of siting lines to reduce public exposure to EMFs and to explore ways to reduce the creation of magnetic fields around lines. According to National Institute of Environmental Health Sciences, the strongest EMF around the outside of a substation comes from the power lines entering and leaving the substation. The strength of the EMF from equipment within the substations, such as transformers, reactors, and capacitor banks, decreases rapidly with increasing distance. Beyond the substation fence or wall, the EMF produced by substation equipment is typically indistinguishable from background levels (NIEHS 2002).

The American Conference of Governmental Industrial Hygienists (ACGIH) is a professional organization (not a governmental regulatory agency) that provides technical knowledge, advice, and guidance on occupational health and safety. Although its guidelines are not directly relevant for exposures to the public, it is noteworthy that the ACGIH occupational threshold limit values for whole body exposures are 25 kV per meter for 60-Hz electric fields and 1 millitesla (mT) (10,000 mG) for 60-Hz magnetic fields, with higher limits for certain localized exposures (ACGIH 2019). According to the World Health Organization, the vast majority of studies have been conducted on power-frequency (50 and 60 Hz) magnetic fields, and as stated previously, the results of these studies are inconclusive.

CALIFORNIA DEPARTMENT OF EDUCATION REGULATION

The California Department of Education (CDE) evaluates potential school sites under a range of criteria, including environmental and safety issues. There are no EMF guidelines that apply to existing school sites; this information is presented to demonstrate the range of existing guidelines that address EMFs.

Exposures to power-frequency EMFs underlie one of the criteria for school siting. CDE has established the following underground transmission line easement “setback” limits for locating any part of a school site property line near the edge of easements for any electrical power lines rated 50 kV and above as follows (CDE 2006):

- 25.0 feet for lines from 50 to 133 kV (interpreted by CDE as up to 200 kV)
- 37.5 feet for lines from 220 to 230 kV
- 87.5 feet for lines from 500 to 550 kV

School districts with sites that do not meet CDE setbacks may still obtain construction approval from the state by submitting an EMF mitigation plan. The mitigation plan must consider possible reductions of EMFs from all potential sources, including power lines, internal wiring, office equipment, and mechanical equipment.

CPUC GUIDELINES

In 1991, the CPUC initiated an investigation into EMFs associated with electric power facilities. This investigation explored the approach to potential mitigation measures for reducing public health impacts and possible development of policies, procedures, or regulations.

Following input from interested parties, the CPUC implemented a decision (D.93-11-013) (CPUC 1993) that requires that utilities use low-cost or no-cost mitigation measures for facilities requiring certification under General Order 131-D (CPUC 1995). The decision directed the utilities to use a 4 percent benchmark for low-cost mitigation. This decision also implemented EMF measurement, research, and education programs, and provided the direction that led to the preparation of the DHS study described previously (Neutra et al. 2002). The CPUC did not adopt any specific numerical limits or regulation on EMF levels related to electric power facilities.

In Decision D.93-11-013, the CPUC addressed mitigation of EMFs of utility facilities and implemented the following recommendations (CPUC 1993):

- No-cost and low-cost steps to reduce EMF levels
- Workshops to develop EMF design guidelines
- Uniform residential and workplace programs
- Stakeholder and public involvement
- A 4-year education program
- A 4-year non-experimental and administrative research program
- An authorization of federal experimental research conducted under the National Energy Policy Act of 1992

In 2006, the CPUC affirmed the low-cost or no-cost policy to mitigate EMF exposure from new utility transmission and substation projects (CPUC 2006a). This decision also adopted rules and policies to improve utility design guidelines for reducing EMFs that were issued in a separate report (CPUC 2006b). The CPUC stated that “at this time we are unable to determine whether there is a significant scientifically verifiable relationship between EMF exposure and negative health consequences” (CPUC 2006a).

To this date, the CPUC has not implemented a general requirement that utilities include non-routine mitigation measures or other mitigation measures that are based on numeric values of EMF exposure and has not adopted any specific limits or regulations on EMF levels related to electric power facilities. The CPUC may determine mitigation measures for projects under its jurisdiction on a project-by-project basis.

K.4 Consideration of Electric and Magnetic Fields for the Proposed Project and Project Variant

Although the proposed Martin Substation separation would involve the installation of two new transformers on new foundations, the new transformers would be installed to achieve two interconnected utility systems and would not be installed to achieve an increased capacity. Therefore, a field management plan is not required for the Martin Substation separation consistent with CPUC’s EMF Design Guidelines for Electrical

Facilities (CPUC 2006a). Similarly, the distribution components of the project would not require a field management plan because distribution line construction and design standards already incorporate magnetic field reduction measures for distribution lines (CPUC 2006a). Therefore, the following consideration of EMF focuses on the project variant.

The new City Substation at the Daly City Yard (project variant) would be designed as a gas-insulated substation to provide service to San Francisco. The substation would be connected by new underground transmission lines to the existing Martin Substation at voltage levels of 230 kV and 115 kV. The Daly City Yard is within the existing PG&E property, to the west of Martin Substation equipment.

The new City Substation would include step-down transformers, such as 230/115 kV and 115/12 kV transformers. These transformers would convert system voltage from 230 kV to 115 kV and from 115 kV to 12 kV, respectively, and ultimately connect to the electrical system serving San Francisco. Outgoing 230 kV, 115 kV, and 12 kV transmission lines would be routed from New City Substation to Geneva Avenue and Bayshore Boulevard. As part of the substation, gas-insulated switchgear buildings would be constructed that would contain high-voltage components, such as circuit breakers and disconnect switches. Gas-insulated switchgear is high-voltage equipment in which the major conducting facilities are sealed within an enclosed environment. Installation of the high voltage switchgear within buildings reduces the EMF compared to outdoor switchgear installation. The sealed design of the equipment provides excellent insulation and would allow for a compact footprint for the new City Substation. The handling, usage, and disposal of the insulating medium would comply with local, state, and federal laws and regulations. Other than the gas-insulated switchgear, the functions of the individual equipment would be nearly identical to those at an outdoor substation, such as the adjacent Martin Substation.

The Preliminary Field Management Plan for the Underground Transmission Line for the New City Substation (project variant) at Daly City Yard (AECOM, 2024a; Attachment 2) and Field Management Plan for the New City Substation (project variant) at Daly City Yard (AECOM 2024b; Attachment 3) for the project, prepared in compliance with CPUC General Order 121-D (CPUC 1995) and CPUC Decisions 93-11-013 (CPUC 1993) and 06-01-042 (CPUC 2006a), indicate that the proposed project would implement no-cost and low-cost steps to reduce EMF levels along the underground transmission alignments and at the new City Substation (see Attachments 2 and 3).

Proposed field reduction measures for the transmission lines include adjusting the depth of the transmission lines, adopting a triangular configuration for the phases of the transmission line, and reducing the distance between these phases. Increasing the depth of the transmission lines effectively reduces EMF exposure without incurring additional costs. The triangular transmission line configuration minimizes the EMFs generated by unbalanced mutual phase impedance coupling found in traditional horizontal and vertical line arrangements (see Attachment 2, Section 2, *Triangular Configuration of the Phases of Transmission Line*). Lastly, reducing the distance between the phases allows the magnetic fields from individual phases to cancel each other out more effectively, significantly lowering the EMF surrounding the lines. These are no-cost measures as they leverage the existing infrastructure without the need for additional materials or significant alterations.

Regarding field management at the new City Substation, the project involves a strategic placement of transformer locations, which would be situated near the middle of Daly City Yard, at the greatest distance from surrounding land uses and surrounding public roads (Schwerin Street and Geneva Avenue). The underground lines connecting Martin Substation to the new City Substation would be installed as far from

adjacent properties as practical and at a depth that minimizes EMF exposure to the public. The closest school to the transmission line alignments is Bayshore Elementary School. The proposed incoming and outgoing underground lines would be located at least 650 feet from Bayshore Elementary school, which meets the CDE transmission line easement "setback" requirements for electrical power lines rated 50 kV and above (see the *California Department of Education Regulation* discussion, above). The Daly City Yard would accommodate all connections to be installed underground inside the substation. The project variant would not expand the substation property boundary; however, as noted above, the substation would be located in the center of Daly City Yard, as far as possible from the property boundary. The lines within the duct bank would be configured in a triangle formation, deliberately avoiding horizontal or vertical configurations. Lastly, the high voltage switchgear would be installed inside the gas-insulated switchgear building, which would substantially reduce the EMF compared to an outdoor switchgear installation. This comprehensive plan enhances the project's efficiency and decreases exposure to the public.

K.5 Summary Regarding EMFs

After several decades of study regarding potential public health risks from exposure to EMF, research results remain inconclusive. Several national and international panels have conducted reviews of data from multiple studies and state that there is not sufficient evidence to conclude that EMF causes cancer or other adverse health effects. There are no applicable regulations related to EMF levels from power lines. However, the CPUC has implemented decisions requiring utilities to incorporate low-cost or no-cost measures, where applicable, for managing EMF from transmission lines. No-cost measures have been incorporated into the design of relevant project components.

K.6 References Cited

ACGIH (American Conference of Governmental Industrial Hygienists). 2019. 2019 TLVs and BEIs, Based on the Documentation of the Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices.

AECOM. 2024a. Preliminary Field Management Plan for PG&E Asset Acquisition Project. Variant – Underground Transmission Line for the New City Substation at Daly City Yard. November 14, 2024.

AECOM. 2024b. Field Management Plan for PG&E Asset Acquisition Project. Variant – New City Substation at Daly City Yard. November 25, 2024.

CDE (California Department of Education). 2006. Power Line Setback Exemption Process Guidance. May 2006. Accessed online at: http://www.cde.ca.gov/ls/fa/sf/powerlinesetback.asp.

CPUC (California Public Utilities Commission). 1993. "Order Instituting Investigation on the Commission's Own Motion to Develop Policies and Procedures for Addressing the Potential Health Effects of Electric and Magnetic Fields of Utility Facilities." Decision No. 93-11-013, Investigation No. 91-01-012. November 2, 1993. Accessed online at: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Ffiles.cpuc.ca.gov%2Fgopher-data%2Fenviron%2Fd9311013.doc&wdOrigin=BROWSELINK

CPUC. 1995. "Rules Relating to the Planning and Construction of Electric Generation, Transmission/Power/Distribution Line Facilities and Substations Located in California." General Order no. 131-D. Effective September 10, 1995 (Decision 95-08-038). Accessed online at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M521/K752/521752647.pdf

CPUC. 2006a. “Opinion on Commission Policies Addressing Electromagnetic Fields Emanating from Regulated Utility Facilities.” Decision 06-01-042. January 26, 2006. Accessed online at: http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/53181.pdf.

CPUC. 2006b. EMF Design Guidelines for Electrical Facilities. July 21, 2006. Accessed online at: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/infrastructure/emfs/ca_emf_design_guidelines.pdf

Gauger, J.R. 1985. “Household Appliance Magnetic Field Survey.” Institute of Electrical and Electronics Engineers (IEEE), Vol. PAS-104, No. 9:2436-44.

Neutra, R.R., V. Delpizzo, and G.M. Lee. 2002. “An Evaluation of the Possible Risks from Electric and Magnetic Fields (EMFs) from Power Lines, Internal Wiring, Electrical Occupations and Appliances.” Oakland, California: California EMF Program, California.

NIEHS (National Institute of Environmental Health Sciences). 2002. “Electric and Magnetic Fields Associated with the Use of Electric Power.” sponsored by the NIEHS/DOE EMF RAPID Program. June 2002. Accessed online at: https://health.hawaii.gov/irhb/files/2013/12/NIEHS-EMF-Rapid-Booklet-2002.pdf.

SCENIHR (Scientific Committee on Emerging and Newly Identified Health Risks**)**. 2015. Opinion on potential health effects of exposure to electromagnetic fields (EMF). Luxembourg: European Commission, DG Health and Food Safety. Health effects of EMF‐2015 01 20, 288 p. Online at http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf.

Severson, R.K., R.G. Stevens, W.T. Kaune, D.B. Thomas, L. Heuser, S. Davis, and L.E. Sever. 1988. “Acute Nonlymphocytic Leukemia and Residential Exposure to Power Frequency Magnetic Fields.” *American Journal of Epidemiology* 128 (1):10‐20.

Silva, M., N.P. Hummon, D. Rutter, C. Hooper. 1988. “Power Frequency Magnetic Fields in the Home.” Institute of Electrical and Electronics Engineers, No. 88 WM 101-8.

Wertheimer, N., and E. Leeper. 1979. “Electrical Wiring Configurations and Childhood Cancer.” *American Journal of Epidemiology* 109:273‐84.

PAGE INTENTIONALLY BLANK

ATTACHMENT 1
EMF DESIGN GUIDELINES FOR ELECTRICAL FACILITIES, JULY 2006

PAGE INTENTIONALLY BLANK

EMF Design Guidelines for Electrical Facilities

July 21, 2006

Table of Contents

1 CALIFORNIA EMF POLICY 1

1.1 HISTORICAL BACKGROUND OF CALIFORNIA EMF POLICY 1

1.2 CURRENT CALIFORNIA EMF POLICY 1

1.2.1 Standardized EMF Design Guidelines 3

1.2.2 Standardized Table of Magnetic Field Reduction Measures 3

1.2.3 Additional Considerations Used in the Design Guidelines 4

2 METHODS FOR REDUCING MAGNETIC FIELDS 5

2.1 INCREASING THE DISTANCE FROM ELECTRICAL FACILITIES 5

2.2 REDUCING CONDUCTOR (PHASE) SPACING 5

2.3 PHASING CIRCUITS TO REDUCE MAGNETIC FIELDS 5

3 THE FIELD MANAGEMENT PLAN PROCESS 6

3.1 THE FIELD MANAGEMENT PLAN 6

3.2 TYPES OF FMP 6

3.3 DETERMINING IF AN FMP IS REQUIRED, AND IF SO, WHAT TYPE 6

3.4 PROJECTS EXEMPT FROM THE FMP REQUIREMENT 11

3.5 PRIORITIZING WITHIN AND BETWEEN LAND USE CLASSES 12

4 FIELD MANAGEMENT PLANS FOR TRANSMISSION LINES 13

4.1 PROJECT DESCRIPTION 13

4.2 TWO-DIMENSIONAL MAGNETIC FIELD MODELING FOR TRANSMISSION LINES 13

5 FIELD MANAGEMENT PLANS FOR SUBSTATIONS 15

6 CALIFORNIA DEPARTMENT OF EDUCATION'S (CDE) CRITERIA FOR SITING NEW SCHOOLS ADJACENT TO ELECTRIC POWER LINES RATED 50 KV AND ABOVE 16

EMF Design Guidelines for Electrical Facilities

1 California EMF Policy

1.1 Historical Background of California EMF Policy

In 1993, the California Public Utilities Commission (CPUC) issued Decision 93-11-013, establishing EMF policy for California's regulated electric utilities.

The Decision acknowledged that scientific research had not demonstrated that exposures to EMF cause health hazards and that it was inappropriate to set numeric standards that would limit exposure. In recognizing the scientific uncertainty, the CPUC addressed public concern over EMF by establishing a no-cost and low-cost EMF reduction policy that utilities would follow for proposed electrical facilities.

In workshops ordered by the CPUC, the utilities developed the initial EMF Design Guidelines based upon the no-cost and low-cost EMF policy. Fundamental elements of the policy and the Design Guidelines included the following:

A) No-cost and low-cost magnetic field reduction measures would be considered on new and upgraded projects.

B) Low-cost measures, in aggregate, would:

   a. Cost in the range of 4% of the total project cost.

   b. Achieve a noticeable magnetic field reduction.

   The CPUC stated,

   > "We direct the utilities to use 4 percent as a benchmark in developing their EMF mitigation guidelines. We will not establish 4 percent as an absolute cap at this time because we do not want to arbitrarily eliminate a potential measure that might be available but costs more than the 4 percent figure. Conversely, the utilities are encouraged to use effective measures that cost less than 4 percent."[1]

C) For distribution facilities, utilities would apply no-cost and low-cost measures by integrating reduction measures into construction and design standards, rather than evaluating no-cost and low-cost measures for each project.

1.2 Current California EMF Policy

In 2006, the CPUC updated its EMF Policy in Decision 06-01-042. The decision re-affirmed that health hazards from exposures to EMF have not been established and that state and federal public health regulatory agencies have determined that setting numeric exposure limits is not appropriate. The CPUC also re-affirmed that the existing no-cost and low-cost precautionary-

[1] CPUC Decision 93-11-013, Section 3.3.2, p.10

based EMF policy should be continued. In the decision, the CPUC required the utilities to update their EMF Design Guidelines to reflect the following key elements of the updated EMF Policy:

A) "The Commission [CPUC] has exclusive jurisdiction over issues related to EMF exposure from regulated utility facilities."[2]

B) "…while we continue our current policy of low-cost and no cost EMF mitigation, as defined by a 4% benchmark of total project cost, we would consider minor increases above the 4% benchmark if justified under unique circumstances, but not as a routine application in utility design guidelines. We add the additional distinction that any EMF mitigation cost increases above the 4% benchmark should result in significant EMF mitigation to be justified, and the total costs should be relatively low."[3]

C) For low cost mitigation, the "EMF reductions will be 15% or greater at the utility ROW [right-of-way]…"[4]

D) "Parties generally agree on the following group prioritization for land use categories in determining how mitigation costs will be applied:

1. Schools and licensed day care[5]
2. Residential
3. Commercial/industrial
4. Recreational
5. Agricultural
6. Undeveloped land"

E) "Low-cost EMF mitigation is not necessary in agricultural and undeveloped land except for permanently occupied residences, schools or hospitals located on these lands."[6]

F) "Although equal mitigation for an entire class is a desirable goal, we will not limit the spending of EMF mitigation to zero on the basis that not all class members can benefit."[7]

G) "…. We [CPUC] do not request that utilities include non-routine mitigation measures, or other mitigation measures that are based on numeric values of EMF exposure, in revised design guidelines…"[8]

[2] CPUC Decision 06-01-042, p. 21
[3] Ibid., p. 7
[4] Ibid., p. 10
[5] "As an additional fixed location of young children, we will add hospitals to this category." Ibid., p. 7
[6] Ibid., p. 20
[7] Ibid., p. 10
[8] Ibid., p. 17

The CPUC also clarified utilities' roles on EMF during the CPCN (Certificate of Public Convenience and Necessity) and PTC (Permit to Construct). The CPUC stated,

> "EMF concerns in future CPCN [Certificate of Public Convenience and Necessity] and PTC [Permit to Construct] proceedings for electric transmission and substation facilities should be limited to the utility's compliance with the Commission's [CPUC] low-cost and no-cost policies."[9]

Furthermore, the CPUC directed "the Commission's Energy Division to monitor and report on new EMF related scientific data as it becomes available."[10] These EMF Design Guidelines, therefore, will be revised as more information or direction from the CPUC becomes available.

1.2.1 Standardized EMF Design Guidelines

Decision 06-01-042 directed the utilities to hold a workshop to develop standard approaches for their EMF Design Guidelines. This workshop was held in spring of 2006, and this document represents the standardized design guidelines produced as a result of that workshop. The guidelines describe the routine magnetic field reduction measures that all regulated California electric utilities will consider for new and upgraded transmission line and transmission substation projects.

These guidelines are not applied to changes made in connection with routine maintenance, emergency repairs, or minor changes to existing facilities. See §3.4 for a list of exemptions.

1.2.2 Standardized Table of Magnetic Field Reduction Measures

As directed by Decision 06-01-042, these guidelines include a standardized table that utilities will use to summarize "the estimated costs and reasons for adoption or rejection"[11] of reduction measures considered for any particular project. Table 1-1 shows the information to be displayed in the standardized table. Utilities may choose to add columns for additional information as necessary for any particular project. Typical format is shown below.

Table 1-1 Low-Cost Reduction Measures Adopted or Rejected

Project Segment	Location (Street, Area)	Adjacent Land Use	Reduction Measure Considered	Measure Adopted? (Yes/No)	Reason(s) if not adopted	Estimated Cost to Adopt
		Per §1.2-D	Per § 2			

[9] Ibid., p. 21
[10] Ibid., p. 16
[11] Ibid., p. 13.

1.2.3 Additional Considerations Used in the Design Guidelines

These additional elements of policy resulting from Decisions 93-11-013 and 06-01-042 are fundamental to application of the guidelines:

- Any proposed changes in guidelines should be consistent with the EMF policy established in this decision [D.06-01-042] and in D.93-11-013.[12]
- The guidelines "should not compromise safety, reliability, or the requirements of [CPUC] General Orders (GO) 95 and 128."[13]
- Without exception, design and construction of electric power system facilities must comply with all applicable federal and state regulations, applicable safety codes, and each electric utility's construction standards.
- Non-routine field reduction measures are not necessary except in unique circumstances, and are not included in the guidelines.
- The guidelines do not include reduction measures "that are based on numeric values of EMF exposure."[14]
- Modeling is done for magnetic fields only.
- Modeling of magnetic fields is for comparison of reduction techniques, and "does not measure actual environmental magnetic fields."[15]
- "[P]ost-construction measurement of EMF in the field cannot indicate the effectiveness of mitigation measures"[16] and is not required.
- "The appropriate location for measuring EMF mitigation is the utility ROW as this is the location at which utilities may maintain access control."[17]
- Reduction measures are not applicable to reconfigurations or relocations of up to 2,000 feet, the distance under which certain exemptions apply under GO 131-D.[18]
- "Utility design guidelines should consider EMF mitigation at the time the FMP [(Magnetic) Field Management Plan] is prepared…" The CPUC does "not require utility design guidelines to include low-cost EMF mitigation for undeveloped land."[19]
- Distribution facilities are not considered in magnetic field modeling or in FMPs for transmission line or substation projects rated 50 kV and above.

[12] Ibid., p. 20.
[13] Ibid., p. 21.
[14] Ibid., p. 17.
[15] Ibid., p. 11.
[16] Ibid., p. 11.
[17] Ibid., p. 20.
[18] The CPUC's General Order 131-D establishes rules and specifications for permitting and construction of electric generation, transmission and distribution facilities and substations located in California.

[19] Ibid., p. 9.

2 Methods for Reducing Magnetic Fields

The following magnetic field reduction methods may be considered for new and upgraded electrical facilities:

A) Increasing the distance from electrical facilities by:
   a. Increasing structure height or trench depth.
   b. Locating power lines closer to the centerline of the corridor.

B) Reducing conductor (phase) spacing.

C) Phasing circuits to reduce magnetic fields.

2.1 Increasing the Distance from Electrical Facilities

Reducing magnetic field strength by increasing the distance from the source can be accomplished either by increasing the height or depth of the conductor from ground level. Furthermore, locating the power lines as far away from the edge of the right-of-way or as close to centerline as possible will result in lower field levels at the edge of the right-of-way. For substations, placing major electrical equipment, such as switch-racks and power transformers, near the center of the substation can reduce the magnetic field levels at the property line.

2.2 Reducing Conductor (Phase) Spacing

The magnetic field produced by overhead and underground power lines is approximately inversely proportional to the distance between the phase conductors. Thus, reducing the spacing between conductors by 50 percent generally reduces the magnetic field at ground level by approximately 50 percent. The minimum distance between overhead conductors for power lines built in California is established by CPUC General Order (GO) 95. Utilities may establish minimum clearances greater than those allowed in GO 95 if required for safe working conditions or to prevent flash over. In most cases, insulation levels will be established based on lightning, switching surge, or insulator contamination considerations.

Because underground conductors are insulated, they may be placed within inches of each other. This means that there generally can be greater magnetic field cancellation in an underground circuit than an overhead circuit. Therefore, the magnetic field levels from an underground circuit will generally be lower than a comparably loaded overhead circuit at most locations other than directly above the underground line, where the cancellation effect of the underground conductors is offset by their proximity to the surface. In contrast, overhead conductors will be much farther away and will generally create a lower magnetic field directly under the line than a comparably loaded underground circuit.

2.3 Phasing Circuits to Reduce Magnetic Fields

When two or more circuits share a pole or tower, the resultant magnetic field will be the vector sum of the individual conductor fields on the structure. By using proper phasing techniques, the field from one circuit can reduce the field from another circuit, thereby reducing the level of magnetic field at ground level.

3 The Field Management Plan Process

3.1 The Field Management Plan

The Field Management Plan (FMP) documents the consideration of no-cost and low-cost magnetic field reduction measures for new or significantly reconstructed transmission lines and substations rated 50 kV and above (refer to § 3.4 for exceptions).

FMPs will be prepared for relevant transmission projects and will be retained with the work order. For any project requiring a permit under GO 131-D, the FMP will be incorporated as a part of the GO 131-D filing.

Utilities have incorporated magnetic field reduction measures into their distribution construction and design standards. Therefore, FMPs are not prepared for any distribution projects.

Basic elements of the FMP include a project description, an evaluation of no-cost and low-cost magnetic field reduction measures, and specific recommendations regarding magnetic field reduction measures to be incorporated into the transmission line and substation design (see §§ 4 and 5 of these guidelines for additional information concerning the contents of transmission line and substation FMPs).

3.2 Types of FMP

There are two types of FMP for transmission line projects, a "Basic FMP" and a "Detailed FMP," and a "Checklist FMP" for substation projects.

For transmission line projects with limited work scope, as described in Table 3-1 below, a Basic FMP is sufficient to document no-cost and low-cost magnetic field reduction measures. The Basic FMP consists of a transmission line project description, applicable no-cost and low-cost magnetic field reduction measures without magnetic field model(s), and recommendations.

The Detailed FMP consists of a transmission line project description, evaluation of no-cost and low-cost magnetic field reduction measures, magnetic field models, and recommendations (refer to § 3.3 to determine what types of transmission line projects require a Detailed FMP).

For substation projects, a checklist FMP, showing an evaluation of magnetic field reduction measures adopted or rejected, will be used. An example of the Checklist FMP is shown on Table 5-1.

3.3 Determining If an FMP is Required, and If so, What Type

The CPUC in Decision 93-11-013 (§ 3.4.2, p. 15) states, "Utility management should have reasonable latitude to deviate and modify their guidelines as conditions warrant and as new magnetic fields information is received." Table 3-1 provides criteria to determine if the project requires a Detailed FMP, a Basic FMP, a Checklist FMP, or no FMP.

Table 3-1 Criteria to Determine Whether an FMP is Required		
FMP Type Required	**Type of Work**	**FMP Criteria**
Transmission Line (rated 50 kV and above)		
Detailed FMP Note: A Detailed FMP will be used for transmission line projects requiring permitting under GO 131-D.	**New Transmission Line**: The construction of a new transmission line, if the construction requires permitting under GO 131-D. **Major Upgrade**: Major upgrade (including replacement of a significant number of existing structures) on an existing transmission line, if the upgrade requires permitting under GO 131-D.	The construction of a new transmission line will incorporate no-cost and low-cost magnetic field reduction measures. Magnetic field model is required. All major upgrades of existing transmission lines will require no-cost and low-cost magnetic field reduction measures unless otherwise exempted under § 3.4. If permitting under GO 131-D is not required, a Basic FMP may be used, and magnetic field modeling is not required.
Basic FMP Note: A Basic FMP will be used unless the transmission line project requires permitting under GO 131-D.	**Rule 20 Conversions**: Direct replacement of overhead transmission lines with underground transmission lines under Rule 20. **Relocation more than 2000 ft**: Relocation of poles and/or towers involving more than 2000 feet of transmission line. **Pole-head Reconfiguration more than 2000 ft**: Pole-head reconfiguration involving more than 2000 feet of transmission line. The complete replacement of an existing pole-head configuration with a new design.	The transmission line route generally is pre-established for Rule 20 conversions. Phase spacing and depth are set by utility construction standards. Thus, phase arrangement is the only magnetic field reduction measure available to the designer. Therefore, the Basic FMP will be restricted to an evaluation of phase arrangement. Magnetic field modeling is not required. Relocation of existing transmission lines generally does not provide for alternative transmission line routes. Available options are typically limited to minor changes in pole and/or tower height, minor changes in pole-head[20] configuration, or phase arrangement. The Basic FMP will normally cover these options only. Magnetic field modeling is not required. Pole-head replacement is limited in scope; thus, field management options are generally restricted to selecting the pole-head configuration and phase arrangement. In most cases, the new pole-head configuration must be consistent with the remainder of the line. The Basic FMP will be limited to an

[20] It can also be referred to as "pole-top"

Table 3-1 Criteria to Determine Whether an FMP is Required		
FMP Type Required	**Type of Work**	**FMP Criteria**
Basic FMP Note: A Basic FMP will be used unless the transmission line project requires permitting under GO 131-D	 **Reconductoring more than 2000 ft.**: Replacement only of existing conductors and/or insulators with new conductors and/or insulators.	assessment of alternative pole-head configurations and will not require magnetic field modeling. In most cases, replacement of existing transmission conductors is limited in scope; therefore, the Basic FMP will be limited to an assessment of phase arrangement for reconductor activity involving more than 2000 transmission circuit feet. Magnetic field modeling is not required.
None (see exemptions § 3.4)	**Relocation less than 2000 ft**: Relocation of poles and/or towers involving less than 2000 feet of transmission line(s). **Reconductoring less than 2000 ft.**: Replacement only of existing conductors and/or insulators with new conductors and/or insulators. **Pole-head Re-Configuration less than 2000 ft.:** Pole-head reconfiguration involving 2000 feet or less of a transmission line(s) will not require a FMP. **Maintenance:** All maintenance work that does not materially change the design or overall capacity of the transmission line, including the one-for-one replacement of hardware, equipment, poles or towers. **Safety and Protective Devices:** The addition of current transformers, potential transformers, switches, power factor correction, fuses, etc. to existing overhead, pad-mount, or underground circuits. **Emergency Repairs:** All emergency work required to restore service or prevent danger to life and property.	Minor relocation of facilities is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures. Replacement of existing transmission line conductors is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures. Pole-head reconfiguration involving 2000 feet or less of a transmission line(s) will not require a FMP. Maintenance work is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures. The addition of protective equipment or power factor correction to existing transmission circuits is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures. This work is performed on existing facilities under emergency conditions and does not involve redesign.

Table 3-1 Criteria to Determine Whether an FMP is Required		
FMP Type Required	**Type of Work**	**FMP Criteria**
Substation (Rated 50 kV and above)		
Checklist FMP	**New Substations:** The construction of a new substation having a rated high side voltage of 50kV or above.	The construction of a new substation will incorporate no-cost and low-cost magnetic field reduction measures as outlined in §5. A no-cost and low-cost checklist[21] will be used as a part of the FMP.
	Major Upgrade with GO 131-D: Major reconstruction of an existing substation that involves the installation of additional transformers to achieve an increased rated capacity and that requires permitting under GO 131-D.	All major upgrade of existing substations will require evaluations of no-cost and low-cost magnetic field reduction measures as outlined in §5, unless otherwise exempted under § 3.4. A no-cost and low-cost check list may be used.
	Major Upgrade without GO 131-D: Major upgrade of an existing substation that involves the installation of additional transformers to achieve an increased rated capacity and that does not require permitting under GO 131-D.	Major substation upgrade projects involving the addition of new transformers but not requiring GO 131-D permitting may use a no-cost and low-cost check list only. The 'no-cost and low-cost' will be limited to an evaluation of magnetic field reduction measures applicable to the transmission get-away[22] and to the location of the new transformers so as to maximize the distance from the transformers to the substation fence.

[21] See Section 5 for more information about no-cost and low-cost check lists for substation projects.
[22] This can be a part of Transmission FMP.

Table 3-1 Criteria to Determine Whether an FMP is Required		
FMP Type Required	**Type of Work**	**FMP Criteria**
None (see exemptions § 3.4)	**Reconstruction without installation of additional transformers**: This includes, for example, the installation of additional switchgear, line or bank positions, power factor correction capacitors, underground circuits and overhead circuits.	The addition of switchgear or other apparatus is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures.
	Direct Replacement: The direct replacement of substation equipment, even if the new equipment has a different capacity rating.	The direct replacement of substation equipment is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures.
	Maintenance: All maintenance work that does not materially change the design of the substation.	Maintenance work is limited in scope and does not provide significant opportunity to implement magnetic field reduction measures.
	Emergency Repairs: All emergency work required to restore service or prevent danger to life and property.	This work is performed on existing facilities under emergency conditions and does not involve redesign.
Distribution Project (Rated less than 50 kV)		
None	Construction or reconstruction of distribution lines with voltages less than 50 kV.	Each electric utility's distribution construction and design standards incorporates magnetic field reduction measures for distribution lines.

3.4 Projects Exempt from the FMP Requirement

The CPUC, in Decision 93-11-013, recognized that some flexibility was required in the EMF Design Guidelines. In section 3.4.2 of the Decision, the CPUC stated: "Electric utility management should have flexibility to modify the guidelines and to incorporate additional concepts and criteria as new EMF information becomes available. However, if the EMF Design Guidelines are to be truly used as guidelines, the utilities should incorporate criteria which justify exempting specific types of projects from the guidelines."

The following criteria to determine those transmission and substation projects exempted from the requirement for consideration of no-cost and low-cost magnetic field reduction measures:

1. Emergency
   - All work required to restore service or remove an unsafe condition.
2. Operation & Maintenance
   - Washing and switching operations.
   - Replacing cross-arms, insulators, or line hardware.
   - Replacing deteriorated poles.
   - Maintaining underground cable and vaults.
   - Replacing line and substation equipment with equipment serving the same purpose and with similar ratings.
   - Repairing line and substation equipment.
3. Relocations
   - Line relocation of up to 2000 feet.
   - Installation of guy poles or trenching poles only.
4. Minor Improvements
   - Addition of safety devices.
   - Reconductoring up to 2000 feet, where changing pole-head configuration is not required.
   - Installation of overhead switches.
   - Insulator replacement.
   - Modification of protective equipment and monitoring equipment.
   - Intersetting of additional structures between existing support structures.
5. Projects located exclusively adjacent to undeveloped land—including land under the jurisdiction of the National Park Service, the State Department of Parks and Recreation, U.S. Forest Service, or Bureau of Land Management (BLM).

3.5 Prioritizing Within and Between Land Use Classes

The CPUC stated in Decision 06-01-042, "[a]lthough equal mitigation for an entire class is a desirable goal, we will not limit the spending of EMF mitigation to zero on the basis that not all class members can benefit."[23]

While Decision 06-01-042 directs the utilities to favor schools, day-care facilities and hospitals over residential areas when applying low-cost magnetic field reduction measures, prioritization within a class can be difficult on a project case-by-case basis because schools, day-care facilities, and hospitals are often integrated into residential areas, and many licensed day-care facilities are housed in private homes that can be easily moved from one location to another. Therefore, utilities may group public schools, licensed day-care centers, hospitals, and residential together to receive highest prioritization for low-cost magnetic field reduction measures. Commercial and industrial areas may be grouped as a second priority group, followed by recreational and agricultural areas as the third group. Low-cost magnetic field reduction measures will not be considered for undeveloped land such as open space, state and national parks, Bureau of Land Management and National Forest Service Land.

When spending for low-cost measures would otherwise disallow equitable magnetic field reduction for all areas within a single land-use class, prioritization can be achieved by considering location and/or density of permanently occupied structures on lands adjacent to the projects, as appropriate.

[23] Ibid., p. 10

4 Field Management Plans for Transmission Lines

Construction of a new transmission line or the major upgrade of an existing transmission line, if they require GO-131D permitting, or the relocation of 2000 feet or more of an existing transmission line will require the preparation of a FMP; refer to § 3.3 to determine if a Detailed FMP (or Basic FMP) is needed; refer to § 3.4 for exemption criteria.

Transmission FMPs should include the following sections:

- Project Description;
- Evaluation of No-Cost Magnetic Field Reduction Measures;
- Evaluation of Low-Cost Magnetic Field Reduction Measures; and
- Recommendations including a table showing magnetic field reduction measures.

In addition to these requirements, a two-dimensional (2D) magnetic field model is required for a Detailed FMP.

4.1 Project Description

The project description portion of the transmission line FMP will include the following:

- For a Detailed FMP, the proposed line route should be shown on an attached project map illustrating the transmission line route, alternative line route (if applicable), and major streets and highways. A Basic FMP should briefly describe the scope of work including the line route;
- Description of land use adjacent to the line route for both Basic and Detailed FMPs;
- Circuit name and rated voltage, and circuit phasing if more than one circuit is present in the same corridor for both Basic and Detailed FMPs (rated 50 kV and above);
- Description of proposed design. For a Detailed FMP, include circuit configuration, and minimum ground clearance for overhead design. For a Basic FMP, include circuit configuration. For underground facilities (for both Detailed FMP or Basic FMP), show the depth and configuration of duct bank;
- Include estimated total project costs for proposed design.(for a Detailed FMP).

4.2 Two-Dimensional Magnetic Field Modeling for Transmission Lines

The purpose of magnetic field modeling is to evaluate relative effectiveness of various magnetic field reduction measures, not to predict magnetic field levels, as the CPUC recognized in Decision 06-01-042:

> "Utility modeling methodology is intended to compare differences between alternative EMF mitigation measures and not determine actual EMF amounts."[24]

[24] Ibid., p. 20

> "… the modeling indicates relative differences in magnetic field reductions between different transmission line construction methods, but does not measure actual environmental magnetic fields. In the same way, these relative differences in mitigation measures will be evident regardless of whether a maximum peak or a projected peak is used for the comparisons… It is also true that post construction measurement of EMF in the field cannot indicate the effectiveness of mitigation measures used as it would be extremely difficult to eliminate all other EMF sources."[25]

Two-dimensional magnetic field software can be used to evaluate the magnetic field characteristics of the proposed construction and various magnetic field reduction alternatives. Estimates of magnetic field levels are calculated based on a specific set of conditions. Therefore, it is important to make logical assumptions as to what these conditions will be and to keep these calculation conditions consistent when comparing two or more different cases.

Typical two-dimensional magnetic field modeling assumptions include:

- The line will be considered operating at forecasted design load;
- Magnetic field strength is calculated at a height of three feet above ground (assuming flat terrain);
- Resultant magnetic fields are being used;
- All line loadings are considered as balanced (i.e. neutral or ground currents are not considered);
- The line is considered working under normal operating conditions (emergency conditions are not modeled);
- Terrain is flat;
- Dominant power flow directions are being used; and
- Contribution of shield wire currents is not included.

[25] Ibid., p. 11

5 Field Management Plans for Substations

Construction of a new substation rated 50 kV and above or the major upgrade of an existing substation rated 50 kV and above will require the preparation of a substation FMP in a form of a check list (see example in Table 5-1). Magnetic field modeling for the substation project is not required.

A major upgrade for purposes of these Guidelines means the expansion of an existing substation through the addition of transformer bank(s) or new transmission line(s). "One-for-one" replacement of substation transformers, circuit breakers, or other apparatus does not constitute an major upgrade for purposes of these Guidelines, even if that replacement results in an increase in rated capacity. The addition of instrumentation, control, or protection equipment does not constitute a major upgrade. Refer to § 3.3 to determine if a substation FMP is needed, and to § 3.4 for exemption criteria.

Generally, magnetic field values along the substation perimeter are low compared to the substation interior because of the distance to the energized equipment. Normally, the highest values of magnetic fields around the perimeter of a substation are caused by overhead power lines and underground duct banks entering and leaving the substation, and not by substation equipment. Therefore, the magnetic field reduction measures generally applicable to a substation project are as follows:

- Site selection for a new substation;
- Setback of substation structures and major substation equipment (such as bus, transformers, and underground cable duct banks, etc.) from perimeter;
- Lines entering and exiting the substation (this will be a part of a transmission line FMP).

The Substation Checklist FMP evaluates the no-cost and low-cost measures considered for the substation project, the measures adopted, and reasons that certain measures were not adopted. An example Substation check list is shown below:

Table 5-1 Example of Substation Checklist for a FMP

No.	No-Cost and Low-Cost Magnetic Field Reduction Measures Evaluated for a Substation Project	Measures Adopted? (Yes/No)	Reason(s) if not Adopted
1	Keep high-current devices, transformers, capacitors, and reactors away from the substation property lines.	☐	
2	For underground duct banks, the minimum distance should be 12 feet from the adjacent property lines or as close to 12 feet as practical.	☐	
3	Locate new substations close to existing power lines to the extent practical.	☐	
4	Increase the substation property boundary to the extent practical.	☐	
5	Other:	☐	

6 California Department of Education's (CDE) Criteria for Siting New Schools Adjacent to Electric Power Lines Rated 50 kV and Above

The California Department of Education evaluates potential school sites under a range of criteria, including environmental and safety issues. Proximity to high-voltage power transmission lines[26] is one of the criteria. As the CPUC directed in Decision 06-01-042, the California investor-owned utilities worked with the CDE to align EMF Design Guidelines with the CDE's policies to the extent those policies were consistent with the CPUC's EMF Policy as stated in its Decision 06-01-042. As a result, the updated power line setback exemption guidelines were issued in May 2006. In revising its precautionary EMF approach, the CDE stated:

> "The proposed guidance acknowledges the scientific uncertainty of the health effects of EMFs, the lack of any state or nationally established standard for EMF exposure, and the PUC's recently reconfirmed reliance upon no/low-cost measures targeted to only reduce fields from new power transmission lines." [27]

CDE has established the following "setback[27]" limits for locating any part of a school site property line near the edge of easements for any overhead power lines rated 50 kV and above:

- 100 Feet for 50 – 133 kV Power Lines (interpreted by CDE up to 200 kV)
- 150 Feet for 220 – 230 kV Power Lines
- 350 Feet for 500 – 550 kV Power Lines

For underground power lines rated 50 kV and above, the CDE's setback distances are as follows:

- 25 feet for 50-133 kV line (interpreted by CDE up to 200 kV)
- 37.5 feet for 220-230 kV line
- 87.5 feet for 500-550 kV line

School districts that have sites which do not meet the CDE's setbacks may still obtain construction approval from the state by submitting an exemption application. Generally, school districts hire independent consultants who are familiar with the process to complete CDE's application requirements.

[26] *School Site Selection and Approval Guide*, California Department of Education
[27] "Power Line Setback Exemption Guidance - May 2006" by the California Department of Education

ATTACHMENT 2
PRELIMINARY FIELD MANAGEMENT PLAN FOR PG&E ASSET ACQUISITION PROJECT, VARIANT – UNDERGROUND TRANSMISSION LINE FOR THE NEW CITY SUBSTATION AT DALY CITY YARD, AECOM, NOVEMBER 14, 2024

PAGE INTENTIONALLY BLANK

AECOM

Preliminary Field Management Plan for PG&E Asset Acquisition Project

Variant – Underground Transmission Line for the New City Substation at Daly City Yard

November 14, 2024

Delivering a better world

1.1. Introduction

In 1993, the California Public Utilities Commission (CPUC) adopted an electromagnetic field (EMF) policy for electric utility facilities, transmission, and distribution lines. The CPUC decided not to adopt a specific numerical standard for EMF exposure because they concluded that there was no reliable scientific basis for adverse health effects from power grid EMF exposure.

On July 21, 2006, the CPUC adopted the EMF Design Guidelines for Electrical Facilities. There are two types of Field Management Plans (FMPs) for Transmission line projects: a "Basic FMP"- Direct replacement of overhead transmission line with underground transmission lines and "Detailed FMP" -New Transmission lines.

The New City Substation has new 115kV and 230kV transmission lines connected to the adjacent Martin Substation. A detailed FMP is required for new transmission lines above 50kV, which consists of a transmission line project description, evaluation of no-cost and low-cost magnetic field reductions measures, magnetic field model and recommendations.

1.2. Project Description

The New City Substation at the Daly City Yard, called the Project Variant in the Environmental Impact Report (EIR), considers a gas-insulated substation that would serve the City and County of San Francisco. Existing transmission lines from the south, in San Mateo County, as well as the transmission lines from San Francisco, are to be connected to New City Substation at several voltage levels: 12kV, 115kV and 230 kV.

The New City Substation has step-down transformers (which reduce the input voltage to a lower voltage) including two 230/115 kV, 420MVA transformers, and four 115/12 kV, 45MVA transformers. These transformers convert system voltage from 230 kV to 115 kV and 115 kV to 12 kV, respectively.

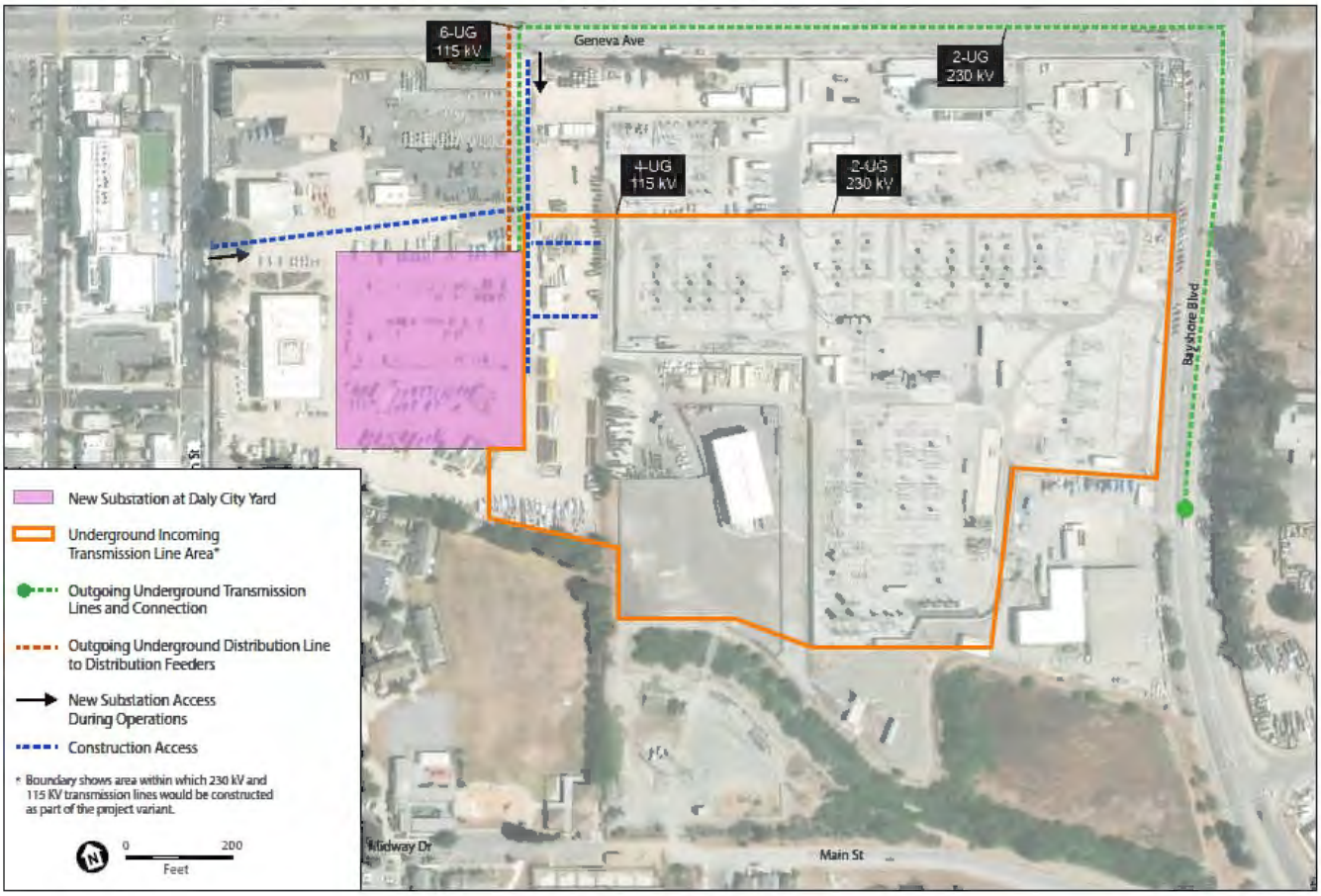
As part of the New City Substation, the City would build gas-insulated substation buildings that would contain high-voltage components (e.g., circuit breakers and disconnect switches). Gas-insulated switchgear refers to high-voltage equipment in which the major conducting facilities are contained within a sealed environment. The equipment's sealed design provides excellent insulation, allowing for a compact footprint for the New City Substation. The storage, use, and disposal of the insulating medium would comply with local, state, and federal laws and regulations. Apart from the gas-insulated switchgear, the functions of the individual equipment would be nearly identical to those at an outdoor substation (such as the adjacent PG&E Martin Substation).

A description of the underground transmission and distribution lines is in Table 1. Figure 1 displays a map of the transmission lines proposed on the site:

Table 1 – New City Substation Underground Transmission Line Description

North face of Variant Substation	2 - 230kV underground transmission lines 6 -115kV underground transmission lines 21-12kV distribution lines
East face of Variant substation	4 -115kV underground transmission lines
South face of Variant substation	2 - 230kV underground transmission lines

Figure 1 – New Substation at Daly City Yard



1.3. Detailed FMP

The proposed transmission lines connected to the New City Substation are underground. As there are no anticipated overhead transmission lines associated with this project, the detailed FMP will only present the results for various configurations of 230kV and 115kV underground transmission lines.

Before modelling EMF for New City Substation Transmission lines, no-cost and low-cost approaches to reduce the EMF for transmission lines are considered.

In accordance with the EMF Design Guidelines, filed with the CPUC in compliance with CPUC Decisions 93-11-013 and 06-01-042, the proposed project would implement the following "no-cost and low-cost" magnetic field reduction measures. The field reduction measures would include the following:

1. Increased Depth of the Underground Transmission Lines

The depth of the transmission lines affects EMF values, with the EMF decreasing as the depth of the transmission lines increases. Figure 2 below shows the ductbank at a depth of 2.5 ft, while figure 3 shows the ductbank at an increased depth of 3ft. The EMF exposure generated by the ductbank is weaker at a depth of 3ft compared to a depth of 2.5ft. Since transmission lines can be installed at a standard depth within the threshold, this method effectively reduces EMF exposure without incurring additional costs, as shown in Figures 2 and 3. This method is a No Cost measure considering 3ft is the standard minimum cover of transmission lines.

Figure 2 – EMF Exposure of 201R Duct bank with a 2' 6" Burial Depth

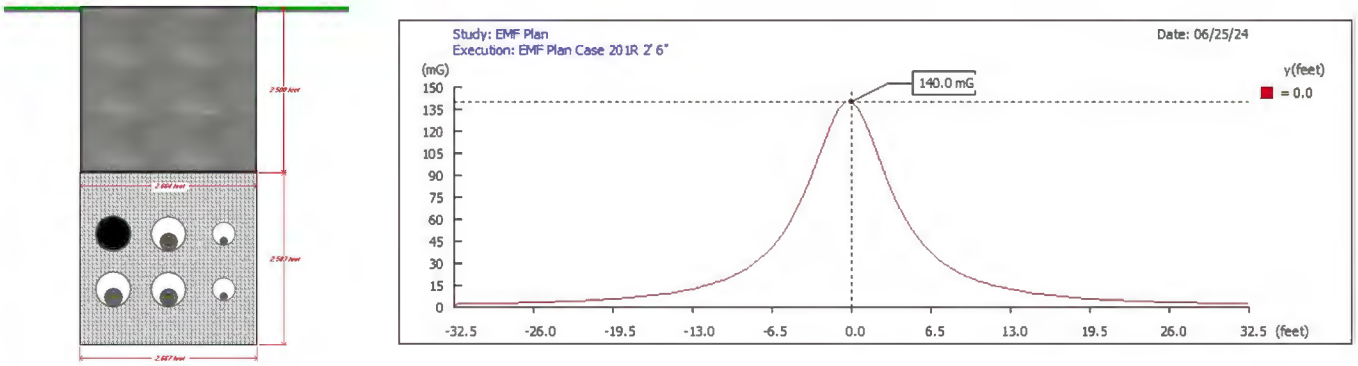
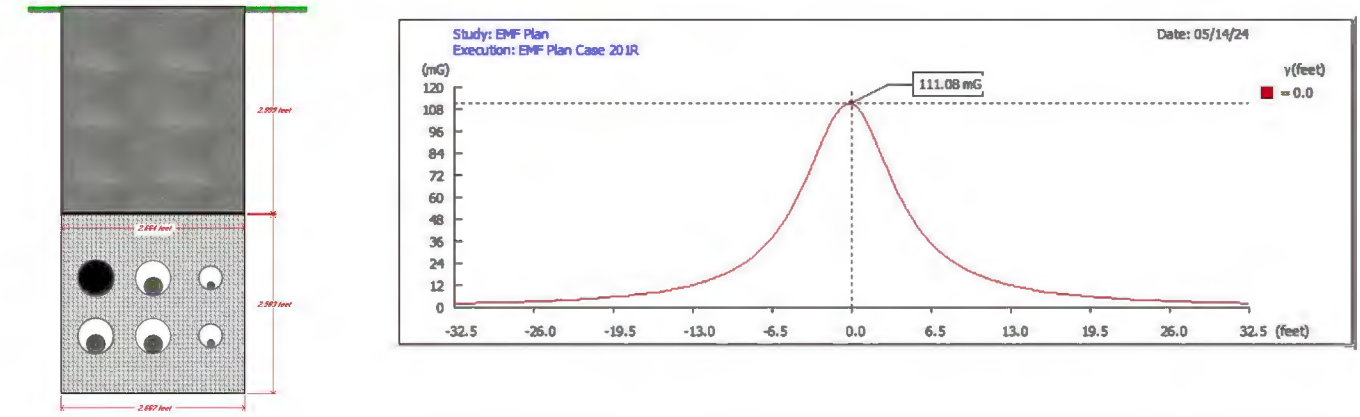


Figure 3 - EMF Exposure of 201R Duct bank with a 3' Burial Depth (Reduced EMF)



2. Triangular Configuration of the Phases of Transmission Line

Traditional horizontal and vertical transmission line arrangements tend to generate higher EMF due to unbalanced mutual phase impedance coupling. Below models show the horizontal and triangular line arrangements at the same duct bank depths in Figures 4 and 5, respectively. In each figure, the empty duct in the bank is shaded black, while the configuration is shown in the filled conduits. The transmission line triangular configuration minimizes these fields, offering a low-cost solution. This method is a No Cost measure.

Figure 4 - EMF Exposure of 201R Duct bank with a Horizontal Line Configuration

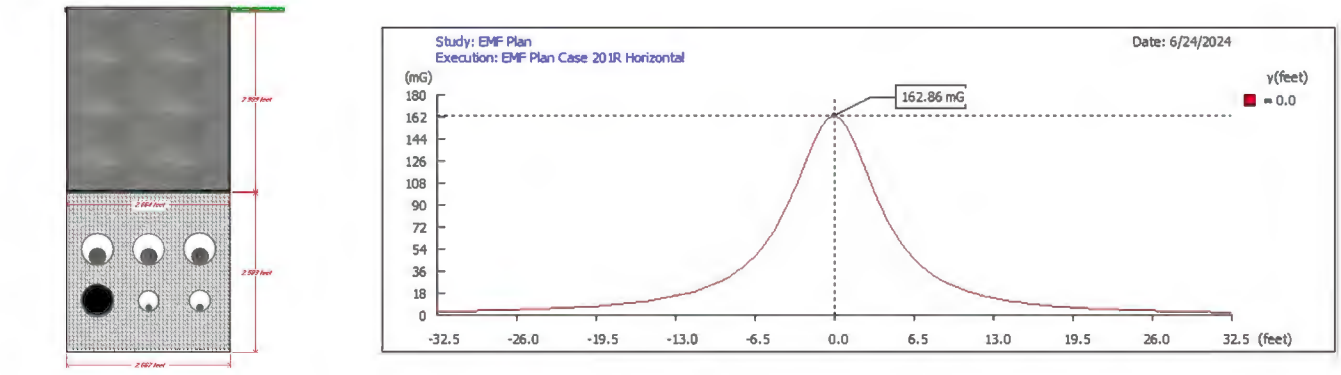
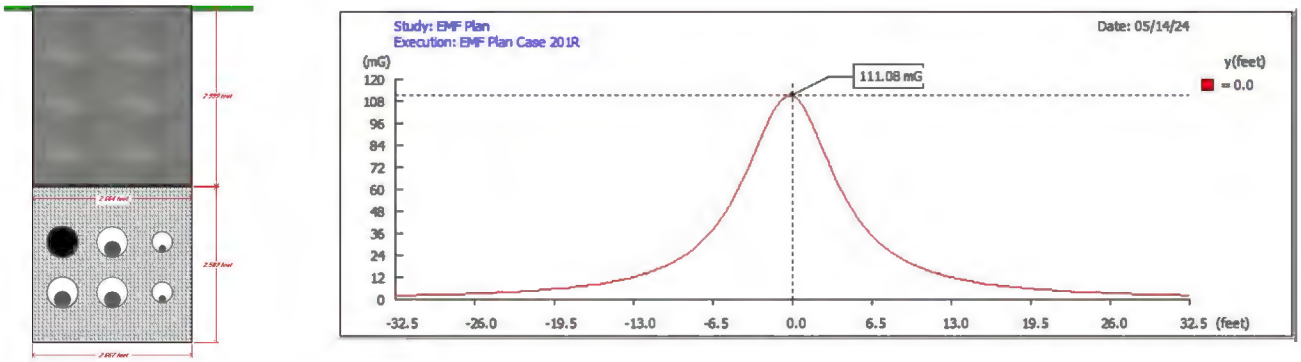


Figure 5 - EMF Exposure of 201R Duct bank with a Triangular Line Configuration (Reduced EMF)



3. Decreased Distance Between the Phases of the Transmission Lines

Decreasing the distance between the phases of transmission lines can significantly reduce the EMF they generate. This reduction occurs because the magnetic fields from the individual phases tend to cancel each other out more effectively when they are closer together. See Figures 6 and 7. The ductbank shown in Figure 6 contains ducts spaced 1' 10" apart vertically and horizontally, while the ductbank shown in figure 7 contains ducts spaced 10" apart. The EMF exposure generated by the ductbank with the 10" spacing is weaker compared to the ductbank with the 1' 10" spacing. This method is no-cost because it leverages the existing infrastructure without requiring additional materials or significant alterations. This method is a No Cost measure.

Figure 6 - EMF Exposure of 201R Duct bank with 1' 10" Spacing Between Lines in the Conduits

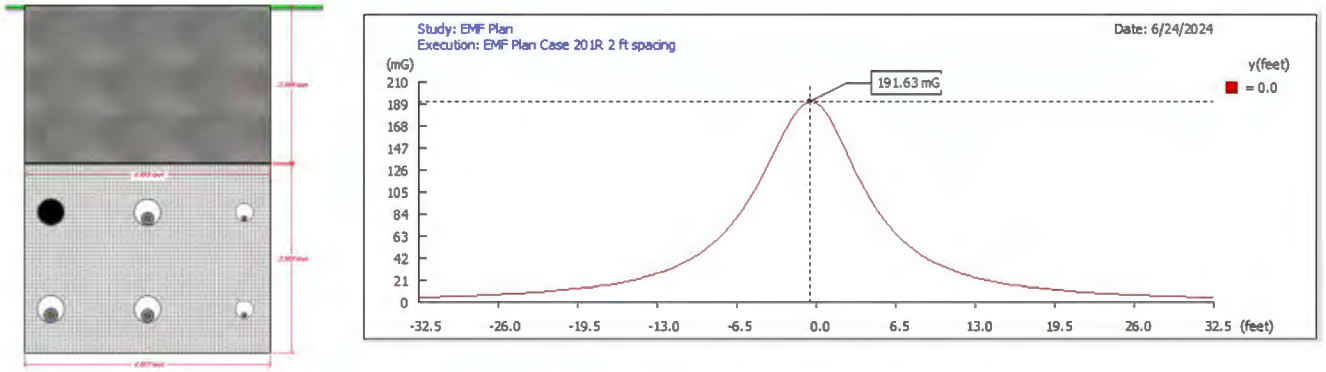
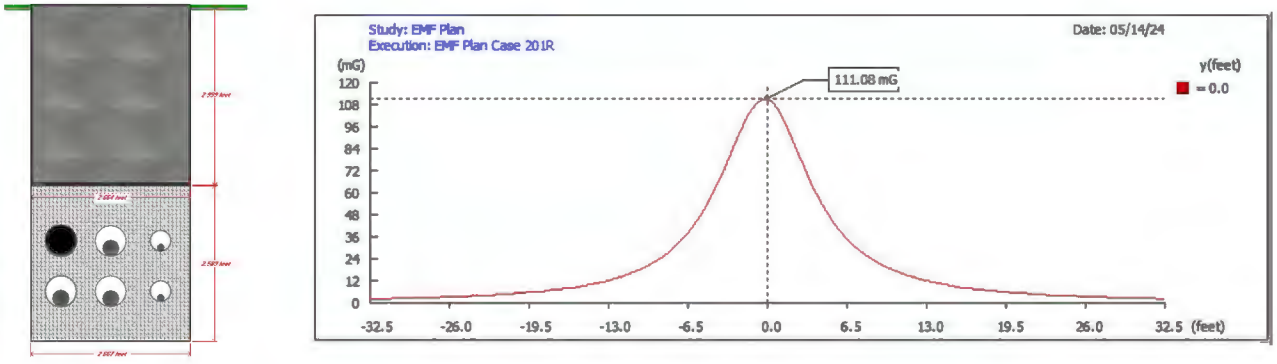


Figure 7 - EMF Exposure of 201R Duct bank with 10" Spacing Between Lines in the Conduits (Reduced EMF)



In addition to the above, high voltage underground cables may induce a sizable EMF due to the high amount of current flow within the cables. The strength of the EMF is affected by specific installation details such as duct bank

configuration, the spacing between conduits, the average load on nearby cables, shield bonding, ambient soil temperature, the thermal resistivity (Rho) of soil, backfill materials, and encasement materials, as applicable.

The CPUC did not adopt a specific numerical standard for EMF exposure because they concluded that there was no reliable scientific basis for adverse health effects from power grid EMF exposure. However, standards including the Institute of Electrical and Electronics Engineer (IEEE) standard C95.1-2019, International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2010, and Comité Européen de Normalisation Électrotechnique (CENELEC) 50527-1:2010 do specify EMF exposure limits to protect individuals from adverse health effects caused by exposure to strong EMFs. According to these standards, the limit for magnetic field exposure for persons in unrestricted environments is 9040 mG based on IEEE, 2000 mG based on ICNIRP, and 1000 mG based on CENELEC. While the CPUC does not have threshold requirements, the results are below the thresholds in the IEEE, CENELEC, and ICNIRP standards.

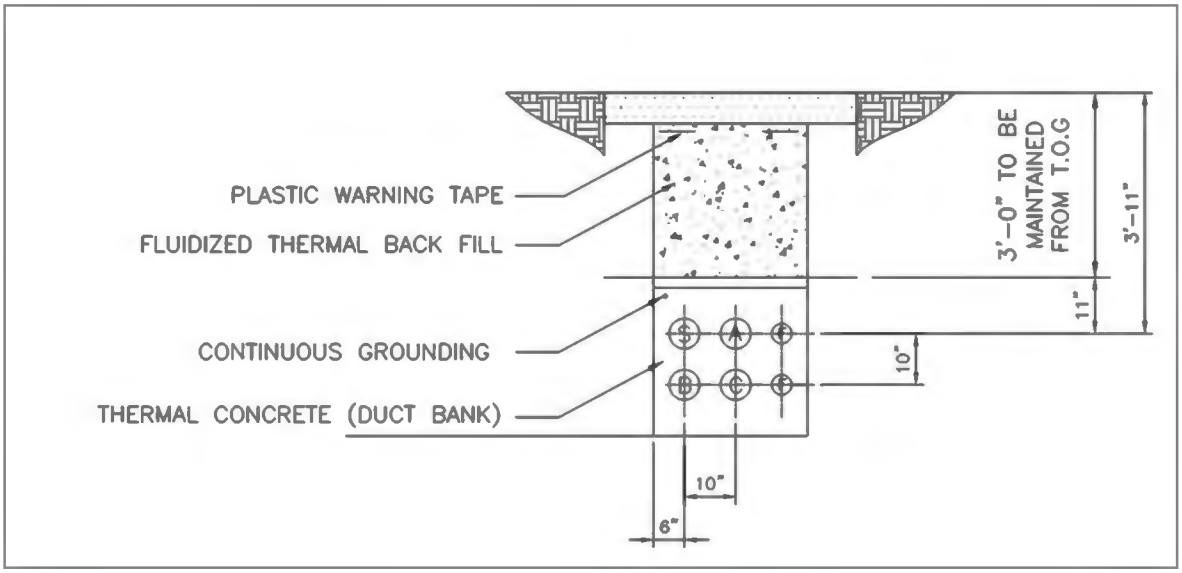
EMF calculations were conducted for this project to determine the maximum EMF strength for the proposed duct bank installation and to compare it to the exposure limits outlined by the previously mentioned standards, considering "no-cost and low-cost" magnetic field reduction measures.

Two duct bank installations were the subject of this study, based on the proposed feeders for the New City Substation.

101R, EMF-115KV-01 Single Circuit 1	
Feeders A, B, C	▪ (1) 1/C 2000kcmil copper, 115kV Cross-Linked polyethylene (XPLE), copper laminate sheath ▪ Cable Model based on Southwire High Voltage copper (cu) 115kV Power Cable Spec
Duct Bank	▪ (4) 6" PVC (Poly-Vinyl Chloride) Sch 40 PVC ducts, arranged 2W x 2H with one spare duct ▪ (2) 4" PVC Sch 40 PVC ducts, arranged 1W x 2H for Fiber Optic Cable ▪ Concrete encased duct bank with 36" backfill ▪ Feeders arranged as indicated on New Substation at Daly City Yard Figure 1
1' offset distance between the (2) duct banks in the Parallel Duct banks scenario	

201R, EMF-230KV-01 Single Circuit 1	
Feeders A, B, C	▪ (1) 1/C 2000kcmil copper, 230kV XPLE, copper laminate sheath ▪ Calculation based on Southwire High Voltage cu 230kV Power Cable Spec
Duct Bank	▪ (4) 6" PVC Sch 40 PVC ducts, arranged 2W x 2H with one spare duct ▪ (2) 4" PVC Sch 40 PVC ducts, arranged 1W x 2H for Fiber Optic Cable ▪ Concrete encased duct bank with 36" ▪ Feeders arranged as indicated on New Substation at Daly City Yard Figure 1
1' offset distance between the (6) duct banks in the Parallel Duct banks scenario	

Figure 8 – Typical Duct Bank Arrangement



1.4 Assumptions

These calculations are based on the following assumptions:

1. Cables are modeled based on the Southwire 230kV XLPE cable data sheet and the Southwire 115kV cable data sheet. See attached references.
2. Cable shields are bonded at both ends.
3. The frequency of the high voltage cables in the duct bank is 60 Hertz (Hz)
4. Load factor = 1.0
5. Conductor temperatures are limited to a maximum of 90 Celsius (C).
6. Ambient soil temperatures are limited to a maximum of 25C
7. In all cases, the native soil was estimated to have Thermal Resistivity (Rho)=0.83 Celsius-meter/watts (C-m/W)
8. In all cases, the concrete duct bank was assumed to have Rho=0.55 C-m/W ("typical" value).
9. Calculations were performed using duct and cable arrangements as indicated below[1].
   A. Case 101R 276A: 2Wx2H duct bank, 276Acable loading, 230kV Cables
   B. Case 101R 500A: 2Wx2H duct bank, 500A cable loading, 230kV Cables
   C. Case 201R 290A: 2Wx2H duct bank, 290A cable loading, 115kV Cables
   D. Case 201R 500A: 2Wx2H duct bank, 500A cable loading, 115kV Cables
   E. Parallel duct banks: (8x) 2Wx2H duct banks, (6x) duct banks with 115kV cables, (2x) duct banks with 230kV Cables, 1' Offset, 290A cable loading for 115kV Cables, 276A cable loading for 230kV cables
10. Duct bank dimensions, spacing, and cable arrangements are as indicated in each report output, following the Cases outlined above.
11. Although the CPUC does not specify a threshold, the maximum limit for the EMF output in each case is compared to the exposure limits stated on existing standards IEEE C95. 1-2019, ICNIRP 2010, and CENELEC 50527-1:2010. Please see table 2 below for exposure limits.

[1] Expected Cable Loading from WECC 2028 Winter Peak Base Case

Table 2 – EMF Exposure Limits

Standard Reference	EMF Exposure Limit
IEEE C95.1-2019	9,000 mG
ICNIRP 2010	2,000 mG
CENELEC 50527-1:2010	1,000 mG

Despite employing realistic assumptions in our models, it is crucial to acknowledge that the final EMF should be based on actual site conditions. The assumptions used in the modeling process, although carefully considered and approximated, cannot fully capture the complexities and variabilities of the specific site.

1.5 Calculation Results

EMF calculations were performed using CYMCAP software (8.2 Revision 2) from CYME International (Eaton). The analysis was performed using the assumptions above under steady-state conditions, with all cables operating at the specified load, then the resulting maximum magnetic flux density generated for each circuit and confirmed to be less than the maximum limit of EMF exposure limits outlined by the IEEE standard C95.1-2019, ICNIRP 2010, and CENELEC 50527-1:2010.

The results for each scenario are attached and summarized below in Figures 9 through 13.

Figure 9 - Case 101R 279A EMF Plot

Case 101R 279A: 2Wx2H duct bank, 276A Cable Ampacity, 230kV Cables, Max EMF: 107.5 mG

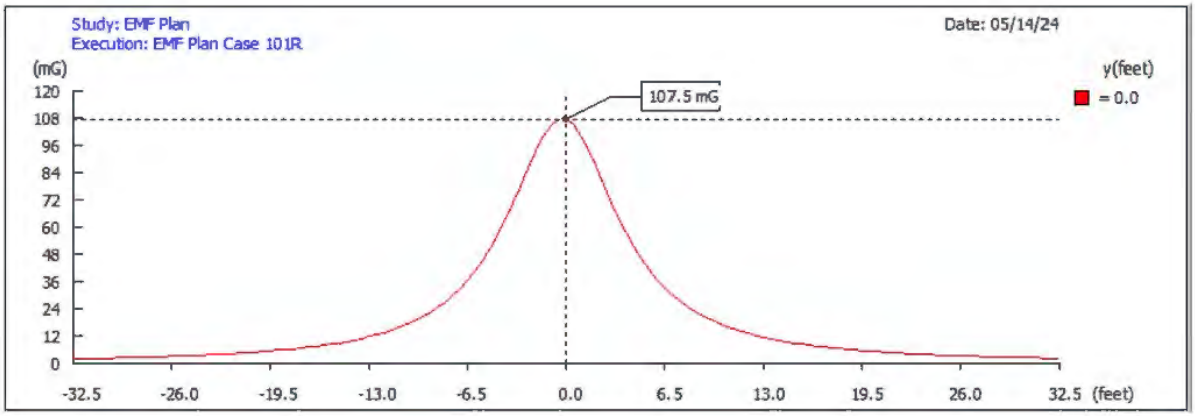


Figure 10 - Case 101R 500A EMF Plot

Case 101R 500A: 2Wx2H duct bank, 500A Cable Ampacity, 230kV Cables, Max EMF: 192.74 mG

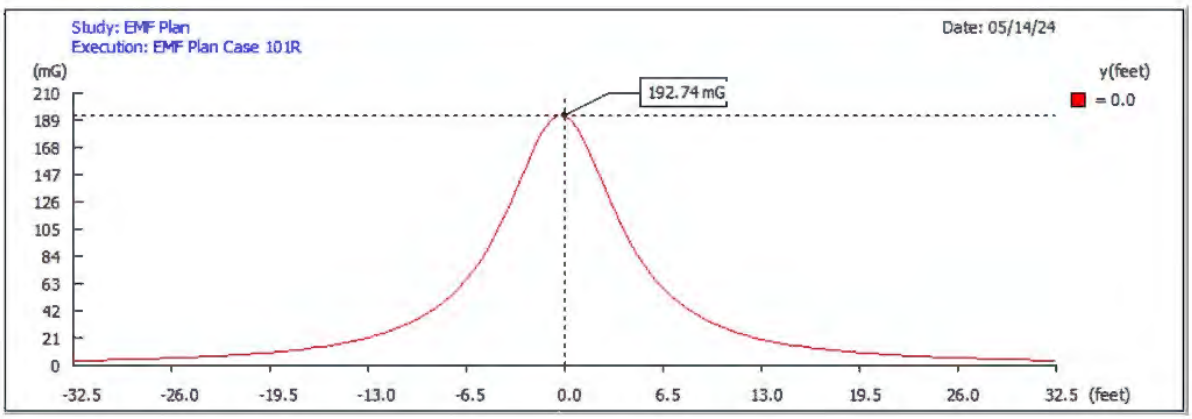


Figure 11 - 201R 290A EMF Plot

Case 201R 290A: 2Wx2H duct bank, 290A Cable Ampacity, 115kV Cables, Max EMF: 111.08 mG,

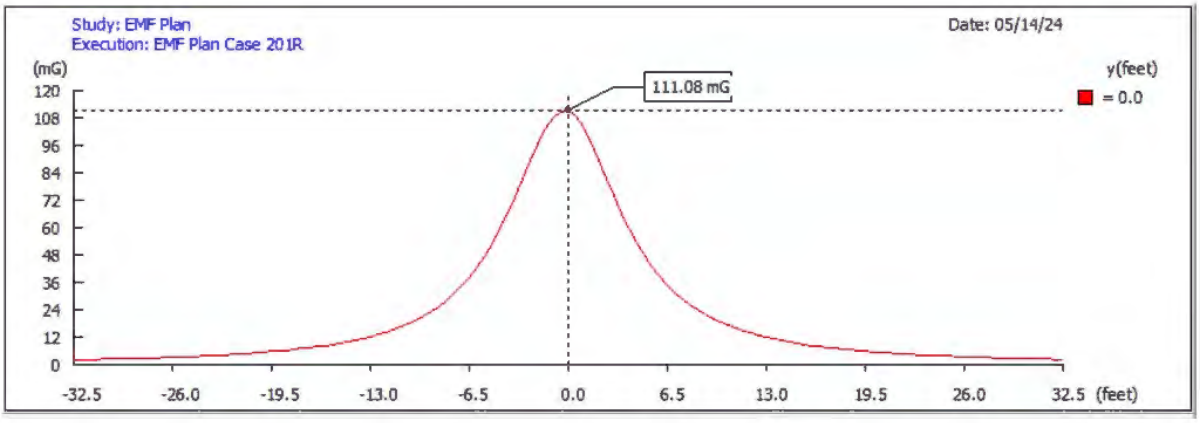


Figure 12 - 201R 500A EMF Plot

Case 201R 500A: 2Wx2H duct bank, 500A Cable Ampacity, 115kV Cables, Max EMF: 189.73 mG,

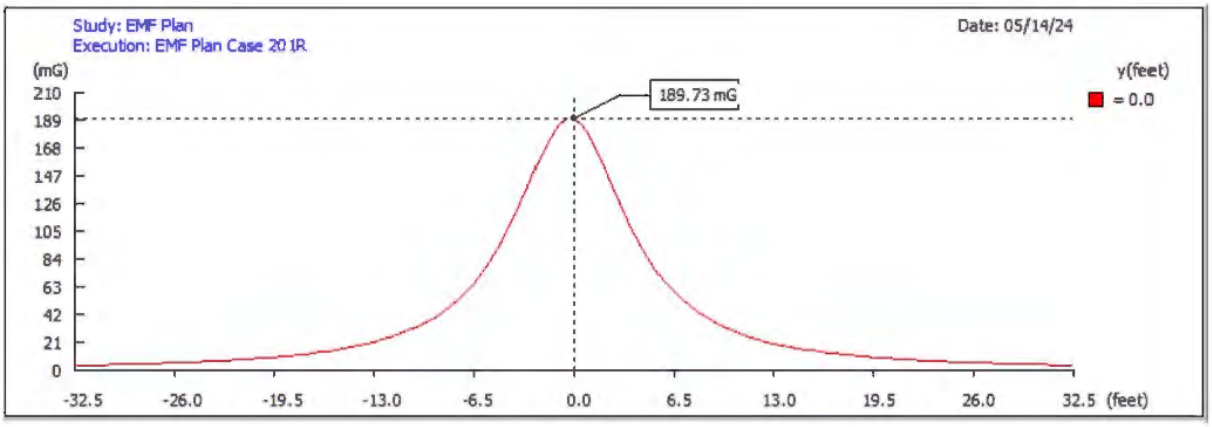
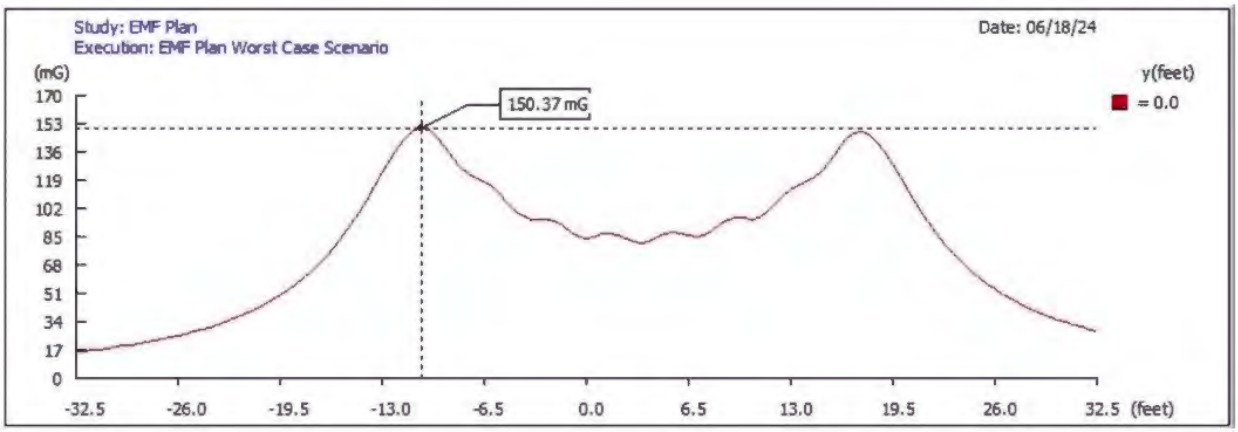


Figure 13 - 201R 290A P EMF Plot

Parallel Duct Banks: (8x) 2Wx2H duct bank: (6x) duct banks with 115kV cables and (2x) duct banks with 230kV cables, 290A cable ampacity for 115kV cables, 276A cable ampacity for 230kV cables, Max EMF: 150.37 mG



Please see the Table 3 below for a summary of results.

Table 3 – EMF Exposure Limits

Case Name	Maximum EMF	Lower than IEEE C95.1 – 2019 (9000 mG)	Lower than ICNIRP 2010 (2000 mG)	Lower than CENELEC 50527-1:2010 Limit (1,000 mG)
Case 101R 279A	107.5 mG	True	True	True
Case 101R 500A	192.74 mG	True	True	True
Case 201R 290A	111.08 mG	True	True	True
Case 201R 500A	189.73 mG	True	True	True
Worst Case Scenario	150.37 mG	True	True	True

1.5 Conclusion and Recommendations

Overall, based on the typical utility corridor and transmission line configurations, the value is lower than the threshold from electric and magnetic fields. Whereas the CPUC doesn't prescribe a threshold value, all the values in the analysis fall below the recommended safety limits from CENELEC, which is the most stringent criterion among international standards. It is also below the recommended limits from ICNIRP and ICES, which are both referenced by the World Health Organization.

Our recommendation is to continue the permitting, engineering, and construction progress of the transmission line since it poses minimal risk for human safety.

It is important to note that this analysis is based on conceptual engineering from June 2024. It is understood that final transmission engineering designs may change; therefore, it is required to revisit these calculations once the transmission engineering is finalized with PE-stamped final duct banks, cables, and configurations.

1.6 Attachments

1. Cable data, Southwire 230kV XLPE Power Cable
2. Cable data, Southwire 115kV XLPE Power Cable
3. Duct bank Installation 101R: EMF-230KV-01 Single Circuit 1
4. Duct bank Installation 201R: EMF-115KV-01 Single Circuit 1
5. CYMCAP Calculation Results
6. CYMCAP EMF Plots and Raw Data

1.7 References

7. CPUC Electromagnetic Field (EMF) Design Guidelines for Electrical Facilities
8. Institute of Electrical and Electronics Engineer (IEEE) standard C95.1-2019
9. Comité Européen de Normalisation Électrotechnique (CENELEC)
10. International Commission on Non-Ionizing Radiation Protection (ICNIRP)

Attachment 1 – Cable Data, Southwire 230KV XLPE Power Cable

230 kV XLPE Power Cable

SW STANDARD WALL XLPE CORRUGATED SHEATH

CABLE CONSTRUCTION

- Concentric Stranded, Compact, or Segmental Copper or Alumimum Conductor
- Smooth Conductor Shield
- Super Clean XLPE Insulation
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Copper or Aluminum Moisture Impervious Sheath
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	245
BIL Rating	1050
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Factory Test Voltages	265 kV / 60 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size (kcmil[1])	Conductor Dia.	Insulation Thickness	Diameter Over Insulation	Overall Jacket Diameter	Min. Bending Radius (install / perm.)	Capacitance	Charging Current	CU Cond & CU Sheath		AL Cond & AL Sheath	
								Cable Weight	30 mil Sheath[2] Short Ckt @ 0.5s	Cable Weight	50 mil Sheath[2] Short Ckt @ 0.5s
	(inches)	(mils)	(inches)	(inches)	(inches)	(pF/ft)	(A/kft)	(lbs/ft)	(kA)	(lbs/ft)	(kA)
1000	1.06	945	3.08	4.06	74/49	42.73	2.14	8.57	46.7	5.73	52.5
1250	1.19	906	3.13	4.13	75/50	47.03	2.35	9.35	47.4	6.00	53.2
1500	1.32	906	3.26	4.28	78/52	50.12	2.51	10.40	49.2	6.50	55.2
1750	1.43	906	3.37	4.40	80/53	52.63	2.64	11.40	50.6	6.94	56.9
2000	1.50	906	3.45	4.50	81/54	54.30	2.72	12.37	51.8	7.33	58.0
2500	1.73	906	3.73	4.84	88/59	61.24	3.01	14.64	55.7	8.51	62.5
3000	1.89	906	3.96	5.11	92/62	66.54	3.33	16.70	58.9	9.47	66.0
3500	2.07	906	4.07	5.23	95/63	69.00	3.45	18.48	60.3	10.16	67.7
4000	2.17	906	4.17	5.35	97/65	71.27	3.57	20.24	61.7	10.84	69.2
5000	2.48	906	4.48	5.71	103/69	78.41	3.93	24.73	66.0	12.40	73.9
6000	2.67	906	4.67	5.94	107/72	82.86	4.15	27.57	68.6	13.83	76.9

Copper Conductor Size (kcmil[1]) Load Factor @ 75%												
Ampacity[3] @ 90°C; per Figures on Page 2		1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	830	940	1020	1090	1160	1370	1490	1580	1660	1730	1810
Power Rating	MVA	331	374	406	434	462	546	594	629	661	689	721
Double Circuit (Fig 2)	Amps	710	790	860	910	960	1140	1230	1300	1360	1400	1450
Power Rating	MVA	283	315	343	363	382	454	490	518	542	558	578

Aluminum Conductor Size (kcmil[1]) Load Factor @ 75%												
Ampacity[3] @ 90°C; per Figures on Page 2		1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	660	750	820	890	950	1090	1190	1280	1430	1620	1760
Power Rating	MVA	263	299	327	355	378	434	474	510	570	645	701
Double Circuit (Fig 2)	Amps	560	630	690	740	790	903	980	1050	1190	1340	1440
Power Rating	MVA	223	251	275	295	315	360	390	418	474	534	574

[1]2500-6000 kcmil conductors are 5 segment Milliken conductors.
[2]Thicker sheath can accommodate more FAULT current.
[3]Based upon single point or cross bonding scheme.

230 kV XLPE Power Cable

SW STANDARD WALL XLPE LAMINATE SHEATH

CABLE CONSTRUCTION

- Concentric Stranded, Compact, or Segmental Copper or Alumimum Conductor
- Smooth Conductor Shield
- Super Clean XLPE Insulation
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Copper or Aluminum screen wires/ laminate combination
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	245
BIL Rating	1050
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Factory Test Voltages	265 kV / 60 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size (kcmil[1])	Conductor Dia.	Insulation Thickness	Diameter Over Insulation	Overall Jacket Diameter	Min. Bending Radius (install / perm.)	Capacitance	Charging Current	CU Cond, CU Screen Wires, CU Laminate	AL Cond, CU Screen Wires, AL Laminate
								Cable Weight[2]	Cable Weight[2]
	(inches)	(mils)	(inches)	(inches)	(inches)	(pF/ft)	(A/kft)	(lbs/ft)	(lbs/ft)
1000	1.06	945	3.08	3.76	68/46	42.73	2.14	7.98	5.95
1250	1.19	906	3.13	3.81	69/46	47.03	2.35	8.72	6.19
1500	1.32	906	3.26	3.94	71/48	50.12	2.51	9.72	6.65
1750	1.43	906	3.37	4.06	74/49	52.63	2.64	10.66	7.08
2000	1.50	906	3.45	4.15	75/50	54.30	2.72	11.59	7.44
2500	1.73	906	3.73	4.45	81/54	61.24	3.01	13.68	8.53
3000	1.89	906	3.96	4.69	85/57	66.54	3.33	15.62	9.42
3500	2.07	906	4.07	4.81	87/58	69.00	3.45	17.35	10.09
4000	2.17	906	4.17	4.91	89/59	71.27	3.57	19.06	10.75
5000	2.48	906	4.48	5.25	95/63	78.41	3.93	23.40	12.23
6000	2.67	906	4.67	5.45	99/66	82.86	4.15	26.16	13.60

Copper Conductor Size (kcmil[1]) Load Factor @ 75%												
Ampacity[3] @ 90°C; per Figures on Page 2		1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	850	960	1050	1120	1190	1440	1570	1690	1800	1870	1980
Power Rating	MVA	339	382	418	446	474	574	625	673	717	745	789
Double Circuit (Fig 2)	Amps	720	800	880	940	990	1190	1300	1390	1470	1660	1770
Power Rating	MVA	287	319	351	374	394	474	518	554	586	661	705

Aluminum Conductor Size (kcmil[1]) Load Factor @ 75%												
Ampacity[3] @ 90°C; per Figures on Page 2		1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	670	760	840	910	970	1130	1250	1360	1450	1660	1820
Power Rating	MVA	267	303	335	363	386	450	498	542	578	661	725
Double Circuit (Fig 2)	Amps	570	640	700	760	810	940	1030	1120	1190	1360	1490
Power Rating	MVA	227	255	279	303	323	374	410	446	474	542	594

[1]2500-6000 kcmil conductors are 5 segment Milliken conductors.
[2]Weight based on screen sized at 279 kcmil which is calculated to accommodate 30 kA for 0.5 sec.
[3]Based upon single point or cross bonding scheme.

Attachment 2 – Cable Data, Southwire 115KV XLPE Power Cable

115 kV XLPE Power Cable

SW STANDARD WALL XLPE CORRUGATED SHEATH

CABLE CONSTRUCTION

- Concentric Stranded, Compact, or Segmental Copper or Alumimum Conductor
- Smooth Conductor Shield
- Super Clean XLPE Insulation
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Copper or Aluminum Moisture Impervious Sheath
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	121
BIL Rating	550
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Factory Test Voltages	135 kV / 60 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size (kcmil[1])	Conductor Dia.	Insulation Thickness	Diameter Over Insulation	Overall Jacket Diameter	Min. Bending Radius (install / perm.)	Capacitance	Charging Current	CU Cond & CU Sheath		AL Cond & AL Sheath	
								Cable Weight	30 mil Sheath[2] Short Ckt @ 0.5s	Cable Weight	50 mil Sheath[2] Short Ckt @ 0.5s
	(inches)	(mils)	(inches)	(inches)	(inches)	(pF/ft)	(A/kft)	(lbs/ft)	(kA)	(lbs/ft)	(kA)
750	0.91	512	2.03	2.78	50/34	57.76	1.45	5.13	31.6	3.06	35.7
1000	1.06	512	2.19	2.98	54/36	64.51	1.62	6.18	33.9	3.53	38.3
1250	1.19	512	2.32	3.13	57/38	69.78	1.75	7.10	35.7	3.92	40.3
1500	1.32	512	2.45	3.28	60/40	75.08	1.88	8.10	37.5	4.36	42.3
1750	1.43	512	2.58	3.44	62/42	80.36	2.01	9.10	39.3	4.80	44.3
2000	1.50	512	2.66	3.53	64/43	83.23	2.08	10.00	40.4	5.14	45.4
2500	1.73	512	2.95	3.87	70/47	95.22	2.38	12.10	44.4	6.14	49.9
3000	1.89	512	3.18	4.14	75/50	104.40	2.61	14.03	47.5	6.97	53.4
3500	2.07	512	3.28	4.26	77/52	108.68	2.72	15.74	49.0	7.60	55.0
4000	2.17	512	3.38	4.38	79/53	112.64	2.82	17.45	50.3	8.22	56.5
5000	2.48	512	3.69	4.74	86/57	125.09	3.13	21.75	54.6	9.65	61.3
6000	2.67	512	3.88	5.13	93/62	132.86	3.33	24.47	57.2	10.90	64.2

Copper Conductor Size (kcmil[1]) Load Factor @ 75%													
Ampacity[3] @ 90°C; per Figures on Page 2		750	1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	750	870	970	1060	1130	1200	1440	1560	1670	1760	1900	2000
Power Rating	MVA	149	173	193	211	225	239	287	311	333	351	378	398
Double Circuit (Fig 2)	Amps	640	740	820	890	940	990	1180	1280	1360	1430	1530	1620
Power Rating	MVA	127	147	163	177	187	197	235	255	271	285	305	323

Aluminum Conductor Size (kcmil[1]) Load Factor @ 75%													
Ampacity[3] @ 90°C; per Figures on Page 2		750	1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	590	690	780	860	920	980	1130	1250	1350	1440	1620	1760
Power Rating	MVA	118	137	155	171	183	195	225	249	269	287	323	351
Double Circuit (Fig 2)	Amps	500	580	650	720	770	820	940	1030	1110	1180	1310	1410
Power Rating	MVA	100	116	129	143	153	163	187	205	221	235	261	281

[1]2500-6000 kcmil conductors are 5 segment Milliken conductors.
[2]Thicker sheath can accommodate more FAULT current.
[3]Based upon single point or cross bonding scheme.

115 kV XLPE Power Cable

SW STANDARD WALL XLPE LAMINATE SHEATH

CABLE CONSTRUCTION

- Concentric Stranded, Compact, or Segmental Copper or Alumimum Conductor
- Smooth Conductor Shield
- Super Clean XLPE Insulation
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Copper or Aluminum screen wires/ laminate combination
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	121
BIL Rating	550
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Factory Test Voltages	135 kV / 60 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size (kcmil[1])	Conductor Dia.	Insulation Thickness	Diameter Over Insulation	Overall Jacket Diameter	Min. Bending Radius (install / perm.)	Capacitance	Charging Current	CU Cond, CU Screen Wires, CU Laminate	AL Cond, CU Screen Wires, AL Laminate
								Cable Weight[2]	Cable Weight[2]
	(inches)	(mils)	(inches)	(inches)	(inches)	(pF/ft)	(A/kft)	(lbs/ft)	(lbs/ft)
750	0.91	512	2.03	2.62	48/32	57.76	1.45	5.07	3.55
1000	1.06	512	2.19	2.80	51/34	64.51	1.62	6.04	3.99
1250	1.19	512	2.32	2.94	53/36	69.78	1.75	6.90	4.35
1500	1.32	512	2.45	3.08	56/37	75.08	1.88	7.83	4.74
1750	1.43	512	2.58	3.21	58/39	80.36	2.01	8.76	5.15
2000	1.50	512	2.66	3.31	60/40	83.23	2.08	9.63	5.48
2500	1.73	512	2.95	3.61	65/44	95.22	2.38	11.60	6.39
3000	1.89	512	3.18	3.85	70/47	104.40	2.61	13.68	7.16
3500	2.07	512	3.28	3.96	72/48	108.68	2.72	15.07	7.77
4000	2.17	512	3.38	4.07	74/49	112.64	2.82	16.72	8.36
5000	2.48	512	3.69	4.41	80/53	125.09	3.13	20.86	9.66
6000	2.67	512	3.88	4.62	84/56	132.86	3.33	23.50	10.93

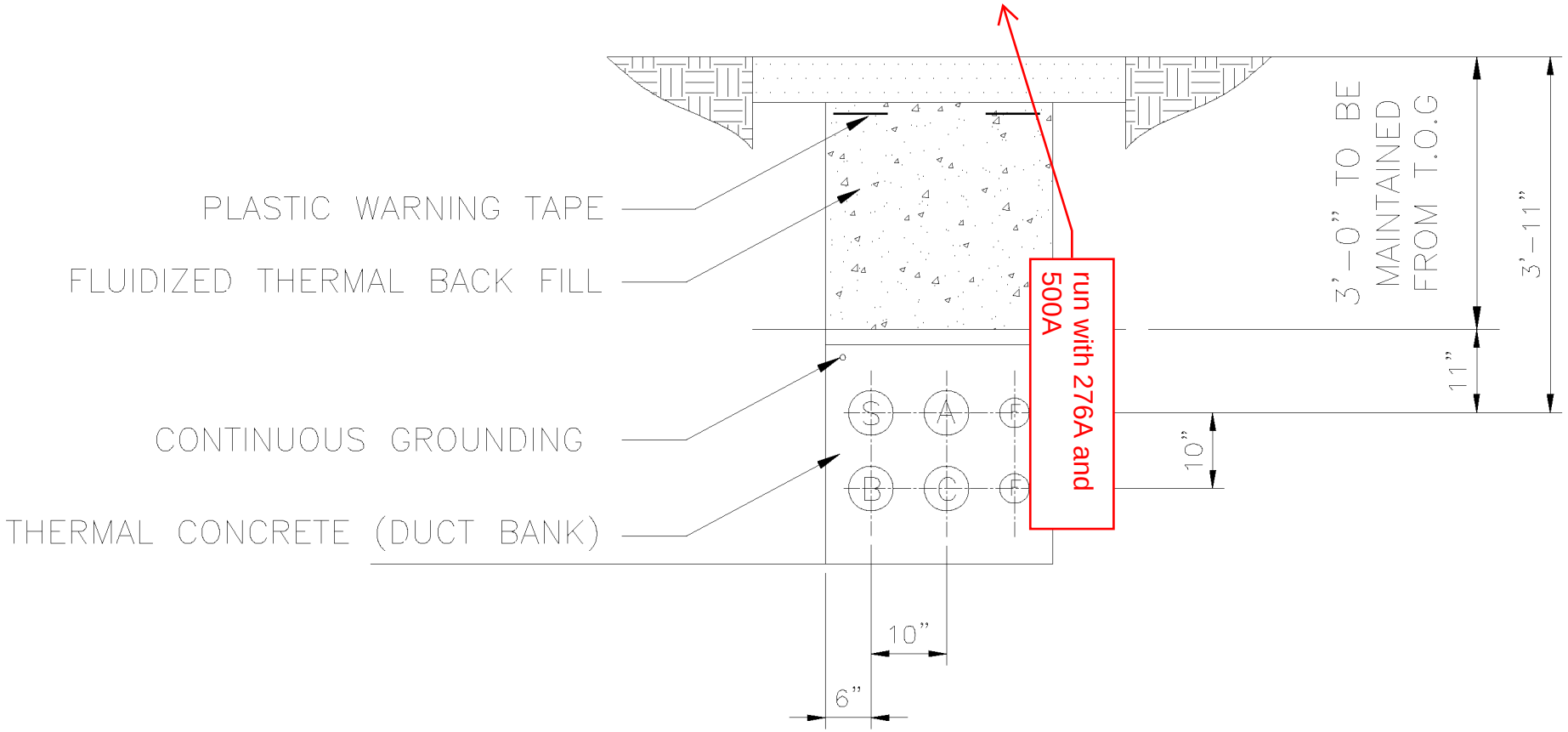
Copper Conductor Size (kcmil[1]) Load Factor @ 75%													
Ampacity[3] @ 90°C; per Figures on Page 2		750	1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	760	890	990	1080	1160	1230	1480	1620	1750	1850	2040	2190
Power Rating	MVA	151	177	197	215	231	245	295	323	349	368	406	436
Double Circuit (Fig 2)	Amps	640	740	830	900	960	1020	1220	1330	1430	1510	1660	1770
Power Rating	MVA	127	147	165	179	191	203	243	265	285	301	331	353
Aluminum Conductor Size (kcmil[1]) Load Factor @ 75%													
Ampacity[3] @ 90°C; per Figures on Page 2		750	1000	1250	1500	1750	2000	2500	3000	3500	4000	5000	6000
Single Circuit (Fig 1)	Amps	600	710	800	880	950	1010	1170	1300	1410	1510	1740	1900
Power Rating	MVA	120	141	159	175	189	201	233	259	281	301	347	378
Double Circuit (Fig 2)	Amps	510	590	670	730	790	840	970	1070	1160	1240	1410	1540
Power Rating	MVA	102	118	133	145	157	167	193	213	231	247	281	307

[1]2500-6000 kcmil conductors are 5 segment Milliken conductors.
[2]Weight based on screen sized at 279 kcmil which is calculated to accommodate 30 kA for 0.5 sec.
[3]Based upon single point or cross bonding scheme.

Attachment 3 – Duct Bank Installation 101R: EMF-230KV-01 Single Circuit 1

EMF–230KV–01 SINGLE CIRCUIT 1

1. 230KV, 1 SET OF CABLES, 1000A, 2000KCMIL,
2. 36" TOP OF DUCTBANK FROM FINISHED GRADE/ROAD

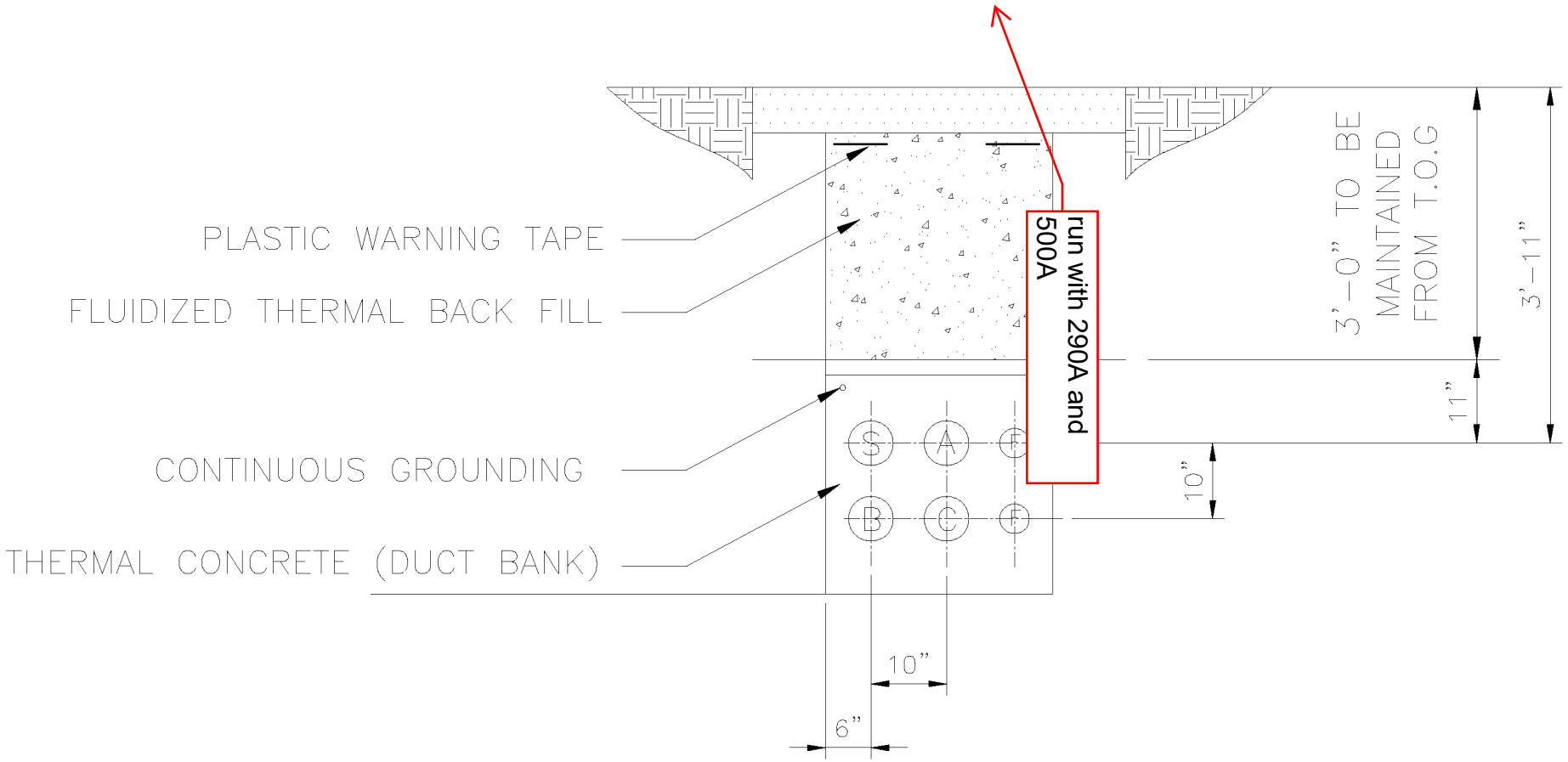


NOTE: AMPACITY AND CABLE SIZE WILL BE FINALIZED AFTER AMPACITY STUDY

Attachment 4 – Duct Bank Installation 201R: EMF-115KV-01 Single Circuit 1

EMF–115KV–01 SINGLE CIRCUIT 1

1. 115KV, 1 SET OF CABLES, 1000A, 2000KCMIL,
2. 36" TOP OF DUCTBANK FROM FINISHED GRADE/ROAD



NOTE: AMPACITY AND CABLE SIZE WILL BE FINALIZED AFTER AMPACITY STUDY

Attachment 5 – CYMCAP Calculation Results

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 201R 2_ 6_
Date:	9/23/2024 5:42:48 PM

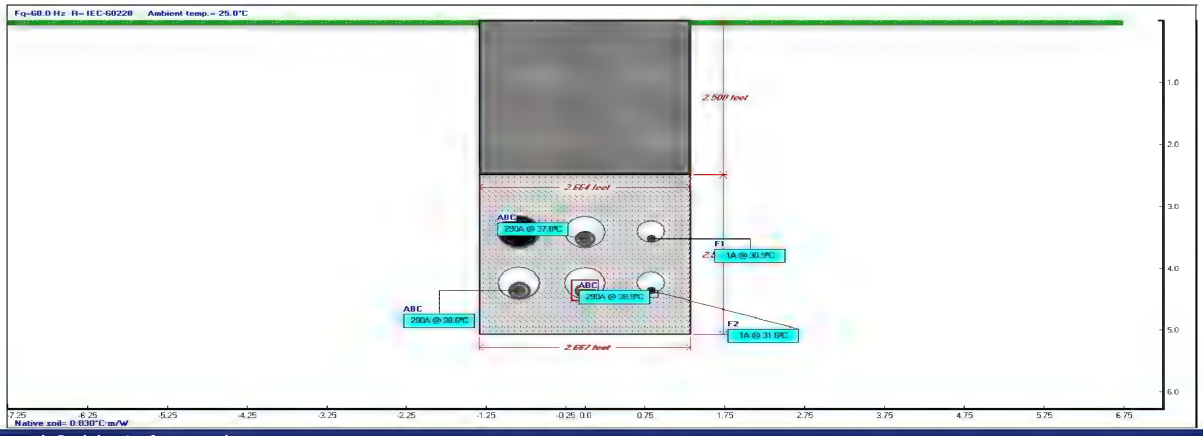
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	7.05E-06	3.79	2.67	2.58	0.50
Backfill	0.00	1.25	2.67	2.50	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 115KV XLPE	Single Core	Round Stranded	115.00	1013.48	3.32	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 115KV XLPE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1	A	60.00	0.00	3.53	1.00	1 Conductor Bothends Triangular
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1	B	60.00	-0.83	4.36	1.00	1 Conductor Bothends Triangular
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1	C	60.00	0.00	4.36	1.00	1 Conductor Bothends Triangular
4	AWG_1	2	A	60.00	0.83	3.52	1.00	1 Conductor No Bonding
5	AWG_1	3	A	60.00	0.83	4.36	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]

Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	37.78	36.55	n/a	35.88	32.02	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	38.55	37.32	n/a	36.65	32.81	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	38.95	37.72	n/a	37.04	33.20	n/a
4	AWG_1	1.00	30.85	30.82	n/a	30.82	30.74	n/a
5	AWG_1	1.00	31.58	31.55	n/a	31.54	31.47	n/a

Electrical Resistances

Cable	Cable ID	R_0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.01	0.04	0.05	n/a	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.01	0.04	0.05	n/a	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.01	0.04	0.05	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.03	n/a	0.90	n/a
5	AWG_1	0.98	0.00	0.00	1.03	n/a	0.90	n/a

Thermal Resistances

Cable	Cable ID	T_1 [K.m/W]	T_2 [K.m/W]	T_3 [K.m/W]	T_4' [K.m/W]	T_4'' [K.m/W]	T_4''' [K.m/W]	T_4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.40	0.08	0.88	1.36
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.40	0.08	0.97	1.45
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.39	0.08	1.02	1.50
4	AWG_1	0.64	0.00	0.05	0.74	0.11	65.59	66.44
5	AWG_1	0.64	0.00	0.05	0.74	0.11	73.87	74.72

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.95	0.00	2.44	1.55	0.00
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.95	0.00	2.44	1.56	0.00
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.95	0.00	2.44	1.56	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	$\Delta\theta$int [°C]	[A]	[µF/mile]	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 115KV XLPE	4.04	317.88	0.56	41.28	0.36	0.25	0.07
2	SOUTHWIRE 2000KCMIL 115KV XLPE	4.57	317.84	0.56	41.28	0.36	0.25	0.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	4.97	317.82	0.56	41.28	0.36	0.25	0.07
4	AWG_1	5.71	0.00	0.23	8.42E-06	0.00	0.00	1.78
5	AWG_1	6.43	0.00	0.23	8.42E-06	0.00	0.00	1.78

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 201R Horizontal
Date:	9/23/2024 5:40:06 PM

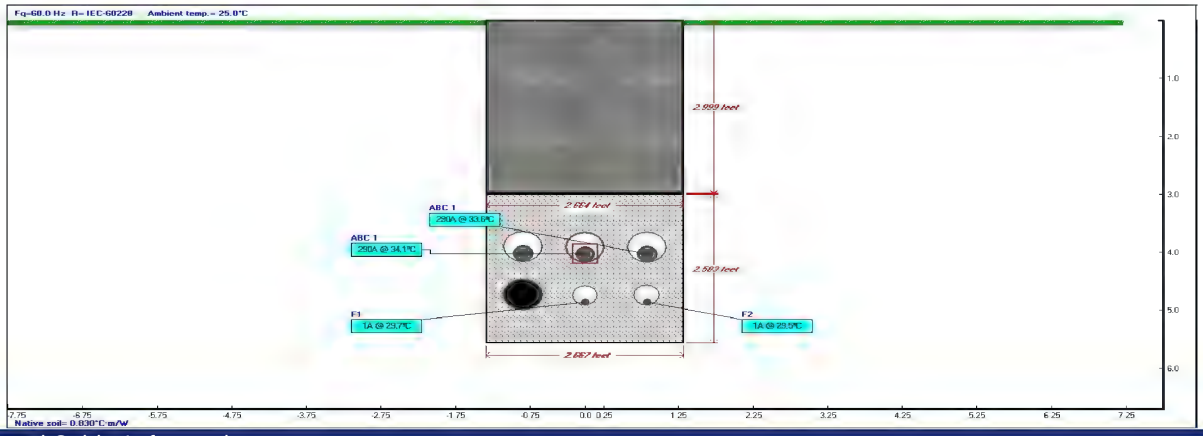
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	7.05E-06	4.29	2.67	2.58	0.50
Backfill	0.00	1.50	2.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 115KV XLPE	Single Core	Round Stranded	115.00	1013.48	3.32	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 115KV XLPE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1	A	60.00	-0.83	4.03	1.00	1 Conductor 1 Point Bonded Flat
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1	B	60.00	0.00	4.03	1.00	1 Conductor 1 Point Bonded Flat
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1	C	60.00	0.83	4.03	1.00	1 Conductor 1 Point Bonded Flat
4	AWG_1	2	A	60.00	0.00	4.85	1.00	1 Conductor No Bonding
5	AWG_1	3	A	60.00	0.83	4.85	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]

Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	33.60	32.38	n/a	31.97	29.55	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	34.07	32.85	n/a	32.42	29.93	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	33.63	32.41	n/a	32.00	29.58	n/a
4	AWG_1	1.00	29.73	29.70	n/a	29.67	29.60	n/a
5	AWG_1	1.00	29.46	29.43	n/a	29.41	29.33	n/a

Electrical Resistances

Cable	Cable ID	R_0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.28	0.01	0.04	0.05	n/a	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.28	0.01	0.04	0.05	n/a	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.28	0.01	0.04	0.05	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.02	n/a	0.90	n/a
5	AWG_1	0.98	0.00	0.00	1.02	n/a	0.90	n/a

Thermal Resistances

Cable	Cable ID	T_1 [K.m/W]	T_2 [K.m/W]	T_3 [K.m/W]	T_4' [K.m/W]	T_4'' [K.m/W]	T_4''' [K.m/W]	T_4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.41	0.08	0.92	1.41
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.41	0.08	0.97	1.46
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.41	0.08	0.93	1.42
4	AWG_1	0.64	0.00	0.05	0.74	0.11	52.53	53.38
5	AWG_1	0.64	0.00	0.05	0.75	0.11	49.46	50.31

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.02	0.00	1.50	0.03	0.00
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.07	0.00	1.55	0.11	0.00
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.02	0.00	1.50	0.03	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	$\Delta\theta$int [°C]	[A]	[µF/mile]	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 115KV XLPE	2.61	0.00	0.56	40.47	0.34	0.23	0.07
2	SOUTHWIRE 2000KCMIL 115KV XLPE	2.92	0.00	0.56	40.47	0.34	0.23	0.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	2.61	0.00	0.56	40.47	0.34	0.23	0.07
4	AWG_1	4.56	0.00	0.23	8.42E-06	0.00	0.00	1.77
5	AWG_1	4.29	0.00	0.23	8.42E-06	0.00	0.00	1.77

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 201R 2 ft spacing
Date:	9/23/2024 5:31:34 PM

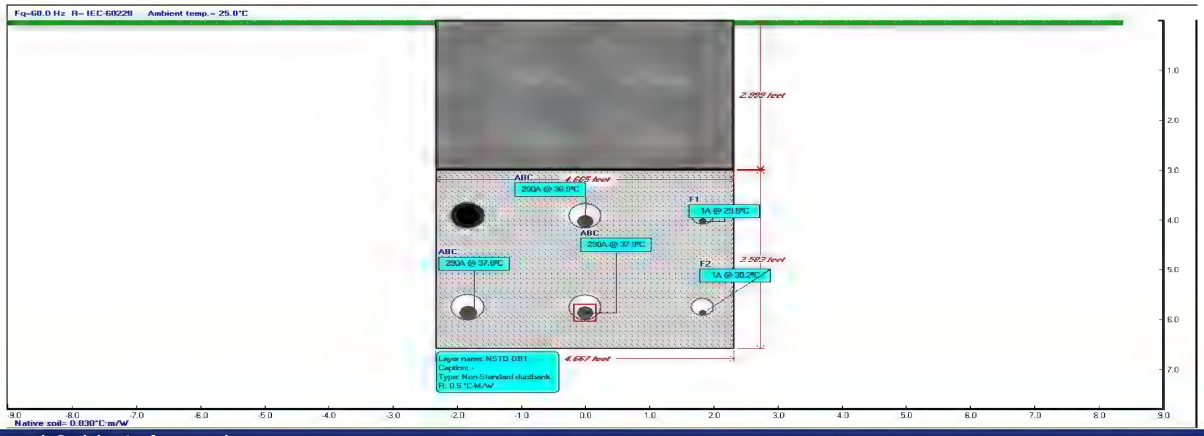
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	1.03E-05	4.79	4.67	3.58	0.50
Backfill	0.00	1.50	4.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 115KV XLPE	Single Core	Round Stranded	115.00	1013.48	3.32	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 115KV XLPE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1	A	60.00	0.00	4.03	1.00	1 Conductor Bothends Triangular
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1	B	60.00	-1.83	5.86	1.00	1 Conductor Bothends Triangular
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1	C	60.00	0.00	5.86	1.00	1 Conductor Bothends Triangular
4	AWG_1	2	A	60.00	1.83	4.02	1.00	1 Conductor No Bonding
5	AWG_1	3	A	60.00	1.83	5.85	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]

Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	36.92	35.70	n/a	35.02	31.14	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	37.76	36.53	n/a	35.86	31.98	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	37.94	36.71	n/a	36.04	32.16	n/a
4	AWG_1	1.00	29.46	29.43	n/a	29.43	29.36	n/a
5	AWG_1	1.00	30.19	30.16	n/a	30.16	30.08	n/a

Electrical Resistances

Cable	Cable ID	R_0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.00	0.04	0.05	n/a	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.00	0.04	0.05	n/a	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.00	0.04	0.05	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.02	n/a	0.90	n/a
5	AWG_1	0.98	0.00	0.00	1.02	n/a	0.90	n/a

Thermal Resistances

Cable	Cable ID	T_1 [K.m/W]	T_2 [K.m/W]	T_3 [K.m/W]	T_4' [K.m/W]	T_4'' [K.m/W]	T_4''' [K.m/W]	T_4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.40	0.08	0.76	1.25
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.40	0.08	0.87	1.35
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.40	0.08	0.89	1.37
4	AWG_1	0.64	0.00	0.05	0.75	0.11	49.74	50.59
5	AWG_1	0.64	0.00	0.05	0.74	0.11	58.04	58.89

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.96	0.00	2.45	1.59	0.00
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.97	0.00	2.45	1.59	0.00
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.97	0.00	2.45	1.59	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	$\Delta\theta$int [°C]	[A]	[µF/mile]	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 115KV XLPE	3.25	320.91	0.56	46.46	0.45	0.34	0.07
2	SOUTHWIRE 2000KCMIL 115KV XLPE	3.61	320.89	0.56	46.46	0.45	0.34	0.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	3.90	320.88	0.56	46.46	0.45	0.34	0.07
4	AWG_1	4.32	0.00	0.23	8.42E-06	0.00	0.00	1.77
5	AWG_1	5.04	0.00	0.23	8.42E-06	0.00	0.00	1.77

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 101R
Date:	5/14/2024 1:57:34 PM

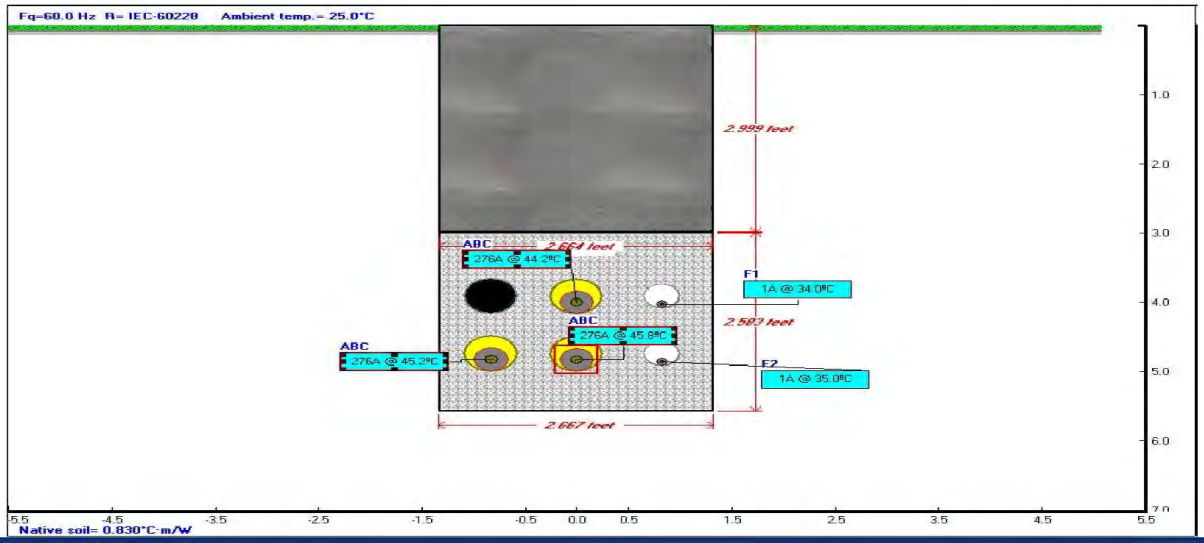
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	7.05E-06	4.29	2.67	2.58	0.50
Backfill	0.00	1.50	2.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 230KV XPLE	Single Core	Round Stranded	230.00	1013.48	4.15	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 230KV XPLE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 230KV XPLE	1	A	60.00	0.00	3.99	1.00	1 Conductor Bothends Triangular
2	SOUTHWIRE 2000KCMIL 230KV XPLE	1	B	60.00	-0.83	4.83	1.00	1 Conductor Bothends Triangular
3	SOUTHWIRE 2000KCMIL 230KV XPLE	1	C	60.00	0.00	4.83	1.00	1 Conductor Bothends Triangular
4	AWG_1	2	A	60.00	0.83	4.02	1.00	1 Conductor No Bonding

5	AWG_1	3	A	60.00	0.83	4.85	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]
Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	44.24	41.53	n/a	40.53	35.82	n/a
2	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	45.23	42.52	n/a	41.52	36.82	n/a
3	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	45.75	43.04	n/a	42.04	37.35	n/a
4	AWG_1	1.00	34.03	34.00	n/a	34.00	33.92	n/a
5	AWG_1	1.00	34.97	34.94	n/a	34.93	34.86	n/a

Electrical Resistances

Cable	Cable ID	R0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.26	0.01	0.04	0.04	n/a	n/a
2	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.26	0.01	0.04	0.04	n/a	n/a
3	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.26	0.01	0.04	0.04	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.04	n/a	0.91	n/a
5	AWG_1	0.98	0.00	0.00	1.04	n/a	0.91	n/a

Thermal Resistances

Cable	Cable ID	T1 [K.m/W]	T2 [K.m/W]	T3 [K.m/W]	T4' [K.m/W]	T4'' [K.m/W]	T4''' [K.m/W]	T4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.32	0.08	0.93	1.34
2	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.32	0.08	1.02	1.42
3	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.32	0.08	1.06	1.47
4	AWG_1	0.64	0.00	0.05	0.73	0.11	101.91	102.74
5	AWG_1	0.64	0.00	0.05	0.72	0.11	112.59	113.42

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ1	λ2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 230KV XPLE	0.56	2.27	0.70	0.00	3.53	1.25	0.00
2	SOUTHWIRE 2000KCMIL 230KV XPLE	0.56	2.27	0.71	0.00	3.54	1.25	0.00
3	SOUTHWIRE 2000KCMIL 230KV XPLE	0.56	2.27	0.71	0.00	3.54	1.25	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	Δθint [°C]	[A]	[μF/mile]	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 230KV XPLE	6.28	303.50	0.36	51.38	0.36	0.22	0.07
2	SOUTHWIRE 2000KCMIL 230KV XPLE	6.95	303.47	0.36	51.38	0.36	0.22	0.07
3	SOUTHWIRE 2000KCMIL 230KV XPLE	7.50	303.45	0.36	51.38	0.36	0.22	0.07
4	AWG_1	8.89	0.00	0.23	8.42E-06	0.00	0.00	1.80
5	AWG_1	9.82	0.00	0.23	8.42E-06	0.00	0.00	1.80

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 101R
Date:	5/14/2024 2:05:25 PM

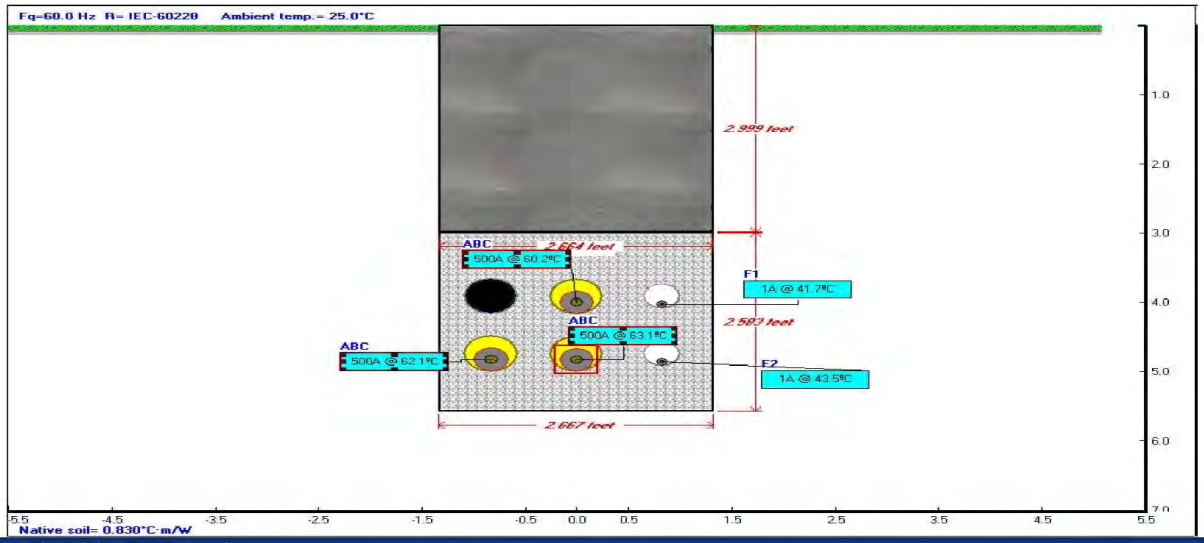
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	7.05E-06	4.29	2.67	2.58	0.50
Backfill	0.00	1.50	2.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 230KV XPLE	Single Core	Round Stranded	230.00	1013.48	4.15	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 230KV XPLE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 230KV XPLE	1	A	60.00	0.00	3.99	1.00	1 Conductor Bothends Triangular
2	SOUTHWIRE 2000KCMIL 230KV XPLE	1	B	60.00	-0.83	4.83	1.00	1 Conductor Bothends Triangular
3	SOUTHWIRE 2000KCMIL 230KV XPLE	1	C	60.00	0.00	4.83	1.00	1 Conductor Bothends Triangular
4	AWG_1	2	A	60.00	0.83	4.02	1.00	1 Conductor No Bonding

5	AWG_1	3	A	60.00	0.83	4.85	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]
Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 230KV XPLE	500.00	60.21	55.35	n/a	53.48	45.18	n/a
2	SOUTHWIRE 2000KCMIL 230KV XPLE	500.00	62.08	57.20	n/a	55.33	47.08	n/a
3	SOUTHWIRE 2000KCMIL 230KV XPLE	500.00	63.05	58.17	n/a	56.30	48.07	n/a
4	AWG_1	1.00	41.74	41.71	n/a	41.71	41.64	n/a
5	AWG_1	1.00	43.49	43.46	n/a	43.45	43.38	n/a

Electrical Resistances

Cable	Cable ID	R0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.24	0.01	0.04	0.04	n/a	n/a
2	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.23	0.01	0.04	0.04	n/a	n/a
3	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.23	0.01	0.04	0.04	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.07	n/a	0.94	n/a
5	AWG_1	0.98	0.00	0.00	1.08	n/a	0.94	n/a

Thermal Resistances

Cable	Cable ID	T1 [K.m/W]	T2 [K.m/W]	T3 [K.m/W]	T4' [K.m/W]	T4'' [K.m/W]	T4''' [K.m/W]	T4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.30	0.08	0.93	1.32
2	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.30	0.08	1.02	1.40
3	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.29	0.08	1.06	1.44
4	AWG_1	0.64	0.00	0.05	0.70	0.11	189.93	190.74
5	AWG_1	0.64	0.00	0.05	0.69	0.11	209.88	210.68

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ1	λ2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 230KV XPLE	1.91	2.27	2.41	0.00	6.60	1.26	0.00
2	SOUTHWIRE 2000KCMIL 230KV XPLE	1.92	2.27	2.43	0.00	6.62	1.26	0.00
3	SOUTHWIRE 2000KCMIL 230KV XPLE	1.93	2.27	2.44	0.00	6.63	1.27	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	Δθint [°C]	[A]	[μF/mile]	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 230KV XPLE	11.72	548.91	0.36	51.38	0.36	0.22	0.07
2	SOUTHWIRE 2000KCMIL 230KV XPLE	12.97	548.78	0.36	51.38	0.36	0.22	0.07
3	SOUTHWIRE 2000KCMIL 230KV XPLE	13.97	548.72	0.36	51.38	0.36	0.22	0.07
4	AWG_1	16.60	0.00	0.23	8.42E-06	0.00	0.00	1.85
5	AWG_1	18.34	0.00	0.23	8.42E-06	0.00	0.00	1.86

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 201R
Date:	5/14/2024 2:11:29 PM

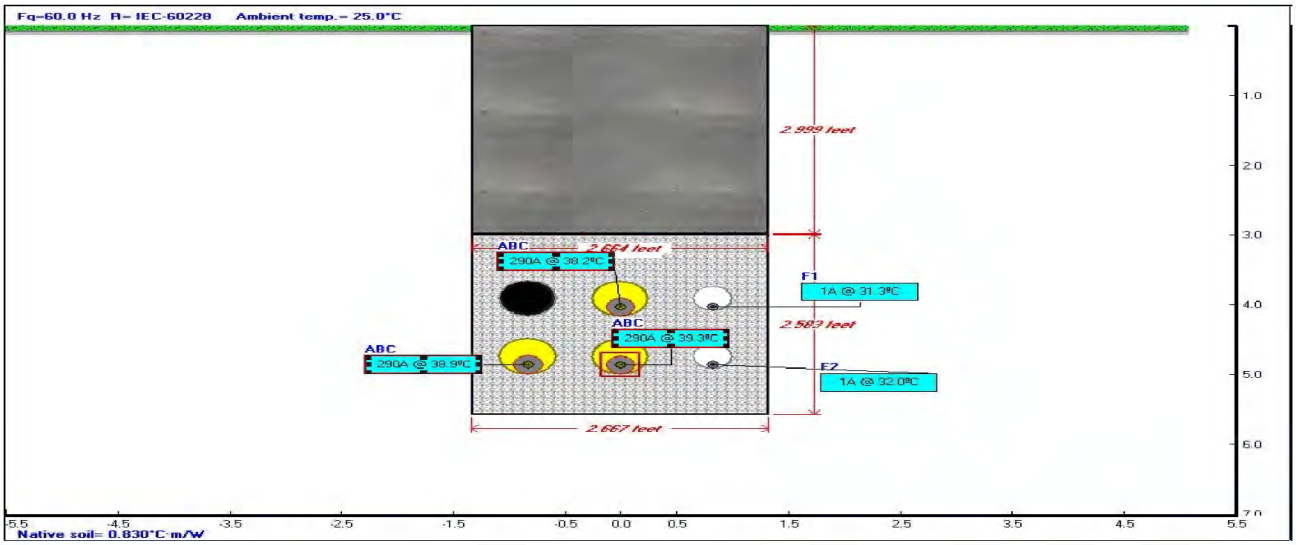
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity
NSTD DB1	7.05E-06	4.29	2.67	2.58	0.50
Backfill	0.00	1.50	2.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Tempera	Maximum Emergency Conductor
SOUTHWIRE 2000KCMIL 115KV XLPE	Single Core	Round Stranded	115.00	1013.48	3.32	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 115KV XLPE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequenc	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1	A	60.00	0.00	4.03	1.00	1 Conductor Bothends
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1	B	60.00	-0.83	4.86	1.00	1 Conductor Bothends
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1	C	60.00	0.00	4.86	1.00	1 Conductor Bothends
4	AWG_1	2	A	60.00	0.83	4.02	1.00	1 Conductor

5	AWG_1	3	A	60.00	0.83	4.85	1.00	1 Conductor

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]
Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperat
1	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	38.21	36.98	n/a	36.31	32.46	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	38.94	37.71	n/a	37.04	33.20	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	39.34	38.10	n/a	37.43	33.60	n/a
4	AWG_1	1.00	31.28	31.25	n/a	31.24	31.17	n/a
5	AWG_1	1.00	31.96	31.94	n/a	31.93	31.86	n/a

Electrical Resistances

Cable	Cable ID	R0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Tempera	DC Resistance of Sheath at Operating Tempera ture	DC Resistance of Concentric Wires at Operating	DC Resistance of Armor at Operating Tempera ture
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.01	0.04	0.05	n/a	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.01	0.04	0.05	n/a	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.27	0.01	0.04	0.05	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.03	n/a	0.90	n/a
5	AWG_1	0.98	0.00	0.00	1.03	n/a	0.90	n/a

Thermal Resistances

Cable	Cable ID	T1 [K.m/W]	T2 [K.m/W]	T3 [K.m/W]	T4' [K.m/W]	T4'' [K.m/W]	T4''' [K.m/W]	T4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.40	0.08	0.93	1.41
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.39	0.08	1.02	1.50
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.39	0.08	1.07	1.55
4	AWG_1	0.64	0.00	0.05	0.74	0.11	70.45	71.29
5	AWG_1	0.64	0.00	0.05	0.74	0.11	78.31	79.15

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ1	λ2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.95	0.00	2.44	1.55	0.00
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.95	0.00	2.44	1.56	0.00
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.61	0.88	0.95	0.00	2.45	1.56	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	Δθint [°C]	[A]	[μF/mile	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mil
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 115KV XLPE	4.32	317.86	0.56	41.28	0.36	0.25	0.07
2	SOUTHWIRE 2000KCMIL 115KV XLPE	4.83	317.82	0.56	41.28	0.36	0.25	0.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	5.24	317.81	0.56	41.28	0.36	0.25	0.07
4	AWG_1	6.13	0.00	0.23	8.42E-06	0.00	0.00	1.78
5	AWG_1	6.82	0.00	0.23	8.42E-06	0.00	0.00	1.78

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF Plan Case 201R
Date:	5/14/2024 2:09:07 PM

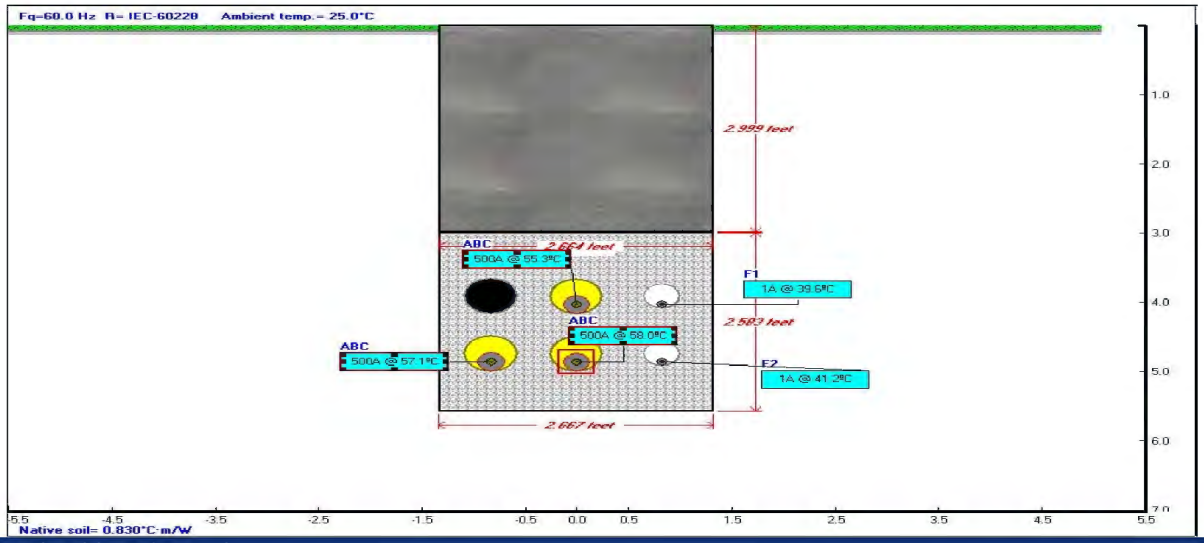
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	7.05E-06	4.29	2.67	2.58	0.50
Backfill	0.00	1.50	2.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 115KV XLPE	Single Core	Round Stranded	115.00	1013.48	3.32	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 115KV XLPE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1	A	60.00	0.00	4.03	1.00	1 Conductor Bothends Triangular
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1	B	60.00	-0.83	4.86	1.00	1 Conductor Bothends Triangular
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1	C	60.00	0.00	4.86	1.00	1 Conductor Bothends Triangular
4	AWG_1	2	A	60.00	0.83	4.02	1.00	1 Conductor No Bonding

5	AWG_1	3	A	60.00	0.83	4.85	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]
Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	500.00	55.30	52.58	n/a	51.00	42.52	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	500.00	57.06	54.32	n/a	52.73	44.30	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	500.00	57.96	55.23	n/a	53.63	45.22	n/a
4	AWG_1	1.00	39.57	39.54	n/a	39.54	39.47	n/a
5	AWG_1	1.00	41.19	41.16	n/a	41.15	41.08	n/a

Electrical Resistances

Cable	Cable ID	R0 [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.24	0.01	0.04	0.05	n/a	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.24	0.01	0.04	0.05	n/a	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.24	0.01	0.04	0.05	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.06	n/a	0.93	n/a
5	AWG_1	0.98	0.00	0.00	1.07	n/a	0.94	n/a

Thermal Resistances

Cable	Cable ID	T1 [K.m/W]	T2 [K.m/W]	T3 [K.m/W]	T4' [K.m/W]	T4'' [K.m/W]	T4''' [K.m/W]	T4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.37	0.08	0.93	1.38
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	1.02	1.47
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	1.07	1.51
4	AWG_1	0.64	0.00	0.05	0.71	0.11	165.17	165.98
5	AWG_1	0.64	0.00	0.05	0.70	0.11	183.63	184.44

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ1	λ2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1.89	0.88	2.97	0.00	5.74	1.57	0.00
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1.90	0.88	2.99	0.00	5.77	1.57	0.00
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1.90	0.88	3.00	0.00	5.78	1.58	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	Δθint [°C]	[A]	[μF/mile]	[Ω]	[Ω/mile]	[Ω/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 115KV XLPE	10.14	546.77	0.56	41.28	0.36	0.25	0.07
2	SOUTHWIRE 2000KCMIL 115KV XLPE	11.35	546.63	0.56	41.28	0.36	0.25	0.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	12.27	546.56	0.56	41.28	0.36	0.25	0.07
4	AWG_1	14.43	0.00	0.23	8.42E-06	0.00	0.00	1.84
5	AWG_1	16.04	0.00	0.23	8.42E-06	0.00	0.00	1.85

General Summary Report

CYMCAP Version	8.2 Revision 2
Study:	EMF Plan
Execution:	EMF PLan (8x) Parallel 201R 290A
Date:	6/18/2024 1:55:03 PM

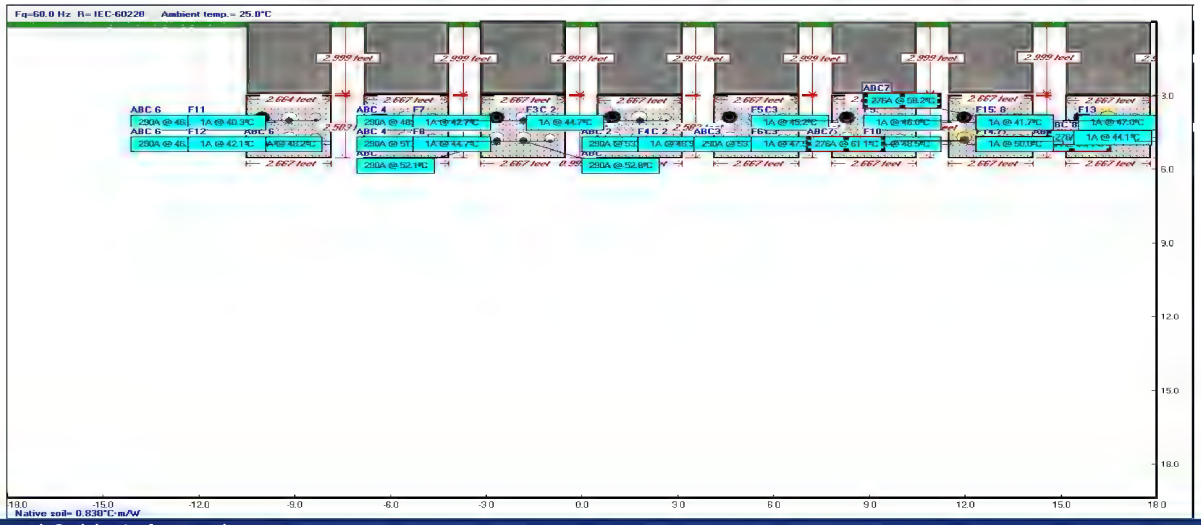
Simulation Data

Installation type:	Multiple Ductbanks
Steady State Option	Temperature
Ambient temperature [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No
Consider effect of soil dry out	No
Consider Electrical interaction between circuits	No
Induced current in metallic layers as a fraction of conductor current (applied to all single phase circuits) [A]	0.00

Installation Type:Multiple Ductbanks/Backfills

Ambient Soil Temperature at Installation Depth [°C]	25.00
Native Soil Thermal Resistivity [K.m/W]	0.83
Consider Non-Isothermal Earth Surface	No

Layer Name	X [ft]	Y [ft]	Width [ft]	Height [ft]	Thermal Resistivity [K.m/W]
NSTD DB1	-1.83	4.29	2.67	2.58	0.50
Backfill	-1.83	1.50	2.67	3.00	0.90
NSTD DB2	1.83	4.29	2.67	2.58	0.50
Backfill	1.83	1.50	2.67	3.00	0.90
NSTD DB3	5.50	4.29	2.67	2.58	0.50
NSTD DB4	-5.50	4.29	2.67	2.58	0.50
NSTD DB5	9.17	4.29	2.67	2.58	0.50
NSTD DB6	-9.17	4.29	2.67	2.58	0.50
Backfill	5.50	1.50	2.67	3.00	0.90
Backfill	-5.50	1.50	2.67	3.00	0.90
Backfill	9.17	1.50	2.67	3.00	0.90
Backfill	-9.17	1.50	2.67	3.00	0.90
NSTD DB7	12.83	4.29	2.67	2.58	1.00
NSTD DB8	16.50	4.29	2.67	2.58	0.90
Backfill	12.83	1.50	2.67	3.00	0.90
Backfill	16.50	1.50	2.67	3.00	0.90



General Cable Information

Cable ID	Number of Cores	Conductor Construction	Voltage [kV]	Conductor Area [mm²]	Cable Overall Diameter [in]	Maximum Steady-State Conductor Temperature [°C]	Maximum Emergency Conductor Temperature [°C]
SOUTHWIRE 2000KCMIL 115KV XLPE	Single Core	Round Stranded	115.00	1013.48	3.32	90.00	110.00
SOUTHWIRE 2000KCMIL 230KV XPLE	Single Core	Round Stranded	230.00	1013.48	4.15	90.00	110.00
AWG_1	Single Core	ROUND COMPRESSED	35.00	53.49	1.41	90.00	110.00

Detailed Cable Information

Cable ID	Conductor	Insulation	Sheath / Tape	Concentric Wires	Filler	Armour	Jacket / Armour Serving
SOUTHWIRE 2000KCMIL 115KV XLPE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
SOUTHWIRE 2000KCMIL 230KV XPLE	Copper	XLPE Filled	Copper	n/a	n/a	n/a	PVC
AWG_1	Aluminum	XLPE Unfilled	n/a	Copper	n/a	n/a	Polyethylene

General Input Data

Cable	Cable ID	Circuit No.	Phase	Fq [Hz]	X [ft]	Y [ft]	DLF [p.u.]	Sheath / Shield Bonding
Cable Index Number	Cable Equipment ID	Circuit No.	Cable Phase	Operating Frequency	X coordinate	Y coordinate	Daily Load Factor	Bonding Type
1	SOUTHWIRE 2000KCMIL 115KV XLPE	1	A	60.00	-1.83	4.03	1.00	1 Conductor Bothends Triangular
2	SOUTHWIRE 2000KCMIL 115KV XLPE	1	B	60.00	-2.67	4.86	1.00	1 Conductor Bothends Triangular
3	SOUTHWIRE 2000KCMIL 115KV XLPE	1	C	60.00	-1.83	4.86	1.00	1 Conductor Bothends Triangular
4	AWG_1	2	A	60.00	-1.00	4.02	1.00	1 Conductor No Bonding
5	AWG_1	3	A	60.00	-1.00	4.86	1.00	1 Conductor No Bonding
6	SOUTHWIRE 2000KCMIL 115KV XLPE	4	A	60.00	1.83	4.03	1.00	1 Conductor Bothends Triangular
7	SOUTHWIRE 2000KCMIL 115KV XLPE	4	B	60.00	1.00	4.86	1.00	1 Conductor Bothends Triangular
8	SOUTHWIRE 2000KCMIL 115KV XLPE	4	C	60.00	1.83	4.86	1.00	1 Conductor Bothends Triangular
9	AWG_1	5	A	60.00	2.67	4.02	1.00	1 Conductor No Bonding
10	AWG_1	6	A	60.00	2.67	4.85	1.00	1 Conductor No Bonding
11	SOUTHWIRE 2000KCMIL 115KV XLPE	7	A	60.00	5.50	4.03	1.00	1 Conductor Bothends Triangular
12	SOUTHWIRE 2000KCMIL 115KV XLPE	7	B	60.00	4.67	4.86	1.00	1 Conductor Bothends Triangular
13	SOUTHWIRE 2000KCMIL 115KV XLPE	7	C	60.00	5.50	4.86	1.00	1 Conductor Bothends Triangular
14	AWG_1	8	A	60.00	6.33	4.02	1.00	1 Conductor No Bonding
15	AWG_1	9	A	60.00	6.33	4.85	1.00	1 Conductor No Bonding
16	SOUTHWIRE 2000KCMIL 115KV XLPE	10	A	60.00	-5.50	4.03	1.00	1 Conductor Bothends Triangular
17	SOUTHWIRE 2000KCMIL 115KV XLPE	10	B	60.00	-6.33	4.86	1.00	1 Conductor Bothends Triangular
18	SOUTHWIRE 2000KCMIL 115KV XLPE	10	C	60.00	-5.50	4.86	1.00	1 Conductor Bothends Triangular
19	AWG_1	11	A	60.00	-4.67	4.02	1.00	1 Conductor No Bonding
20	AWG_1	12	A	60.00	-4.67	4.85	1.00	1 Conductor No Bonding
21	SOUTHWIRE 2000KCMIL 115KV XLPE	13	A	60.00	9.17	4.03	1.00	1 Conductor Bothends Triangular
22	SOUTHWIRE 2000KCMIL 115KV XLPE	13	B	60.00	8.33	4.86	1.00	1 Conductor Bothends Triangular
23	SOUTHWIRE 2000KCMIL 115KV XLPE	13	C	60.00	9.17	4.86	1.00	1 Conductor Bothends Triangular
24	AWG_1	14	A	60.00	10.00	4.02	1.00	1 Conductor No Bonding
25	AWG_1	15	A	60.00	10.00	4.85	1.00	1 Conductor No Bonding
26	SOUTHWIRE 2000KCMIL 115KV XLPE	16	A	60.00	-9.17	4.03	1.00	1 Conductor Bothends Triangular
27	SOUTHWIRE 2000KCMIL 115KV XLPE	16	B	60.00	-10.00	4.86	1.00	1 Conductor Bothends Triangular
28	SOUTHWIRE 2000KCMIL 115KV XLPE	16	C	60.00	-9.17	4.86	1.00	1 Conductor Bothends Triangular
29	AWG_1	17	A	60.00	-8.33	4.02	1.00	1 Conductor No Bonding
30	AWG_1	18	A	60.00	-8.33	4.85	1.00	1 Conductor No Bonding
31	SOUTHWIRE 2000KCMIL 230KV XPLE	19	A	60.00	12.83	3.99	1.00	1 Conductor Bothends Triangular
32	SOUTHWIRE 2000KCMIL 230KV XPLE	19	B	60.00	12.00	4.83	1.00	1 Conductor Bothends Triangular
33	SOUTHWIRE 2000KCMIL 230KV XPLE	19	C	60.00	12.83	4.83	1.00	1 Conductor Bothends Triangular
34	SOUTHWIRE 2000KCMIL 230KV XPLE	20	A	60.00	16.50	3.99	1.00	1 Conductor Bothends Triangular

35	SOUTHWIRE 2000KCMIL 230KV XPLE	20	B	60.00	15.67	4.83	1.00	1 Conductor Bothends Triangular
36	SOUTHWIRE 2000KCMIL 230KV XPLE	20	C	60.00	16.50	4.83	1.00	1 Conductor Bothends Triangular
37	AWG_1	21	A	60.00	13.67	4.02	1.00	1 Conductor No Bonding
38	AWG_1	22	A	60.00	13.67	4.85	1.00	1 Conductor No Bonding
39	AWG_1	23	A	60.00	17.33	4.02	1.00	1 Conductor No Bonding
40	AWG_1	24	A	60.00	17.33	4.85	1.00	1 Conductor No Bonding

Ampacity and Temperatures

Cable	Cable ID	I [A]	θc [°C]	θs [°C]	θa [°C]	θsurf [°C]	θduct [°C]	θair / θcasing [°C]
Cable Index Number	Cable Equipment ID	Steady State Ampacity	Conductor temperature	Sheath/Shield temperature	Armour temperature	Cable surface temperature	Duct surface temperature	Mean air temperature in the tunnel / Casing surface temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	50.22	48.97	n/a	48.28	44.58	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	52.13	50.88	n/a	50.19	46.52	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	52.80	51.54	n/a	50.85	47.19	n/a
4	AWG_1	1.00	43.94	43.91	n/a	43.91	43.84	n/a
5	AWG_1	1.00	46.11	46.08	n/a	46.07	46.00	n/a
6	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	51.01	49.76	n/a	49.07	45.38	n/a
7	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	53.13	51.88	n/a	51.19	47.53	n/a
8	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	53.69	52.43	n/a	51.74	48.09	n/a
9	AWG_1	1.00	44.65	44.62	n/a	44.62	44.55	n/a
10	AWG_1	1.00	46.91	46.88	n/a	46.88	46.81	n/a
11	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	51.55	50.30	n/a	49.61	45.93	n/a
12	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	53.77	52.52	n/a	51.83	48.17	n/a
13	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	54.29	53.04	n/a	52.35	48.70	n/a
14	AWG_1	1.00	45.18	45.16	n/a	45.15	45.08	n/a
15	AWG_1	1.00	47.50	47.48	n/a	47.47	47.41	n/a
16	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	48.81	47.57	n/a	46.88	43.17	n/a
17	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	50.35	49.10	n/a	48.41	44.72	n/a
18	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	51.23	49.98	n/a	49.29	45.61	n/a
19	AWG_1	1.00	42.71	42.68	n/a	42.67	42.60	n/a
20	AWG_1	1.00	44.73	44.70	n/a	44.69	44.62	n/a
21	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	52.22	50.97	n/a	50.28	46.61	n/a
22	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	54.44	53.18	n/a	52.49	48.84	n/a
23	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	55.08	53.82	n/a	53.12	49.48	n/a
24	AWG_1	1.00	46.00	45.97	n/a	45.97	45.90	n/a
25	AWG_1	1.00	48.49	48.46	n/a	48.46	48.39	n/a
26	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	46.00	44.76	n/a	44.07	40.33	n/a
27	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	46.73	45.48	n/a	44.80	41.06	n/a
28	SOUTHWIRE 2000KCMIL 115KV XLPE	290.00	48.17	46.93	n/a	46.24	42.52	n/a
29	AWG_1	1.00	40.31	40.29	n/a	40.28	40.21	n/a
30	AWG_1	1.00	42.10	42.08	n/a	42.07	42.00	n/a
31	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	58.15	55.42	n/a	54.40	49.95	n/a
32	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	61.12	58.37	n/a	57.36	52.95	n/a
33	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	62.17	59.42	n/a	58.40	54.01	n/a
34	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	54.30	51.57	n/a	50.56	46.04	n/a
35	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	58.36	55.63	n/a	54.61	50.16	n/a
36	SOUTHWIRE 2000KCMIL 230KV XPLE	276.00	57.75	55.02	n/a	54.00	49.54	n/a
37	AWG_1	1.00	46.95	46.93	n/a	46.92	46.85	n/a
38	AWG_1	1.00	50.03	50.00	n/a	50.00	49.93	n/a
39	AWG_1	1.00	41.70	41.68	n/a	41.67	41.60	n/a
40	AWG_1	1.00	44.14	44.11	n/a	44.10	44.03	n/a

Electrical Resistances

Cable	Cable ID	Rₒ [Ω/mile]	ys	yp	R [Ω/mile]	R's [Ω/mile]	R'w [Ω/mile]	R'a [Ω/mile]
Cable Index Number	Cable Equipment ID	DC Resistance of the conductor at 20°C	Skin Effect Factor	Proximity Effect Factor	AC Resistance of Conductor at Operating Temperature	DC Resistance of Sheath at Operating Temperature	DC Resistance of Concentric Wires at Operating Temperature	DC Resistance of Armor at Operating Temperature
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
4	AWG_1	0.98	0.00	0.00	1.08	n/a	0.94	n/a
5	AWG_1	0.98	0.00	0.00	1.09	n/a	0.95	n/a
6	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
7	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
8	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
9	AWG_1	0.98	0.00	0.00	1.08	n/a	0.95	n/a
10	AWG_1	0.98	0.00	0.00	1.09	n/a	0.95	n/a
11	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a

12	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
13	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.24	0.01	0.04	0.05	n/a	n/a
14	AWG_1	0.98	0.00	0.00	1.08	n/a	0.95	n/a
15	AWG_1	0.98	0.00	0.00	1.09	n/a	0.96	n/a
16	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
17	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
18	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
19	AWG_1	0.98	0.00	0.00	1.07	n/a	0.94	n/a
20	AWG_1	0.98	0.00	0.00	1.08	n/a	0.95	n/a
21	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
22	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.24	0.01	0.04	0.05	n/a	n/a
23	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.24	0.01	0.04	0.05	n/a	n/a
24	AWG_1	0.98	0.00	0.00	1.09	n/a	0.95	n/a
25	AWG_1	0.98	0.00	0.00	1.09	n/a	0.96	n/a
26	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.26	0.01	0.04	0.05	n/a	n/a
27	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.26	0.01	0.04	0.05	n/a	n/a
28	SOUTHWIRE 2000KCMIL 115KV XLPE	0.03	0.25	0.01	0.04	0.05	n/a	n/a
29	AWG_1	0.98	0.00	0.00	1.06	n/a	0.93	n/a
30	AWG_1	0.98	0.00	0.00	1.07	n/a	0.94	n/a
31	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.24	0.01	0.04	0.04	n/a	n/a
32	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.24	0.01	0.04	0.04	n/a	n/a
33	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.23	0.01	0.04	0.04	n/a	n/a
34	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.24	0.01	0.04	0.04	n/a	n/a
35	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.24	0.01	0.04	0.04	n/a	n/a
36	SOUTHWIRE 2000KCMIL 230KV XPLE	0.03	0.24	0.01	0.04	0.04	n/a	n/a
37	AWG_1	0.98	0.00	0.00	1.09	n/a	0.95	n/a
38	AWG_1	0.98	0.00	0.00	1.10	n/a	0.97	n/a
39	AWG_1	0.98	0.00	0.00	1.07	n/a	0.94	n/a
40	AWG_1	0.98	0.00	0.00	1.08	n/a	0.95	n/a

Thermal Resistances

Cable	Cable ID	T_1 [K.m/W]	T_2 [K.m/W]	T_3 [K.m/W]	T_4' [K.m/W]	T_4'' [K.m/W]	T_4''' [K.m/W]	T_4 [K.m/W]
Cable Index Number	Cable Equipment ID	Thermal resistance of insulation	Thermal resistance of bedding	Thermal resistance of outer covering	Thermal resistance inside the duct	Thermal resistance of the duct	Thermal resistance of the external medium	Total external thermal resistance
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.37	0.08	2.39	2.84
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.62	3.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.70	3.14
4	AWG_1	0.64	0.00	0.05	0.69	0.11	215.04	215.84
5	AWG_1	0.64	0.00	0.05	0.69	0.11	239.78	240.58
6	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.37	0.08	2.49	2.94
7	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.74	3.18
8	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.80	3.24
9	AWG_1	0.64	0.00	0.05	0.69	0.11	223.20	223.99
10	AWG_1	0.64	0.00	0.05	0.68	0.11	248.98	249.77
11	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.55	3.00
12	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.81	3.25
13	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.87	3.31
14	AWG_1	0.64	0.00	0.05	0.69	0.11	229.28	230.08
15	AWG_1	0.64	0.00	0.05	0.68	0.11	255.77	256.55
16	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.37	0.08	2.23	2.68
17	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.37	0.08	2.41	2.86
18	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.51	2.96
19	AWG_1	0.64	0.00	0.05	0.70	0.11	200.99	201.79
20	AWG_1	0.64	0.00	0.05	0.69	0.11	224.02	224.82
21	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.63	3.08
22	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.89	3.33
23	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.36	0.08	2.96	3.40
24	AWG_1	0.64	0.00	0.05	0.69	0.11	238.60	239.39
25	AWG_1	0.64	0.00	0.05	0.68	0.11	266.99	267.77
26	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.38	0.08	1.89	2.35
27	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.38	0.08	1.97	2.43
28	SOUTHWIRE 2000KCMIL 115KV XLPE	0.36	0.00	0.08	0.37	0.08	2.15	2.60
29	AWG_1	0.64	0.00	0.05	0.71	0.11	173.67	174.48
30	AWG_1	0.64	0.00	0.05	0.70	0.11	194.10	194.90
31	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.29	0.08	2.12	2.50
32	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.29	0.08	2.37	2.74
33	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.29	0.08	2.46	2.83
34	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.30	0.08	1.80	2.18
35	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.29	0.08	2.14	2.52
36	SOUTHWIRE 2000KCMIL 230KV XPLE	0.49	0.00	0.09	0.30	0.08	2.09	2.47
37	AWG_1	0.64	0.00	0.05	0.68	0.11	249.43	250.22
38	AWG_1	0.64	0.00	0.05	0.67	0.11	284.56	285.34
39	AWG_1	0.64	0.00	0.05	0.70	0.11	189.52	190.33
40	AWG_1	0.64	0.00	0.05	0.69	0.11	217.29	218.09

Losses

Cable	Cable ID	Wc [W/ft]	Wd [W/ft]	Ws [W/ft]	Wa [W/ft]	Wt [W/ft]	λ_1	λ_2
Cable Index Number	Cable Equipment ID	Conductor Losses	Dielectric Losses	Metallic Screen Losses	Armor/Pipe Losses	Total Losses	Screen Loss Factor	Armour Loss Factor + Pipe Loss Factor
1	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.99	0.00	2.50	1.57	0.00

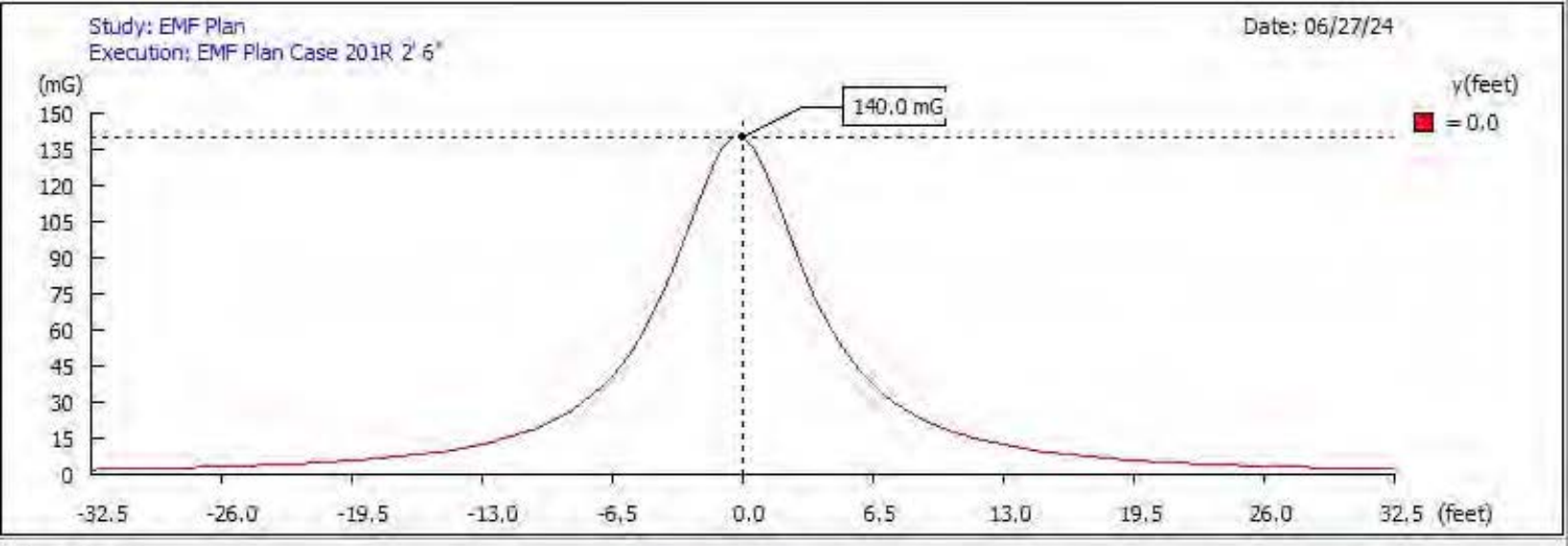
2	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.99	0.00	2.50	1.58	0.00
3	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.51	1.58	0.00
4	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
5	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
6	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.99	0.00	2.50	1.57	0.00
7	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.51	1.58	0.00
8	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.51	1.58	0.00
9	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
10	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
11	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.99	0.00	2.50	1.58	0.00
12	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.51	1.58	0.00
13	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.51	1.58	0.00
14	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
15	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
16	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.98	0.00	2.49	1.57	0.00
17	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.99	0.00	2.50	1.57	0.00
18	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.99	0.00	2.50	1.57	0.00
19	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
20	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
21	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.51	1.58	0.00
22	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	1.00	0.00	2.52	1.58	0.00
23	SOUTHWIRE 2000KCMIL 115KV XLPE	0.64	0.88	1.00	0.00	2.52	1.58	0.00
24	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
25	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
26	SOUTHWIRE 2000KCMIL 115KV XLPE	0.62	0.88	0.98	0.00	2.48	1.57	0.00
27	SOUTHWIRE 2000KCMIL 115KV XLPE	0.62	0.88	0.98	0.00	2.48	1.57	0.00
28	SOUTHWIRE 2000KCMIL 115KV XLPE	0.63	0.88	0.98	0.00	2.49	1.57	0.00
29	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
30	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
31	SOUTHWIRE 2000KCMIL 230KV XPLE	0.58	2.27	0.74	0.00	3.58	1.27	0.00
32	SOUTHWIRE 2000KCMIL 230KV XPLE	0.58	2.27	0.74	0.00	3.60	1.27	0.00
33	SOUTHWIRE 2000KCMIL 230KV XPLE	0.59	2.27	0.75	0.00	3.60	1.27	0.00
34	SOUTHWIRE 2000KCMIL 230KV XPLE	0.57	2.27	0.73	0.00	3.57	1.26	0.00
35	SOUTHWIRE 2000KCMIL 230KV XPLE	0.58	2.27	0.74	0.00	3.59	1.27	0.00
36	SOUTHWIRE 2000KCMIL 230KV XPLE	0.58	2.27	0.73	0.00	3.58	1.27	0.00
37	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
38	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
39	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00
40	AWG_1	0.00	0.03	0.00	0.00	0.03	0.00	0.00

Complementary Information

Cable	Cable ID	**Δθ**int [°C]	[A]	[µF/mile]	[**Ω**]	[**Ω**/mile]	[**Ω**/mile]	[V/A/mile]
Cable Index Number	Cable Equipment ID	Temperature rise due to surrounding heat sources	Induced current on Metallic Screen	Cable Capacitance	Surge Impedance	Reactance of Conductor	Reactance of Metallic Sheath	Voltage drop for Three Phase System
1	SOUTHWIRE 2000KCMIL 115KV XLPE	16.44	317.30	0.56	41.28	0.36	0.25	0.07
2	SOUTHWIRE 2000KCMIL 115KV XLPE	18.17	317.21	0.56	41.28	0.36	0.25	0.07
3	SOUTHWIRE 2000KCMIL 115KV XLPE	18.83	317.18	0.56	41.28	0.36	0.25	0.07
4	AWG_1	18.80	0.00	0.23	8.42E-06	0.00	0.00	1.87
5	AWG_1	20.97	0.00	0.23	8.42E-06	0.00	0.00	1.88
6	SOUTHWIRE 2000KCMIL 115KV XLPE	17.24	317.26	0.56	41.28	0.36	0.25	0.07
7	SOUTHWIRE 2000KCMIL 115KV XLPE	19.17	317.16	0.56	41.28	0.36	0.25	0.07
8	SOUTHWIRE 2000KCMIL 115KV XLPE	19.73	317.13	0.56	41.28	0.36	0.25	0.07
9	AWG_1	19.51	0.00	0.23	8.42E-06	0.00	0.00	1.87
10	AWG_1	21.77	0.00	0.23	8.42E-06	0.00	0.00	1.89
11	SOUTHWIRE 2000KCMIL 115KV XLPE	17.77	317.24	0.56	41.29	0.36	0.25	0.07
12	SOUTHWIRE 2000KCMIL 115KV XLPE	19.80	317.14	0.56	41.29	0.36	0.25	0.07
13	SOUTHWIRE 2000KCMIL 115KV XLPE	20.32	317.11	0.56	41.29	0.36	0.25	0.07
14	AWG_1	20.05	0.00	0.23	8.42E-06	0.00	0.00	1.87
15	AWG_1	22.37	0.00	0.23	8.42E-06	0.00	0.00	1.89
16	SOUTHWIRE 2000KCMIL 115KV XLPE	15.03	317.36	0.56	41.27	0.36	0.25	0.07
17	SOUTHWIRE 2000KCMIL 115KV XLPE	16.37	317.28	0.56	41.27	0.36	0.25	0.07
18	SOUTHWIRE 2000KCMIL 115KV XLPE	17.26	317.24	0.56	41.27	0.36	0.25	0.07
19	AWG_1	17.57	0.00	0.23	8.42E-06	0.00	0.00	1.86
20	AWG_1	19.58	0.00	0.23	8.42E-06	0.00	0.00	1.87
21	SOUTHWIRE 2000KCMIL 115KV XLPE	18.40	317.21	0.56	41.28	0.36	0.25	0.07
22	SOUTHWIRE 2000KCMIL 115KV XLPE	20.43	317.10	0.56	41.28	0.36	0.25	0.07
23	SOUTHWIRE 2000KCMIL 115KV XLPE	21.05	317.07	0.56	41.28	0.36	0.25	0.07
24	AWG_1	20.86	0.00	0.23	8.42E-06	0.00	0.00	1.88
25	AWG_1	23.35	0.00	0.23	8.42E-06	0.00	0.00	1.90
26	SOUTHWIRE 2000KCMIL 115KV XLPE	12.18	317.50	0.56	41.29	0.36	0.25	0.07
27	SOUTHWIRE 2000KCMIL 115KV XLPE	12.69	317.47	0.56	41.29	0.36	0.25	0.07
28	SOUTHWIRE 2000KCMIL 115KV XLPE	14.16	317.40	0.56	41.29	0.36	0.25	0.07
29	AWG_1	15.17	0.00	0.23	8.42E-06	0.00	0.00	1.84
30	AWG_1	16.96	0.00	0.23	8.42E-06	0.00	0.00	1.85
31	SOUTHWIRE 2000KCMIL 230KV XPLE	18.78	303.00	0.36	51.38	0.36	0.22	0.07
32	SOUTHWIRE 2000KCMIL 230KV XPLE	21.73	302.89	0.36	51.38	0.36	0.22	0.07
33	SOUTHWIRE 2000KCMIL 230KV XPLE	22.50	302.85	0.36	51.38	0.36	0.22	0.07
34	SOUTHWIRE 2000KCMIL 230KV XPLE	15.15	303.14	0.36	51.38	0.36	0.22	0.07
35	SOUTHWIRE 2000KCMIL 230KV XPLE	19.04	302.99	0.36	51.38	0.36	0.22	0.07
36	SOUTHWIRE 2000KCMIL 230KV XPLE	18.29	303.01	0.36	51.38	0.36	0.22	0.07

37	AWG_1	21.80	0.00	0.23	8.42E-06	0.00	0.00	1.89
38	AWG_1	24.88	0.00	0.23	8.42E-06	0.00	0.00	1.91
39	AWG_1	16.55	0.00	0.23	8.42E-06	0.00	0.00	1.85
40	AWG_1	18.98	0.00	0.23	8.42E-06	0.00	0.00	1.87

Attachment 6 – CYMCA EMF Plots and Raw Data



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	0.0	3.532	290.0	0.0
1	B	-0.833	4.365	290.0	-120.0
1	C	0.0	4.365	290.0	120.0
2	A	0.833	3.527	1.0	0.0
3	A	0.833	4.36	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet

Y Max: 1.0 feet

Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Save Default Ok Cancel

FIGURE 2: EMF EXPOSURE OF 201R DUCTBANK WITH A 2' 6" BURIAL DEPTH

MAGNETIC FLUX DENSITY [mG]
==========

Study : EMF Plan
Execution: EMF Plan Case 201R 2' 6"

Report created on: 9/23/2024 5:29:33 PM

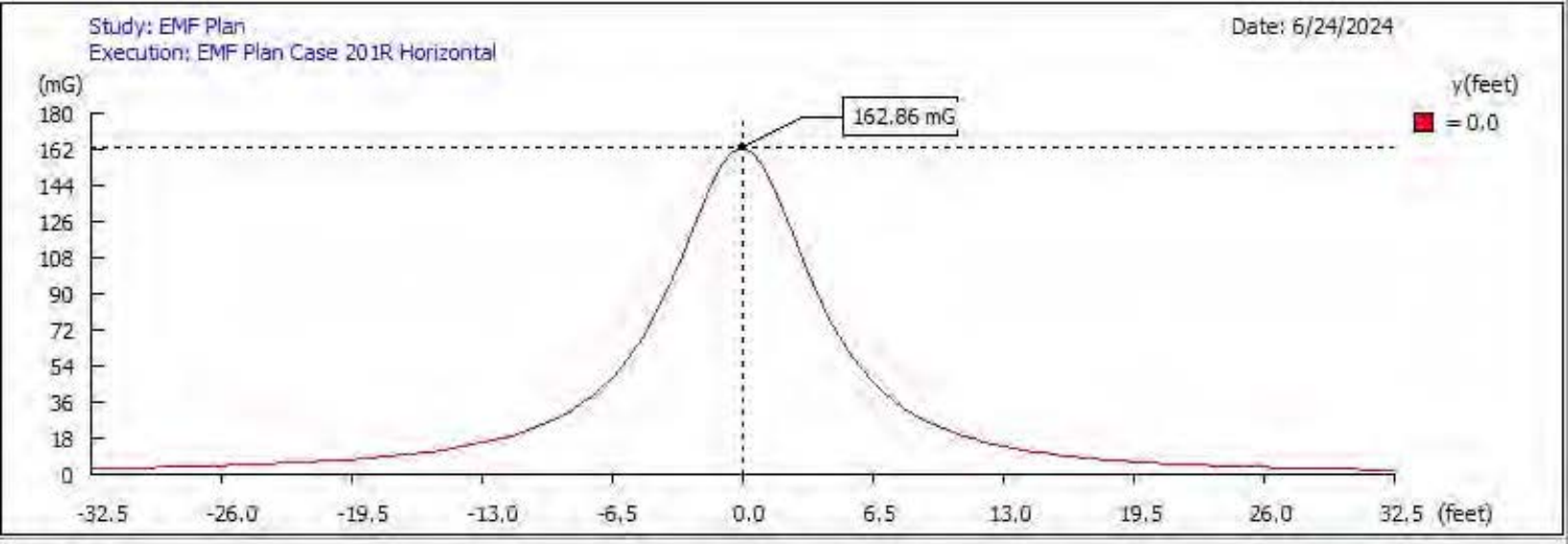
X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	2.0613	2.0528	2.0407	2.0252	2.0084	1.9869	1.9626
-32.0	2.1269	2.1176	2.1044	2.0876	2.0696	2.0465	2.0205
-31.5	2.1957	2.1855	2.1711	2.1529	2.1335	2.1087	2.0808
-31.0	2.2679	2.2566	2.241	2.2213	2.2003	2.1737	2.1438
-30.5	2.3436	2.3312	2.3142	2.2929	2.2703	2.2416	2.2096
-30.0	2.4231	2.4095	2.391	2.368	2.3435	2.3127	2.2783
-29.5	2.5067	2.4918	2.4717	2.4466	2.4203	2.387	2.3501
-29.0	2.5947	2.5783	2.5563	2.5292	2.5007	2.4649	2.4252
-28.5	2.6873	2.6693	2.6453	2.6159	2.5851	2.5465	2.5038
-28.0	2.7848	2.765	2.739	2.707	2.6737	2.632	2.586
-27.5	2.8877	2.866	2.8375	2.8028	2.7667	2.7217	2.6722
-27.0	2.9963	2.9725	2.9414	2.9037	2.8645	2.8159	2.7626
-26.5	3.1111	3.0849	3.0509	3.0099	2.9674	2.9149	2.8573
-26.0	3.2325	3.2036	3.1665	3.1218	3.0757	3.0189	2.9568
-25.5	3.361	3.3292	3.2886	3.2399	3.1899	3.1282	3.0612
-25.0	3.4972	3.4622	3.4177	3.3646	3.3102	3.2434	3.1709
-24.5	3.6417	3.6031	3.5544	3.4963	3.4371	3.3646	3.2862
-24.0	3.7951	3.7526	3.6991	3.6357	3.5712	3.4925	3.4075
-23.5	3.9583	3.9114	3.8526	3.7832	3.7129	3.6273	3.5352
-23.0	4.1321	4.0802	4.0156	3.9396	3.8628	3.7696	3.6697
-22.5	4.3173	4.2599	4.1887	4.1054	4.0215	3.9199	3.8114
-22.0	4.5151	4.4515	4.373	4.2815	4.1896	4.0789	3.9609
-21.5	4.7264	4.6558	4.5692	4.4686	4.3679	4.247	4.1186
-21.0	4.9526	4.8742	4.7784	4.6677	4.5572	4.425	4.2851
-20.5	5.1951	5.1079	5.0018	4.8797	4.7584	4.6136	4.461
-20.0	5.4554	5.3582	5.2406	5.1057	4.9723	4.8136	4.647
-19.5	5.7354	5.6269	5.4962	5.347	5.2	5.0258	4.8437
-19.0	6.0369	5.9155	5.7701	5.6048	5.4426	5.2512	5.0519
-18.5	6.3622	6.2262	6.0641	5.8806	5.7013	5.4907	5.2723
-18.0	6.7139	6.5611	6.38	6.176	5.9776	5.7455	5.5059
-17.5	7.0947	6.9228	6.72	6.4928	6.2728	6.0166	5.7534
-17.0	7.5079	7.314	7.0865	6.833	6.5886	6.3054	6.016
-16.5	7.9573	7.738	7.4822	7.1986	6.9267	6.6132	6.2945
-16.0	8.4469	8.1983	7.9099	7.5921	7.289	6.9415	6.5901
-15.5	8.9817	8.699	8.3732	8.0162	7.6777	7.2918	6.9039
-15.0	9.5672	9.2448	8.8756	8.4737	8.095	7.6658	7.237
-14.5	10.2097	9.841	9.4215	8.968	8.5433	8.0652	7.5908
-14.0	10.9167	10.4935	10.0155	9.5025	9.0255	8.492	7.9664
-13.5	11.6968	11.2093	10.663	10.0813	9.5443	8.9482	8.3651
-13.0	12.5599	11.9963	11.37	10.7086	10.103	9.4358	8.7883
-12.5	13.5177	12.8636	12.1433	11.3893	10.7048	9.9569	9.2372
-12.0	14.5839	13.8217	12.9903	12.1286	11.3533	10.5138	9.713
-11.5	15.7746	14.8825	13.9195	12.932	12.0522	11.1085	10.2169
-11.0	17.1088	16.0599	14.9405	13.8057	12.8053	11.7433	10.7498
-10.5	18.609	17.3697	16.0637	14.7561	13.6167	12.42	11.3126
-10.0	20.3018	18.8302	17.3008	15.7901	14.49	13.1404	11.9056
-9.5	22.219	20.4624	18.6644	16.9147	15.4291	13.906	12.5289
-9.0	24.3983	22.2901	20.1682	18.1369	16.4371	14.7174	13.1823
-8.5	26.8845	24.3401	21.8269	19.4635	17.5167	15.575	13.8645
-8.0	29.7311	26.6428	23.6553	20.9006	18.6696	16.4778	14.5739
-7.5	33.0012	29.2311	25.6683	22.4528	19.8959	17.4238	15.3076
-7.0	36.7687	32.1407	27.8795	24.123	21.1939	18.4094	16.0619
-6.5	41.1193	35.408	30.2999	25.9106	22.5593	19.4293	16.8317
-6.0	46.1502	39.0681	32.9359	27.8111	23.9844	20.4757	17.6104
-5.5	51.9666	43.1503	35.7862	29.8136	25.4575	21.5386	18.3902
-5.0	58.6759	47.6719	38.8382	31.9001	26.9622	22.605	19.1616
-4.5	66.374	52.6287	42.0641	34.0431	28.4765	23.6594	19.9137
-4.0	75.1184	57.9815	45.4146	36.2042	29.9727	24.683	20.6341
-3.5	84.8913	63.6413	48.8158	38.3334	31.4176	25.655	21.3094
-3.0	95.5395	69.452	52.1651	40.3696	32.7731	26.5526	21.9259

-2.5	106.7009	75.1767	55.3318	42.2418	33.9976	27.3521	22.4694
-2.0	117.7352	80.4962	58.1622	43.8736	35.0486	28.0302	22.9268
-1.5	127.6995	85.0277	60.4921	45.1889	35.8855	28.5655	23.2858
-1.0	135.4311	88.3717	62.1657	46.1197	36.4734	28.94	23.5368
-0.5	139.7868	90.1849	63.0587	46.6142	36.7864	29.1407	23.6726
0.0	140.0006	90.2598	63.1002	46.6437	36.8103	29.1605	23.6893
0.5	135.9942	88.5817	62.286	46.2067	36.5443	28.9989	23.5868
1.0	128.429	85.3354	60.6806	45.3292	36.0013	28.6623	23.3683
1.5	118.4502	80.857	58.4047	44.0615	35.2061	28.1631	23.0406
2.0	107.2945	75.5537	55.6139	42.4706	34.193	27.5187	22.613
2.5	95.9868	69.823	52.4749	40.6327	33.0023	26.7503	22.0974
3.0	85.2192	63.9987	49.1452	38.6252	31.6765	25.881	21.5068
3.5	75.3722	58.3276	45.7589	36.5198	30.2575	24.9344	20.8552
4.0	66.5967	52.9706	42.4211	34.379	28.7838	23.9334	20.1565
4.5	58.8999	48.0175	39.2075	32.2535	27.2891	22.8992	19.424
5.0	52.2112	43.5057	36.1674	30.1822	25.8014	21.8503	18.67
5.5	46.4253	39.4372	33.3288	28.1929	24.3428	20.8028	17.9056
6.0	41.4289	35.7931	30.7045	26.3042	22.9303	19.7697	17.1405
6.5	37.1119	32.5421	28.295	24.5268	21.5757	18.7613	16.3826
7.0	33.375	29.6479	26.0937	22.8654	20.2868	17.7854	15.6386
7.5	30.1313	27.0732	24.0893	21.3205	19.068	16.8476	14.9136
8.0	27.3066	24.7822	22.2681	19.8894	17.9213	15.9516	14.2117
8.5	24.8377	22.7415	20.6151	18.5674	16.8464	15.0995	13.5356
9.0	22.6719	20.921	19.1155	17.3486	15.842	14.2922	12.8872
9.5	20.7645	19.2938	17.7546	16.2262	14.9054	13.5298	12.2677
10.0	19.0784	17.8364	16.5191	15.1933	14.0335	12.8116	11.6777
10.5	17.5824	16.5281	15.3961	14.243	13.2227	12.1361	11.1171
11.0	16.2501	15.3507	14.3743	13.3685	12.4692	11.5018	10.5854
11.5	15.0594	14.2886	13.4433	12.5635	11.7692	10.9068	10.0821
12.0	13.9918	13.3283	12.5938	11.822	11.1191	10.349	9.6063
12.5	13.0314	12.4577	11.8173	11.1385	10.515	9.8265	9.1568
13.0	12.1647	11.6668	11.1065	10.5078	9.9536	9.337	8.7325
13.5	11.3802	10.9464	10.4546	9.9252	9.4316	8.8784	8.3322
14.0	10.6682	10.2889	9.8559	9.3865	8.9459	8.4489	7.9547
14.5	10.0202	9.6873	9.305	8.8878	8.4937	8.0464	7.5987
15.0	9.4288	9.1359	8.7973	8.4255	8.0724	7.6691	7.263
15.5	8.8878	8.6292	8.3286	7.9966	7.6794	7.3152	6.9465
16.0	8.3918	8.1629	7.8952	7.598	7.3126	6.9833	6.6479
16.5	7.936	7.7327	7.4938	7.2272	6.97	6.6716	6.3662
17.0	7.5162	7.3352	7.1215	6.8819	6.6495	6.3788	6.1003
17.5	7.1288	6.9673	6.7757	6.5598	6.3496	6.1035	5.8492
18.0	6.7706	6.6261	6.4539	6.259	6.0685	5.8445	5.6121
18.5	6.4387	6.3092	6.1541	5.9779	5.8049	5.6008	5.388
19.0	6.1307	6.0143	5.8744	5.7148	5.5575	5.3711	5.1761
19.5	5.8443	5.7396	5.6131	5.4682	5.3249	5.1546	4.9757
20.0	5.5776	5.4832	5.3687	5.2369	5.1062	4.9503	4.7859
20.5	5.3289	5.2436	5.1397	5.0197	4.9003	4.7574	4.6062
21.0	5.0965	5.0193	4.9249	4.8155	4.7063	4.5751	4.4358
21.5	4.8791	4.8092	4.7232	4.6233	4.5232	4.4027	4.2743
22.0	4.6755	4.612	4.5337	4.4423	4.3505	4.2395	4.121
22.5	4.4845	4.4267	4.3552	4.2715	4.1872	4.085	3.9755
23.0	4.305	4.2525	4.1871	4.1104	4.0328	3.9385	3.8373
23.5	4.1363	4.0883	4.0285	3.9581	3.8866	3.7996	3.7058
24.0	3.9774	3.9336	3.8788	3.814	3.7482	3.6677	3.5808
24.5	3.8276	3.7876	3.7373	3.6777	3.6169	3.5424	3.4618
25.0	3.6862	3.6496	3.6034	3.5485	3.4923	3.4233	3.3485
25.5	3.5526	3.5192	3.4767	3.426	3.374	3.3101	3.2405
26.0	3.4263	3.3956	3.3565	3.3097	3.2616	3.2022	3.1375
26.5	3.3067	3.2786	3.2425	3.1993	3.1547	3.0995	3.0393
27.0	3.1934	3.1676	3.1343	3.0943	3.0529	3.0016	2.9455
27.5	3.0859	3.0622	3.0315	2.9944	2.956	2.9083	2.8559
28.0	2.9839	2.962	2.9337	2.8993	2.8636	2.8192	2.7703
28.5	2.8869	2.8668	2.8406	2.8087	2.7755	2.7341	2.6884
29.0	2.7947	2.7762	2.7519	2.7223	2.6914	2.6528	2.6101
29.5	2.7069	2.6899	2.6674	2.6399	2.6111	2.575	2.5351
30.0	2.6233	2.6076	2.5868	2.5612	2.5343	2.5006	2.4632
30.5	2.5436	2.5291	2.5098	2.486	2.4609	2.4294	2.3944
31.0	2.4676	2.4542	2.4363	2.4141	2.3907	2.3612	2.3284
31.5	2.395	2.3826	2.366	2.3453	2.3235	2.2959	2.2651
32.0	2.3257	2.3142	2.2988	2.2795	2.2591	2.2332	2.2043
32.5	2.2594	2.2488	2.2345	2.2165	2.1974	2.1731	2.1459

Peak value found at:

X	Y=0.0	Y=1.0	Y=2.0	Y=3.0	Y=3.9	Y=4.9	Y=5.9

(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
0.0	140.0006	90.2598	63.1002	46.6437	36.8103	29.1605	23.6893



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-0.833	4.031	290.0	0.0
1	B	0.0	4.031	290.0	-120.0
1	C	0.833	4.031	290.0	120.0
2	A	0.0	4.859	1.0	0.0
3	A	0.833	4.859	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet
Y Max: 1.0 feet
Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Save Default Ok Cancel

FIGURE 4: EMF EXPOSURE OF 201R DUCTBANK WITH A HORIZONTAL CONFIGURATION

MAGNETIC FLUX DENSITY [mG]
==========

Study : EMF Plan
Execution: EMF Plan Case 201R Horizontal

Report created on: 9/23/2024 5:30:44 PM

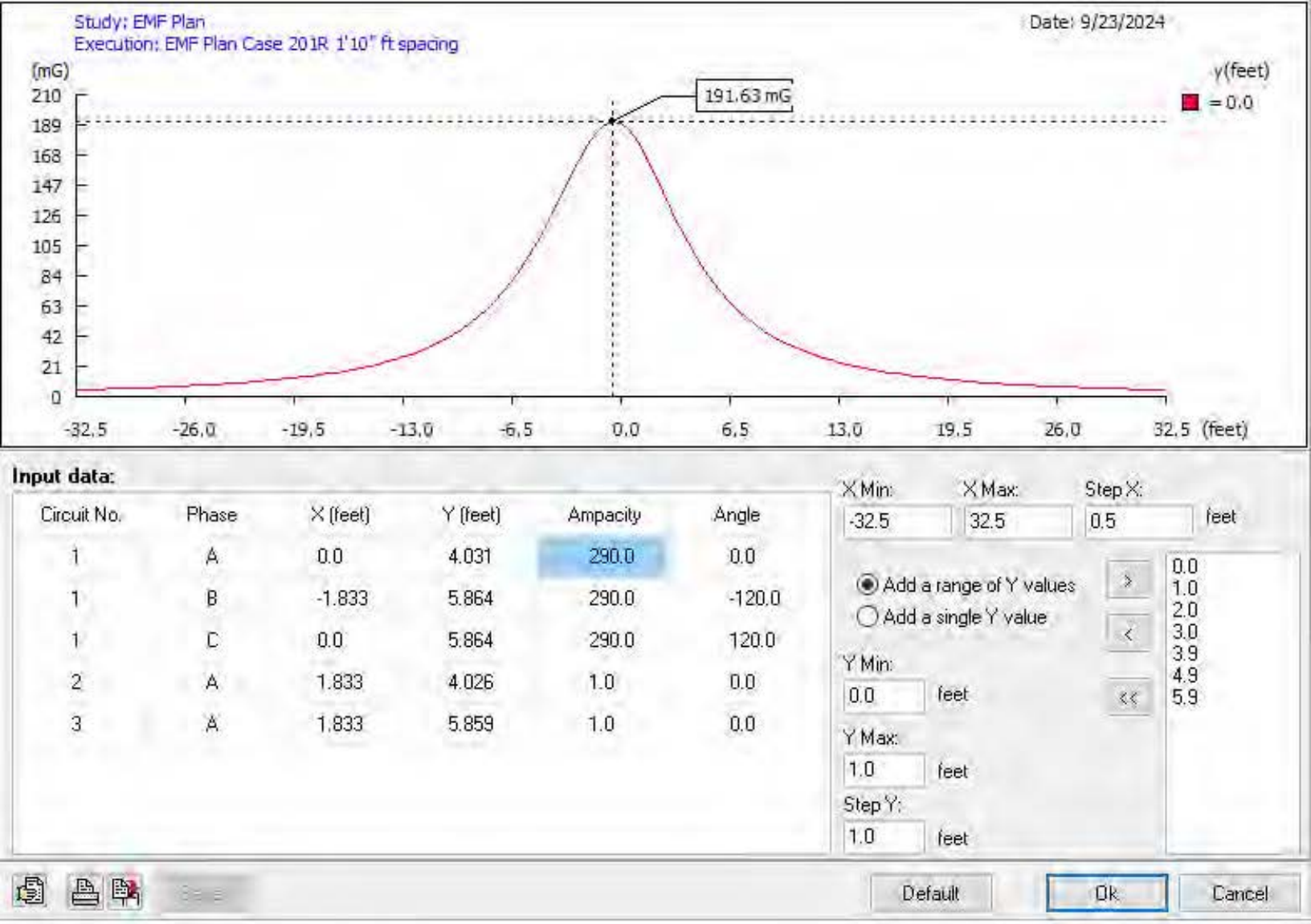
X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	2.911	2.8867	2.8577	2.8241	2.7903	2.7491	2.7045
-32.0	2.9957	2.9699	2.9391	2.9035	2.8677	2.8241	2.777
-31.5	3.0842	3.0568	3.0241	2.9864	2.9485	2.9023	2.8524
-31.0	3.1769	3.1478	3.113	3.073	3.0327	2.9839	2.931
-30.5	3.2739	3.243	3.206	3.1635	3.1208	3.0689	3.0129
-30.0	3.3757	3.3427	3.3034	3.2581	3.2128	3.1577	3.0984
-29.5	3.4824	3.4473	3.4054	3.3572	3.3089	3.2505	3.1875
-29.0	3.5945	3.557	3.5123	3.461	3.4096	3.3474	3.2805
-28.5	3.7123	3.6722	3.6245	3.5697	3.5149	3.4487	3.3776
-28.0	3.8361	3.7932	3.7422	3.6837	3.6253	3.5548	3.4791
-27.5	3.9664	3.9205	3.8659	3.8034	3.7411	3.6658	3.5852
-27.0	4.1037	4.0545	3.996	3.9291	3.8625	3.7822	3.6962
-26.5	4.2485	4.1956	4.1329	4.0612	3.9899	3.9041	3.8124
-26.0	4.4013	4.3445	4.2771	4.2002	4.1238	4.032	3.9341
-25.5	4.5627	4.5015	4.4291	4.3465	4.2646	4.1663	4.0616
-25.0	4.7334	4.6675	4.5895	4.5007	4.4127	4.3073	4.1953
-24.5	4.9142	4.843	4.7589	4.6633	4.5687	4.4556	4.3356
-24.0	5.1057	5.0288	4.938	4.8349	4.7331	4.6115	4.4828
-23.5	5.309	5.2257	5.1275	5.0162	4.9064	4.7757	4.6375
-23.0	5.5249	5.4346	5.3282	5.2079	5.0894	4.9485	4.8
-22.5	5.7546	5.6564	5.541	5.4107	5.2827	5.1308	4.9709
-22.0	5.9993	5.8924	5.767	5.6257	5.4871	5.323	5.1508
-21.5	6.2601	6.1436	6.0071	5.8536	5.7034	5.526	5.3402
-21.0	6.5387	6.4114	6.2626	6.0956	5.9325	5.7404	5.5398
-20.5	6.8367	6.6973	6.5347	6.3527	6.1754	5.9671	5.7501
-20.0	7.1558	7.0029	6.8249	6.6262	6.4332	6.2069	5.972
-19.5	7.4981	7.33	7.1349	6.9175	6.707	6.4608	6.2062
-19.0	7.8659	7.6807	7.4663	7.2281	6.998	6.7299	6.4535
-18.5	8.2618	8.0573	7.8211	7.5595	7.3077	7.0152	6.7148
-18.0	8.6886	8.4623	8.2015	7.9138	7.6376	7.318	6.991
-17.5	9.1497	8.8985	8.61	8.2927	7.9893	7.6396	7.2831
-17.0	9.6488	9.3692	9.0492	8.6986	8.3647	7.9812	7.5922
-16.5	10.19	9.878	9.5222	9.1339	8.7656	8.3446	7.9193
-16.0	10.7783	10.429	10.0323	9.6013	9.1943	8.7312	8.2658
-15.5	11.419	11.0268	10.5833	10.1037	9.6531	9.1428	8.6326
-15.0	12.1185	11.6766	11.1794	10.6445	10.1444	9.5812	9.0213
-14.5	12.8841	12.3846	11.8255	11.2273	10.6712	10.0484	9.433
-14.0	13.724	13.1575	12.5267	11.856	11.2362	10.5464	9.8692
-13.5	14.6481	14.0029	13.289	12.535	11.8428	11.0775	10.3312
-13.0	15.6675	14.93	14.1193	13.2692	12.4944	11.6438	10.8204
-12.5	16.7954	15.9487	15.0249	14.0639	13.1947	12.2476	11.3382
-12.0	18.0471	17.0708	16.0143	14.9248	13.9475	12.8914	11.8857
-11.5	19.4406	18.3097	17.097	15.8581	14.7569	13.5775	12.4643
-11.0	20.9972	19.6808	18.2834	16.8706	15.6271	14.308	13.0748
-10.5	22.7418	21.2018	19.5851	17.9693	16.5624	15.0852	13.7181
-10.0	24.7041	22.8929	21.015	19.1618	17.567	15.9107	14.3945
-9.5	26.9192	24.7773	22.5872	20.4558	18.6447	16.7861	15.104
-9.0	29.4288	26.8812	24.3168	21.859	19.7992	17.7122	15.8462
-8.5	32.2824	29.2346	26.2197	23.3787	21.0332	18.6889	16.6196
-8.0	35.5389	31.8706	28.3125	25.0216	22.3485	19.7153	17.4222
-7.5	39.2676	34.8258	30.6115	26.7928	23.7452	20.789	18.251
-7.0	43.5499	38.1392	33.1317	28.6953	25.2212	21.9059	19.1014
-6.5	48.4796	41.8512	35.8853	30.7287	26.7718	23.0601	19.9679
-6.0	54.163	46.0004	38.8795	32.888	28.3886	24.243	20.8433
-5.5	60.7154	50.6193	42.1133	35.1615	30.0588	25.4435	21.7188
-5.0	68.2542	55.7277	45.5739	37.5299	31.7644	26.6475	22.5837
-4.5	76.8837	61.3224	49.2316	39.9636	33.4817	27.8377	23.4262
-4.0	86.6665	67.3627	53.0344	42.4212	35.1805	28.9936	24.2325
-3.5	97.5837	73.7558	56.9041	44.8493	36.8247	30.0924	24.988
-3.0	109.4717	80.3384	60.7321	47.1818	38.3727	31.1089	25.6772

-2.5	121.95	86.8638	64.3798	49.3423	39.779	32.0169	26.2845
-2.0	134.3601	93.0014	67.6839	51.2474	40.9966	32.7904	26.7949
-1.5	145.7574	98.3554	70.4683	52.8134	41.9801	33.4051	27.1948
-1.0	155.0043	102.509	72.5621	53.9632	42.6891	33.8401	27.4728
-0.5	160.9807	105.0894	73.8218	54.6348	43.0923	34.0796	27.6202
0.0	162.8629	105.8397	74.1532	54.7891	43.1703	34.114	27.6322
0.5	160.361	104.6747	73.5265	54.4144	42.9176	33.9409	27.5075
1.0	153.81	101.7008	71.9823	53.5284	42.3435	33.5651	27.2489
1.5	144.0697	97.1925	69.6247	52.1762	41.4711	32.9986	26.863
2.0	132.2802	91.535	66.6045	50.4241	40.335	32.2594	26.3599
2.5	119.5829	85.1509	63.0973	48.3527	38.9778	31.3699	25.7521
3.0	106.9138	78.436	59.2811	46.0477	37.4467	30.3558	25.0542
3.5	94.9158	71.7169	55.3188	43.593	35.7894	29.244	24.282
4.0	83.9515	65.2332	51.3466	41.0646	34.0518	28.0609	23.4515
4.5	74.1684	59.1405	47.4699	38.5274	32.2749	26.8318	22.5783
5.0	65.5719	53.5242	43.7631	36.0331	30.4942	25.5795	21.6771
5.5	58.0871	48.4171	40.2737	33.6205	28.7384	24.3236	20.7613
6.0	51.6031	43.8174	37.028	31.3174	27.0301	23.0808	19.8427
6.5	45.9963	39.7003	34.0355	29.1409	25.3859	21.8644	18.9313
7.0	41.1472	36.0293	31.2941	27.1005	23.8172	20.6847	18.0354
7.5	36.9469	32.7628	28.7943	25.1994	22.331	19.5493	17.1615
8.0	33.2994	29.8584	26.5217	23.4364	20.931	18.4634	16.3149
8.5	30.1223	27.2752	24.4597	21.8073	19.6179	17.4301	15.4993
9.0	27.3453	24.9756	22.5907	20.3055	18.3908	16.4511	14.7172
9.5	24.9094	22.9253	20.8971	18.9236	17.247	15.5268	13.9702
10.0	22.7647	21.0939	19.3621	17.6533	16.183	14.6564	13.2591
10.5	20.8693	19.4547	17.9699	16.4863	15.1946	13.8387	12.584
11.0	19.1883	17.9842	16.7061	15.4142	14.2774	13.0716	11.9445
11.5	17.6921	16.6619	15.5574	14.4293	13.4267	12.353	11.3398
12.0	16.3557	15.4701	14.5119	13.5239	12.6378	11.6805	10.7689
12.5	15.1581	14.3933	13.559	12.6912	11.9063	11.0514	10.2305
13.0	14.0815	13.4181	12.689	11.9246	11.2279	10.4632	9.7231
13.5	13.1107	12.5328	11.8934	11.2182	10.5984	9.9132	9.2452
14.0	12.2327	11.7273	11.1647	10.5666	10.014	9.3991	8.7954
14.5	11.4364	10.9928	10.4961	9.9649	9.4712	8.9183	8.372
15.0	10.7123	10.3215	9.8817	9.4087	8.9665	8.4685	7.9736
15.5	10.0521	9.7066	9.316	8.8937	8.4969	8.0477	7.5986
16.0	9.4488	9.1424	8.7945	8.4165	8.0597	7.6537	7.2457
16.5	8.8961	8.6235	8.3128	7.9738	7.6522	7.2846	6.9134
17.0	8.3887	8.1455	7.8672	7.5624	7.272	6.9387	6.6005
17.5	7.9219	7.7043	7.4545	7.1797	6.917	6.6142	6.3057
18.0	7.4915	7.2963	7.0715	6.8233	6.5852	6.3097	6.0278
18.5	7.094	6.9184	6.7156	6.491	6.2748	6.0237	5.7658
19.0	6.7261	6.5678	6.3844	6.1807	5.984	5.7548	5.5186
19.5	6.3851	6.242	6.0758	5.8907	5.7115	5.502	5.2852
20.0	6.0684	5.9387	5.7879	5.6194	5.4557	5.2639	5.0648
20.5	5.7738	5.6561	5.5188	5.3652	5.2155	5.0396	4.8565
21.0	5.4993	5.3923	5.2671	5.1267	4.9897	4.8282	4.6596
21.5	5.2433	5.1457	5.0314	4.9029	4.7772	4.6287	4.4732
22.0	5.004	4.9149	4.8103	4.6925	4.5771	4.4403	4.2968
22.5	4.7801	4.6986	4.6028	4.4946	4.3884	4.2623	4.1297
23.0	4.5703	4.4956	4.4077	4.3082	4.2104	4.094	3.9712
23.5	4.3736	4.305	4.2241	4.1325	4.0422	3.9346	3.8209
24.0	4.1887	4.1256	4.0512	3.9667	3.8833	3.7837	3.6783
24.5	4.0149	3.9568	3.8882	3.8102	3.733	3.6407	3.5428
25.0	3.8512	3.7977	3.7343	3.6621	3.5907	3.5051	3.4141
25.5	3.697	3.6475	3.5889	3.5221	3.4558	3.3763	3.2917
26.0	3.5515	3.5057	3.4514	3.3895	3.328	3.254	3.1752
26.5	3.414	3.3716	3.3213	3.2638	3.2066	3.1378	3.0643
27.0	3.2841	3.2447	3.198	3.1446	3.0914	3.0273	2.9587
27.5	3.1611	3.1246	3.0812	3.0314	2.9819	2.9221	2.858
28.0	3.0446	3.0106	2.9702	2.9239	2.8777	2.8219	2.762
28.5	2.9342	2.9026	2.8649	2.8217	2.7786	2.7264	2.6704
29.0	2.8294	2.7999	2.7648	2.7245	2.6842	2.6354	2.5829
29.5	2.7298	2.7024	2.6696	2.6319	2.5942	2.5485	2.4993
30.0	2.6352	2.6096	2.579	2.5437	2.5084	2.4656	2.4194
30.5	2.5452	2.5213	2.4926	2.4596	2.4266	2.3864	2.343
31.0	2.4596	2.4371	2.4103	2.3794	2.3484	2.3107	2.27
31.5	2.378	2.357	2.3318	2.3028	2.2737	2.2383	2.2
32.0	2.3002	2.2805	2.2569	2.2297	2.2023	2.169	2.133
32.5	2.226	2.2075	2.1853	2.1598	2.134	2.1027	2.0687

Peak value found at:

X	Y=0.0	Y=1.0	Y=2.0	Y=3.0	Y=3.9	Y=4.9	Y=5.9

(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
0.0	162.8629	105.8397	74.1532	54.7891	43.1703	34.114	27.6322



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	0.0	4.031	290.0	0.0
1	B	-1.833	5.864	290.0	-120.0
1	C	0.0	5.864	290.0	120.0
2	A	1.833	4.026	1.0	0.0
3	A	1.833	5.859	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet
Y Max: 1.0 feet
Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Default Ok Cancel

FIGURE 6: EMF EXPOSURE OF 201R DUCTBANK WITH A 1' 10" SPACING

MAGNETIC FLUX DENSITY [mG]
==========

Study : EMF Plan
Execution: EMF Plan Case 201R 1'10" ft spacing

Report created on: 9/23/2024 5:35:05 PM

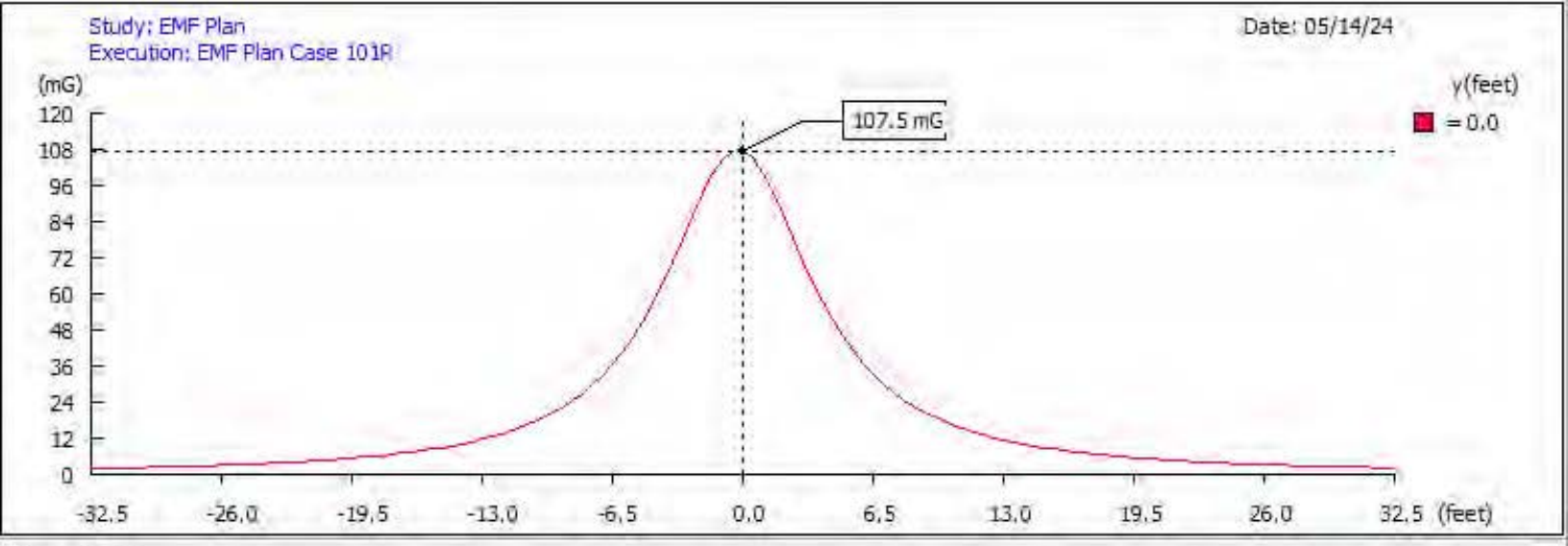
X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	4.6734	4.6315	4.5819	4.5252	4.4686	4.4001	4.3263
-32.0	4.8217	4.7768	4.7237	4.6632	4.6029	4.53	4.4516
-31.5	4.9769	4.9288	4.8721	4.8075	4.7432	4.6656	4.5823
-31.0	5.1397	5.0881	5.0274	4.9584	4.8897	4.807	4.7184
-30.5	5.3105	5.2551	5.1901	5.1162	5.0429	4.9547	4.8604
-30.0	5.4898	5.4303	5.3605	5.2815	5.2031	5.109	5.0085
-29.5	5.6781	5.6141	5.5393	5.4546	5.3708	5.2703	5.1631
-29.0	5.8762	5.8073	5.7269	5.636	5.5463	5.4389	5.3245
-28.5	6.0845	6.0103	5.9239	5.8264	5.7303	5.6154	5.4932
-28.0	6.304	6.2239	6.1309	6.0262	5.9231	5.8001	5.6696
-27.5	6.5353	6.4488	6.3486	6.236	6.1254	5.9936	5.854
-27.0	6.7793	6.6859	6.5778	6.4565	6.3377	6.1963	6.0469
-26.5	7.0369	6.9359	6.8191	6.6885	6.5607	6.409	6.2489
-26.0	7.3092	7.1997	7.0736	6.9327	6.7951	6.6321	6.4605
-25.5	7.5973	7.4786	7.342	7.1899	7.0416	6.8663	6.6822
-25.0	7.9023	7.7734	7.6255	7.461	7.3011	7.1124	6.9146
-24.5	8.2257	8.0856	7.9251	7.7471	7.5743	7.371	7.1584
-24.0	8.5689	8.4163	8.242	8.0491	7.8623	7.643	7.4142
-23.5	8.9335	8.7671	8.5775	8.3682	8.166	7.9292	7.6828
-23.0	9.3213	9.1396	8.933	8.7057	8.4866	8.2306	7.965
-22.5	9.7342	9.5355	9.3102	9.0629	8.8252	8.5482	8.2615
-22.0	10.1745	9.9567	9.7107	9.4413	9.1831	8.8829	8.5733
-21.5	10.6444	10.4055	10.1363	9.8425	9.5616	9.2361	8.9013
-21.0	11.1468	10.8842	10.5892	10.2682	9.9622	9.6088	9.2465
-20.5	11.6845	11.3954	11.0716	10.7203	10.3867	10.0024	9.6099
-20.0	12.2609	11.9419	11.5858	11.201	10.8366	10.4184	9.9926
-19.5	12.8795	12.5269	12.1348	11.7124	11.3139	10.8581	10.3958
-19.0	13.5447	13.1541	12.7213	12.2571	11.8205	11.3232	10.8208
-18.5	14.2608	13.8273	13.3488	12.8376	12.3588	11.8155	11.2689
-18.0	15.0332	14.5509	14.0209	13.4569	12.931	12.3367	11.7413
-17.5	15.8675	15.3298	14.7415	14.1183	13.5397	12.8887	12.2396
-17.0	16.7704	16.1694	15.515	14.8251	14.1876	13.4737	12.7652
-16.5	17.7492	17.0759	16.3463	15.5812	14.8776	14.0937	13.3197
-16.0	18.8123	18.0559	17.2407	16.3906	15.613	14.751	13.9046
-15.5	19.9692	19.1172	18.2042	17.2578	16.3969	15.448	14.5215
-15.0	21.2305	20.2681	19.2433	18.1876	17.233	16.187	15.172
-14.5	22.6086	21.5183	20.3651	19.1852	18.1251	16.9708	15.8578
-14.0	24.1172	22.8783	21.5774	20.256	19.0769	17.8016	16.5802
-13.5	25.7722	24.3602	22.8889	21.4061	20.0927	18.6821	17.3407
-13.0	27.5918	25.9771	24.3089	22.6418	21.1766	19.6148	18.1408
-12.5	29.5967	27.7442	25.8477	23.9696	22.3329	20.602	18.9814
-12.0	31.8105	29.6778	27.5163	25.3966	23.5657	21.646	19.8636
-11.5	34.2603	31.7966	29.3265	26.9297	24.8793	22.7487	20.7877
-11.0	36.9769	34.1207	31.2909	28.5761	26.2774	23.9114	21.754
-10.5	39.9956	36.6726	33.4225	30.3427	27.7634	25.1353	22.762
-10.0	43.3562	39.4765	35.7348	32.236	29.3399	26.4203	23.8106
-9.5	47.1039	42.5583	38.2412	34.2617	31.0086	27.7659	24.898
-9.0	51.289	45.9453	40.9545	36.4243	32.7699	29.1699	26.0211
-8.5	55.9674	49.6655	43.8863	38.7264	34.6222	30.629	27.1762
-8.0	61.1998	53.7464	47.0456	41.1679	36.5619	32.138	28.358
-7.5	67.0504	58.2134	50.4379	43.7454	38.5823	33.6897	29.5598
-7.0	73.5848	63.0872	54.0633	46.4508	40.6736	35.2745	30.7734
-6.5	80.8658	68.3807	57.9142	49.2704	42.8216	36.8802	31.989
-6.0	88.9468	74.0942	61.9729	52.1835	45.0077	38.4917	33.195
-5.5	97.8629	80.21	66.2087	55.1611	47.2081	40.0909	34.3782
-5.0	107.617	86.6848	70.5749	58.1649	49.3933	41.657	35.5238
-4.5	118.1629	93.4427	75.0059	61.1469	51.5288	43.1662	36.6157
-4.0	129.3801	100.3645	79.414	64.0481	53.5741	44.5923	37.6365
-3.5	141.0512	107.2833	83.6902	66.8005	55.4853	45.9076	38.5687
-3.0	152.832	113.9778	87.7044	69.3283	57.2153	47.0837	39.3947

-2.5	164.2289	120.1748	91.3097	71.5516	58.7161	48.0927	40.0976
-2.0	174.5923	125.5597	94.3514	73.3905	59.9421	48.9088	40.662
-1.5	183.1438	129.8013	96.6791	74.7717	60.8524	49.5095	41.075
-1.0	189.0621	132.5907	98.1626	75.6344	61.4143	49.8772	41.3266
-0.5	191.6345	133.6893	98.7082	75.9372	61.6062	50.0005	41.4104
0.0	190.4464	132.9769	98.2732	75.6625	61.4192	49.875	41.324
0.5	185.5299	130.4816	96.8739	74.8192	60.8587	49.5039	41.0693
1.0	177.3828	126.38	94.5843	73.4421	59.9438	48.8975	40.6522
1.5	166.8364	120.9655	91.5263	71.5885	58.7055	48.0726	40.0826
2.0	154.8389	114.5954	87.8542	69.3318	57.1845	47.0518	39.3733
2.5	142.2606	107.6343	83.7349	66.7552	55.4276	45.8611	38.5398
3.0	129.7806	100.411	79.3319	63.944	53.4848	44.5293	37.5992
3.5	117.8603	93.1925	74.7921	60.9802	51.4056	43.0858	36.5697
4.0	106.7701	86.1774	70.2383	57.9374	49.2369	41.5595	35.4694
4.5	96.636	79.4995	65.767	54.8789	47.021	39.9774	34.316
5.0	87.4865	73.2392	61.4492	51.8561	44.7945	38.3643	33.126
5.5	79.2893	67.4356	57.3328	48.9088	42.5879	36.7418	31.9147
6.0	71.9811	62.0994	53.448	46.0669	40.4258	35.1285	30.6957
6.5	65.4815	57.2204	49.8095	43.3503	38.3268	33.5395	29.4806
7.0	59.7064	52.7767	46.4214	40.7717	36.3047	31.9871	28.2793
7.5	54.5743	48.7394	43.2802	38.3377	34.3689	30.4807	27.1
8.0	50.0091	45.0762	40.3768	36.0501	32.5252	29.0271	25.9492
8.5	45.9421	41.7544	37.6993	33.9076	30.7765	27.6312	24.832
9.0	42.3119	38.7419	35.2334	31.906	29.1234	26.2959	23.752
9.5	39.0645	36.0085	32.9645	30.0396	27.5648	25.0229	22.712
10.0	36.1529	33.526	30.8773	28.3017	26.0985	23.8124	21.7135
10.5	33.5359	31.2689	28.9574	26.6848	24.721	22.6639	20.7575
11.0	31.178	29.2138	27.1907	25.1813	23.4286	21.5761	19.8441
11.5	29.0481	27.3399	25.5641	23.7836	22.2171	20.5473	18.9731
12.0	27.1195	25.6285	24.0652	22.4843	21.0818	19.5753	18.1437
12.5	25.369	24.0629	22.6828	21.276	20.0185	18.6577	17.3549
13.0	23.7763	22.6284	21.4066	20.152	19.0226	17.7919	16.6055
13.5	22.3239	21.3116	20.2272	19.1058	18.0898	16.9754	15.894
14.0	20.9963	20.101	19.1358	18.1315	17.2159	16.2055	15.2189
14.5	19.7803	18.986	18.1248	17.2234	16.3969	15.4796	14.5786
15.0	18.6641	17.9574	17.1871	16.3764	15.629	14.7952	13.9715
15.5	17.6373	17.0068	16.3163	15.5856	14.9087	14.1496	13.3959
16.0	16.6911	16.1272	15.5066	14.8468	14.2327	13.5408	12.8503
16.5	15.8175	15.3117	14.7528	14.1559	13.5978	12.9663	12.333
17.0	15.0093	14.5547	14.0502	13.5092	13.0012	12.4239	11.8425
17.5	14.2604	13.8508	13.3945	12.9032	12.4402	11.9118	11.3774
18.0	13.5653	13.1954	12.7819	12.335	11.9122	11.4279	10.9362
18.5	12.9189	12.5842	12.2088	11.8015	11.4149	10.9706	10.5176
19.0	12.3171	12.0136	11.6721	11.3003	10.9463	10.538	10.1203
19.5	11.7558	11.4801	11.1688	10.829	10.5043	10.1286	9.743
20.0	11.2316	10.9806	10.6965	10.3853	10.0871	9.741	9.3847
20.5	10.7412	10.5124	10.2526	9.9672	9.693	9.3738	9.0441
21.0	10.282	10.073	9.835	9.5729	9.3204	9.0257	8.7204
21.5	9.8514	9.6601	9.4419	9.2008	8.968	8.6955	8.4125
22.0	9.447	9.2718	9.0712	8.8492	8.6343	8.3821	8.1194
22.5	9.0669	8.906	8.7215	8.5168	8.3181	8.0845	7.8404
23.0	8.7091	8.5612	8.3913	8.2022	8.0183	7.8016	7.5747
23.5	8.372	8.2359	8.0791	7.9043	7.7339	7.5326	7.3214
24.0	8.0539	7.9285	7.7837	7.6219	7.4638	7.2767	7.08
24.5	7.7536	7.6378	7.5039	7.3539	7.2072	7.0331	6.8496
25.0	7.4697	7.3627	7.2387	7.0995	6.9631	6.801	6.6297
25.5	7.2011	7.1021	6.9871	6.8579	6.7309	6.5798	6.4198
26.0	6.9467	6.855	6.7483	6.6281	6.5098	6.3688	6.2192
26.5	6.7055	6.6205	6.5213	6.4094	6.2992	6.1674	6.0274
27.0	6.4767	6.3977	6.3055	6.2012	6.0983	5.9751	5.8441
27.5	6.2593	6.186	6.1001	6.0029	5.9067	5.7915	5.6686
28.0	6.0528	5.9845	5.9045	5.8137	5.7238	5.6159	5.5006
28.5	5.8563	5.7927	5.718	5.6332	5.5491	5.4479	5.3397
29.0	5.6692	5.6099	5.5402	5.4609	5.3821	5.2872	5.1855
29.5	5.491	5.4357	5.3705	5.2963	5.2224	5.1333	5.0377
30.0	5.321	5.2694	5.2084	5.1389	5.0696	4.9859	4.896
30.5	5.1589	5.1106	5.0536	4.9884	4.9233	4.8446	4.7599
31.0	5.004	4.9589	4.9055	4.8443	4.7831	4.7091	4.6293
31.5	4.8561	4.8139	4.7638	4.7063	4.6488	4.5791	4.5039
32.0	4.7147	4.6751	4.6281	4.5741	4.52	4.4543	4.3833
32.5	4.5794	4.5423	4.4981	4.4473	4.3964	4.3344	4.2675

Peak value found at:

X	Y=0.0	Y=1.0	Y=2.0	Y=3.0	Y=3.9	Y=4.9	Y=5.9

(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-0.5	191.6345	133.6893	98.7082	75.9372	61.6062	50.0005	41.4104



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	0.0	3.996	276.0	0.0
1	B	-0.833	4.83	276.0	-120.0
1	C	0.0	4.83	276.0	120.0
2	A	0.833	4.026	1.0	0.0
3	A	0.833	4.859	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values

Add a single Y value

Y Min: 0.0 feet

Y Max: 1.0 feet

Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Default Ok Cancel

FIGURE 9: CASE 101R 276A EMF PLOT

MAGNETIC FLUX DENSITY [mG]

Study : EMF Plan
Execution: EMF Plan Case 101R

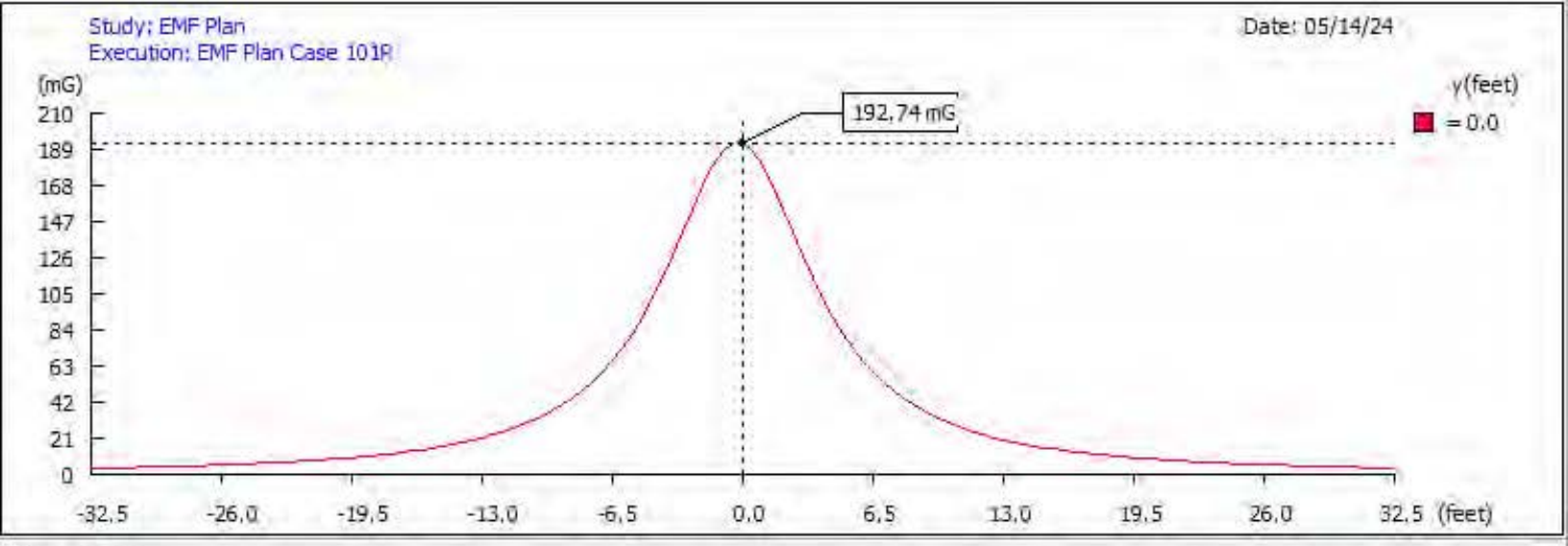
Report created on: 05/14/24 1:59:51 PM

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	1.9581	1.9489	1.9364	1.9206	1.9038	1.8825	1.8587
-32.0	2.0203	2.0102	1.9965	1.9794	1.9614	1.9385	1.913
-31.5	2.0853	2.0743	2.0594	2.041	2.0215	1.997	1.9697
-31.0	2.1536	2.1414	2.1253	2.1053	2.0844	2.058	2.0287
-30.5	2.2252	2.2119	2.1943	2.1727	2.1501	2.1218	2.0904
-30.0	2.3004	2.2858	2.2667	2.2433	2.2189	2.1885	2.1548
-29.5	2.3794	2.3634	2.3426	2.3173	2.291	2.2582	2.222
-29.0	2.4625	2.445	2.4223	2.3949	2.3665	2.3312	2.2923
-28.5	2.5499	2.5307	2.5061	2.4764	2.4457	2.4076	2.3658
-28.0	2.642	2.621	2.5942	2.5619	2.5287	2.4877	2.4428
-27.5	2.7392	2.7161	2.6868	2.6518	2.6159	2.5716	2.5233
-27.0	2.8416	2.8164	2.7844	2.7464	2.7075	2.6597	2.6076
-26.5	2.9499	2.9222	2.8873	2.846	2.8038	2.7521	2.696
-26.0	3.0643	3.0339	2.9958	2.9509	2.9052	2.8492	2.7887
-25.5	3.1854	3.152	3.1104	3.0614	3.0118	2.9513	2.886
-25.0	3.3137	3.2769	3.2314	3.1781	3.1242	3.0586	2.9881
-24.5	3.4498	3.4093	3.3595	3.3013	3.2427	3.1716	3.0953
-24.0	3.5943	3.5496	3.495	3.4315	3.3677	3.2906	3.208
-23.5	3.7478	3.6986	3.6387	3.5692	3.4997	3.4159	3.3265
-23.0	3.9111	3.8568	3.791	3.715	3.6392	3.5481	3.4512
-22.5	4.0852	4.0252	3.9528	3.8695	3.7868	3.6876	3.5825
-22.0	4.2708	4.2045	4.1247	4.0334	3.9429	3.8349	3.7208
-21.5	4.4691	4.3956	4.3077	4.2074	4.1084	3.9906	3.8665
-21.0	4.6812	4.5997	4.5026	4.3924	4.2838	4.1552	4.0202
-20.5	4.9083	4.8178	4.7105	4.5891	4.47	4.3293	4.1823
-20.0	5.152	5.0513	4.9324	4.7985	4.6677	4.5138	4.3534
-19.5	5.4138	5.3015	5.1697	5.0218	4.8779	4.7092	4.5342
-19.0	5.6955	5.5701	5.4236	5.2601	5.1015	4.9164	4.7252
-18.5	5.9991	5.8588	5.6958	5.5145	5.3397	5.1363	4.9271
-18.0	6.3268	6.1697	5.9878	5.7867	5.5935	5.3697	5.1406
-17.5	6.6814	6.5048	6.3016	6.078	5.8642	5.6177	5.3666
-17.0	7.0656	6.8668	6.6393	6.3902	6.1532	5.8813	5.6057
-16.5	7.4827	7.2584	7.0031	6.7251	6.4619	6.1616	5.8588
-16.0	7.9365	7.6828	7.3956	7.0848	6.7921	6.4599	6.1269
-15.5	8.4312	8.1435	7.8198	7.4715	7.1455	6.7775	6.4107
-15.0	8.9719	8.6445	8.2787	7.8877	7.5238	7.1157	6.7113
-14.5	9.564	9.1905	8.7761	8.3361	7.9293	7.476	7.0297
-14.0	10.2139	9.7866	9.3158	8.8196	8.3641	7.8598	7.3668
-13.5	10.9292	10.4386	9.9023	9.3414	8.8304	8.2687	7.7236
-13.0	11.7184	11.1532	10.5406	9.9052	9.3308	8.7043	8.1011
-12.5	12.5915	11.938	11.2361	10.5146	9.8679	9.1683	8.5002
-12.0	13.5601	12.8016	11.9949	11.1738	10.4445	9.6622	8.9217
-11.5	14.6376	13.7539	12.8239	11.8872	11.0632	10.1877	9.3665
-11.0	15.8398	14.8059	13.7303	12.6593	11.727	10.7461	9.835
-10.5	17.1851	15.9703	14.7223	13.495	12.4386	11.3388	10.3276
-10.0	18.695	17.2613	15.8087	14.3992	13.2006	11.9667	10.8445
-9.5	20.3946	18.6949	16.9987	15.3768	14.0154	12.6305	11.3854
-9.0	22.3134	20.2888	18.3022	16.4324	14.8848	13.3304	11.9496
-8.5	24.4855	22.0628	19.729	17.5702	15.8101	14.0659	12.5358
-8.0	26.9504	24.0379	21.2889	18.7935	16.7914	14.8356	13.1422
-7.5	29.7536	26.2365	22.9908	20.1042	17.8279	15.6371	13.7661
-7.0	32.9464	28.681	24.842	21.5023	18.9166	16.4669	14.404
-6.5	36.5851	31.3928	26.8465	22.985	20.0529	17.3198	15.0514
-6.0	40.7298	34.3898	29.0043	24.5459	21.229	18.189	15.7027
-5.5	45.44	37.6826	31.3084	26.1739	22.4345	19.0658	16.3513
-5.0	50.7676	41.2702	33.7428	27.852	23.6551	19.9395	16.9893
-4.5	56.746	45.1332	36.2799	29.5569	24.8729	20.7974	17.6081
-4.0	63.3692	49.2249	38.8766	31.2572	26.0659	21.6249	18.1979
-3.5	70.5692	53.4638	41.4737	32.9144	27.2085	22.4059	18.7482
-3.0	78.1811	57.725	43.9938	34.4826	28.272	23.123	19.2485
-2.5	85.9097	61.8359	46.3432	35.9108	29.2263	23.7587	19.6882
-2.0	93.3073	65.5801	48.4165	37.1454	30.0406	24.2959	20.0573
-1.5	99.7845	68.7135	50.1052	38.1341	30.6866	24.7191	20.3468
-1.0	104.6771	70.9938	51.3095	38.8315	31.1398	25.0154	20.5495
-0.5	107.3775	72.2207	51.9515	39.2032	31.3825	25.1754	20.6602
0.0	107.5008	72.2766	51.9873	39.2303	31.4049	25.1941	20.6761
0.5	105.0137	71.154	51.4147	38.9118	31.2064	25.0711	20.597
1.0	100.2533	68.9582	50.2731	38.2647	30.7957	24.8109	20.4251
1.5	93.819	65.8842	48.6378	37.3219	30.1899	24.4222	20.1655
2.0	86.4	62.1761	46.608	36.1284	29.4125	23.9176	19.825
2.5	78.6213	58.0842	44.293	34.7359	28.4918	23.3121	19.4123
3.0	70.9588	53.8325	41.8	33.1983	27.4582	22.6228	18.9371

3.5	63.723	49.5994	39.2244	31.5674	26.3422	21.867	18.41
4.0	57.0826	45.5138	36.6456	29.8894	25.1725	21.0621	17.8415
4.5	51.1039	41.659	34.1241	28.2038	23.9751	20.2244	17.242
5.0	45.7871	38.0813	31.7033	26.5421	22.7721	19.3685	16.6213
5.5	41.0943	34.7995	29.4112	24.9281	21.5817	18.5073	15.9881
6.0	36.9703	31.8144	27.2644	23.3792	20.4185	17.6517	15.3505
6.5	33.3523	29.1141	25.2695	21.9067	19.2933	16.8105	14.7151
7.0	30.1788	26.6801	23.4267	20.5171	18.2137	15.9906	14.0875
7.5	27.3923	24.4908	21.7316	19.2132	17.1849	15.1974	13.4726
8.0	24.9412	22.5233	20.1772	17.9954	16.2096	14.4346	12.8737
8.5	22.78	20.7551	18.7545	16.8617	15.289	13.7047	12.2938
9.0	20.8693	19.1653	17.4538	15.809	14.4231	13.0092	11.7348
9.5	19.1752	17.7342	16.2653	14.8331	13.6107	12.3486	11.198
10.0	17.6686	16.4443	15.1793	13.9296	12.8501	11.723	10.6842
10.5	16.3246	15.2796	14.1867	13.0937	12.1389	11.1317	10.1939
11.0	15.122	14.2262	13.2787	12.3205	11.4748	10.5739	9.7269
11.5	14.0427	13.2715	12.4474	11.6053	10.855	10.0483	9.2829
12.0	13.0712	12.4046	11.6854	10.9437	10.2768	9.5536	8.8616
12.5	12.1943	11.6158	10.9863	10.3313	9.7375	9.0884	8.4621
13.0	11.4005	10.8966	10.3439	9.7641	9.2344	8.651	8.0838
13.5	10.6799	10.2396	9.7528	9.2383	8.765	8.2398	7.7256
14.0	10.0243	9.6381	9.2082	8.7507	8.3268	7.8535	7.3868
14.5	9.4262	9.0864	8.7057	8.2978	7.9176	7.4904	7.0664
15.0	8.8792	8.5794	8.2414	7.877	7.5353	7.149	6.7635
15.5	8.3779	8.1125	7.8117	7.4854	7.1777	6.8281	6.477
16.0	7.9174	7.682	7.4135	7.1207	6.8432	6.5262	6.2061
16.5	7.4936	7.2841	7.0439	6.7807	6.53	6.2421	5.95
17.0	7.1026	6.9157	6.7005	6.4634	6.2364	5.9747	5.7078
17.5	6.7414	6.5742	6.3809	6.1668	5.9611	5.7227	5.4785
18.0	6.4068	6.2571	6.083	5.8894	5.7026	5.4853	5.2616
18.5	6.0966	5.9621	5.8051	5.6297	5.4598	5.2613	5.0562
19.0	5.8083	5.6873	5.5453	5.3862	5.2315	5.05	4.8617
19.5	5.54	5.4309	5.3024	5.1578	5.0166	4.8504	4.6773
20.0	5.2899	5.1914	5.0748	4.9431	4.8141	4.6618	4.5025
20.5	5.0564	4.9673	4.8614	4.7413	4.6233	4.4834	4.3367
21.0	4.8382	4.7573	4.661	4.5513	4.4432	4.3147	4.1794
21.5	4.6338	4.5604	4.4726	4.3724	4.2731	4.1549	4.03
22.0	4.4422	4.3755	4.2954	4.2035	4.1124	4.0034	3.888
22.5	4.2624	4.2016	4.1284	4.0442	3.9604	3.8598	3.7531
23.0	4.0933	4.0379	3.9709	3.8936	3.8164	3.7236	3.6248
23.5	3.9342	3.8837	3.8222	3.7512	3.68	3.5942	3.5026
24.0	3.7844	3.7381	3.6818	3.6164	3.5507	3.4713	3.3863
24.5	3.643	3.6007	3.5489	3.4886	3.428	3.3544	3.2755
25.0	3.5095	3.4708	3.4231	3.3675	3.3114	3.2432	3.1699
25.5	3.3833	3.3478	3.304	3.2526	3.2007	3.1374	3.0691
26.0	3.264	3.2313	3.1909	3.1435	3.0953	3.0365	2.973
26.5	3.1509	3.1209	3.0836	3.0397	2.9951	2.9404	2.8812
27.0	3.0437	3.0161	2.9817	2.941	2.8996	2.8487	2.7934
27.5	2.942	2.9166	2.8848	2.8471	2.8085	2.7612	2.7096
28.0	2.8454	2.822	2.7926	2.7576	2.7217	2.6776	2.6294
28.5	2.7536	2.732	2.7048	2.6723	2.6389	2.5977	2.5527
29.0	2.6662	2.6463	2.6211	2.5909	2.5598	2.5213	2.4792
29.5	2.583	2.5647	2.5413	2.5132	2.4842	2.4483	2.4088
30.0	2.5038	2.4868	2.4651	2.439	2.4119	2.3783	2.3414
30.5	2.4282	2.4125	2.3924	2.368	2.3428	2.3114	2.2767
31.0	2.3561	2.3416	2.3229	2.3002	2.2766	2.2472	2.2147
31.5	2.2872	2.2738	2.2564	2.2352	2.2132	2.1856	2.1551
32.0	2.2214	2.209	2.1928	2.1731	2.1524	2.1266	2.0979
32.5	2.1585	2.147	2.1319	2.1135	2.0942	2.0699	2.043

Peak value found at:

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
0.0	107.5008	72.2766	51.9873	39.2303	31.4049	25.1941	20.6761



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	0.0	3.996	500.0	0.0
1	B	-0.833	4.83	500.0	-120.0
1	C	0.0	4.83	500.0	120.0
2	A	0.833	4.026	1.0	0.0
3	A	0.833	4.859	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet
Y Max: 1.0 feet
Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Default Ok Cancel

FIGURE 10: CASE 101R 500A EMF PLOT

MAGNETIC FLUX DENSITY [mG]

Study : EMF Plan
Execution: EMF Plan Case 101R

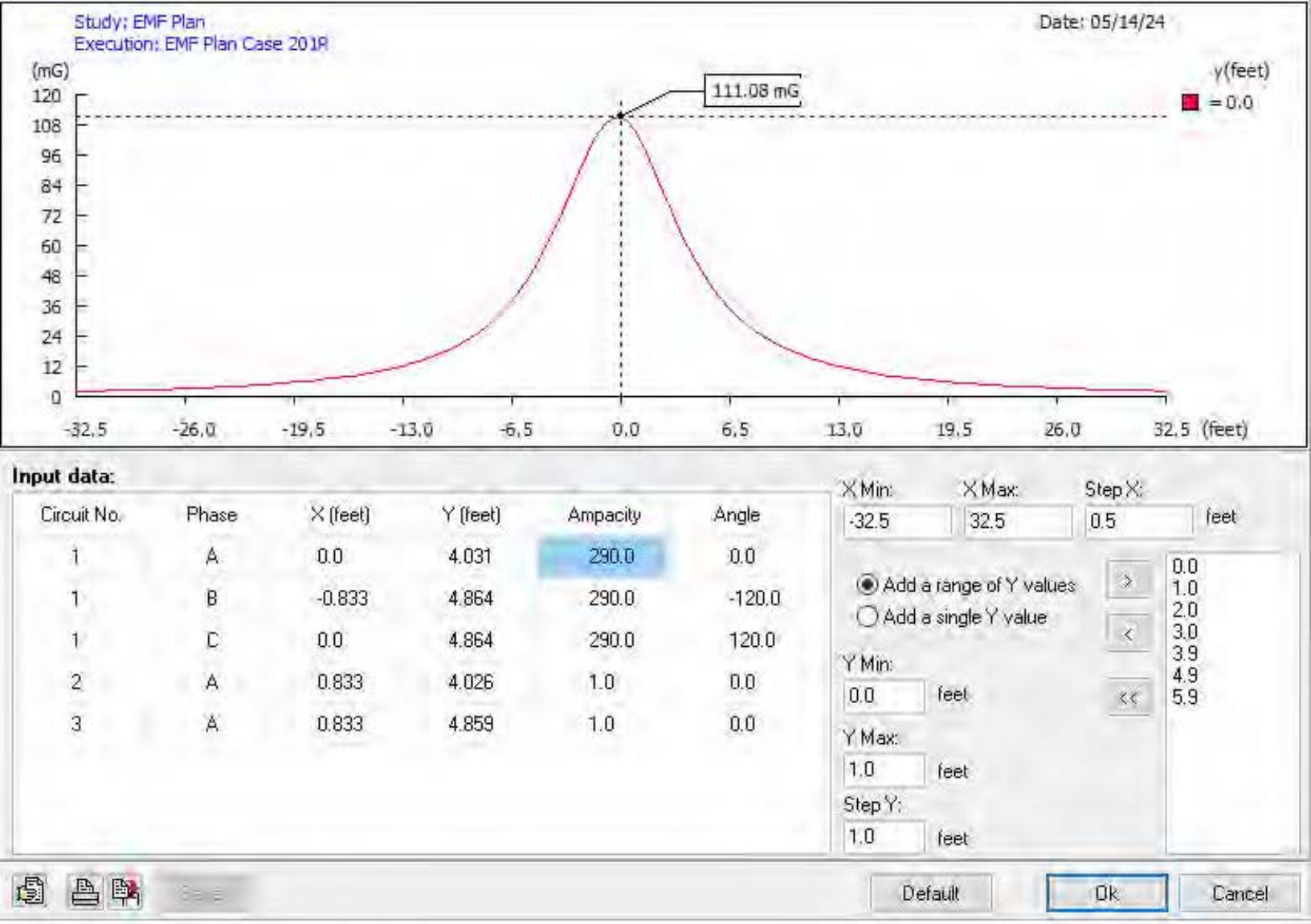
Report created on: 05/14/24 2:06:59 PM

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	3.5814	3.5567	3.5259	3.4894	3.452	3.4059	3.3554
-32.0	3.6947	3.6681	3.635	3.596	3.5561	3.5069	3.4531
-31.5	3.8133	3.7847	3.7492	3.7074	3.6648	3.6123	3.5551
-31.0	3.9377	3.9069	3.8688	3.824	3.7784	3.7224	3.6613
-30.5	4.0682	4.0349	3.994	3.946	3.8972	3.8374	3.7722
-30.0	4.2051	4.1693	4.1253	4.0738	4.0215	3.9575	3.888
-29.5	4.349	4.3103	4.2629	4.2076	4.1516	4.0832	4.0089
-29.0	4.5003	4.4584	4.4075	4.348	4.2879	4.2146	4.1353
-28.5	4.6594	4.6142	4.5592	4.4953	4.4308	4.3522	4.2674
-28.0	4.827	4.7781	4.7188	4.65	4.5806	4.4964	4.4056
-27.5	5.0037	4.9507	4.8867	4.8125	4.7379	4.6475	4.5502
-27.0	5.1901	5.1327	5.0634	4.9834	4.9031	4.806	4.7016
-26.5	5.3869	5.3246	5.2496	5.1632	5.0768	4.9723	4.8603
-26.0	5.5949	5.5272	5.446	5.3526	5.2594	5.1469	5.0266
-25.5	5.815	5.7414	5.6533	5.5522	5.4516	5.3304	5.2011
-25.0	6.0481	5.9679	5.8723	5.7628	5.654	5.5233	5.3842
-24.5	6.2952	6.2078	6.1038	5.9851	5.8674	5.7263	5.5765
-24.0	6.5575	6.4621	6.3489	6.22	6.0925	5.94	5.7785
-23.5	6.8362	6.7319	6.6085	6.4684	6.3301	6.1652	5.9909
-23.0	7.1326	7.0185	6.8838	6.7313	6.5811	6.4025	6.2142
-22.5	7.4484	7.3233	7.1761	7.0098	6.8465	6.6529	6.4493
-22.0	7.7851	7.6477	7.4866	7.3051	7.1274	6.9172	6.6969
-21.5	8.1447	7.9936	7.817	7.6186	7.4249	7.1964	6.9577
-21.0	8.5292	8.3628	8.1688	7.9517	7.7403	7.4916	7.2327
-20.5	8.9409	8.7573	8.5439	8.3059	8.0748	7.8039	7.5227
-20.0	9.3824	9.1794	8.9443	8.6829	8.43	8.1345	7.8287
-19.5	9.8567	9.6318	9.3722	9.0847	8.8075	8.4846	8.1519
-19.0	10.3668	10.1172	9.8302	9.5134	9.209	8.8558	8.4932
-18.5	10.9165	10.6388	10.3208	9.9711	9.6364	9.2495	8.8539
-18.0	11.5098	11.2002	10.8471	10.4604	10.0918	9.6674	9.2353
-17.5	12.1514	11.8054	11.4125	10.9841	10.5774	10.1112	9.6387
-17.0	12.8464	12.4588	12.0206	11.5451	11.0956	10.5828	10.0655
-16.5	13.6009	13.1656	12.6757	12.1468	11.6492	11.0843	10.5172
-16.0	14.4215	13.9312	13.3824	12.7928	12.241	11.6176	10.9953
-15.5	15.3159	14.7622	14.1457	13.4871	12.8741	12.1853	11.5014
-15.0	16.293	15.6657	14.9714	14.2341	13.5518	12.7895	12.0373
-14.5	17.3628	16.65	15.8659	15.0387	14.2778	13.433	12.6046
-14.0	18.5368	17.7243	16.8364	15.906	15.0559	14.1183	13.205
-13.5	19.8285	18.899	17.8906	16.8419	15.8904	14.8482	13.8402
-13.0	21.2534	20.1862	19.0376	17.8525	16.7855	15.6255	14.512
-12.5	22.8292	21.5994	20.287	18.9447	17.7459	16.453	15.222
-12.0	24.5769	23.1541	21.6498	20.1256	18.7764	17.3336	15.9716
-11.5	26.5206	24.8678	23.138	21.4031	19.8819	18.27	16.762
-11.0	28.6886	26.7605	24.7648	22.7853	21.0675	19.2648	17.5944
-10.5	31.1139	28.8547	26.5445	24.2808	22.3378	20.32	18.4692
-10.0	33.8352	31.1758	28.4928	25.8982	23.6976	21.4375	19.3866
-9.5	36.8976	33.7524	30.6263	27.6462	25.1509	22.6183	20.346
-9.0	40.3536	36.6164	32.9621	29.5328	26.701	23.8627	21.3462
-8.5	44.2647	39.8025	35.518	31.5654	28.3497	25.1695	22.3849
-8.0	48.7017	43.3485	38.3111	33.7496	30.0975	26.5363	23.4586
-7.5	53.7458	47.2942	41.357	36.0887	31.9423	27.9588	24.5624
-7.0	59.4887	51.6793	44.6683	38.5824	33.879	29.4303	25.6902
-6.5	66.0313	56.5418	48.2521	41.2253	35.8987	30.9416	26.8337
-6.0	73.4805	61.9127	52.1076	44.0057	37.9879	32.4805	27.983
-5.5	81.9421	67.8107	56.2219	46.9033	40.1272	34.0313	29.1263
-5.0	91.5082	74.2327	60.5656	49.8878	42.2914	35.575	30.2496
-4.5	102.2365	81.1427	65.0888	52.9168	44.4482	37.089	31.3375
-4.0	114.1144	88.4559	69.7139	55.9343	46.5581	38.547	32.3724
-3.5	127.0167	96.0252	74.3342	58.8711	48.5758	39.9204	33.3363
-3.0	140.6447	103.6254	78.8112	61.6456	50.4501	41.1787	34.2101
-2.5	154.4657	110.9465	82.9771	64.1666	52.1273	42.2905	34.9752
-2.0	167.6745	117.601	86.6439	66.3387	53.5532	43.2258	35.614
-1.5	179.2133	123.1526	89.6184	68.0696	54.6774	43.9574	36.111
-1.0	187.8931	127.1693	91.7235	69.2787	55.4571	44.4625	36.4534
-0.5	192.6299	129.2956	92.8216	69.9057	55.8612	44.7249	36.6322
0.0	192.7413	129.3247	92.8363	69.9179	55.8729	44.7361	36.6429
0.5	188.1768	127.2469	91.7653	69.3147	55.4919	44.496	36.4851
1.0	179.548	123.2542	89.681	68.1273	54.7343	44.0126	36.1634
1.5	167.9348	117.6981	86.7193	66.4152	53.6308	43.3021	35.6866
2.0	154.5743	111.0167	83.0582	64.2591	52.2241	42.3867	35.0673
2.5	140.5862	103.6585	78.8933	61.7518	50.5646	41.2937	34.3208
3.0	126.8214	96.023	74.4159	58.9894	48.7066	40.0533	33.4648

3.5	113.8332	88.4289	69.7966	56.0641	46.7043	38.6966	32.5177
4.0	101.9214	81.1054	65.176	53.0583	44.6089	37.2544	31.4986
4.5	91.2021	74.2002	60.662	50.0419	42.4664	35.7555	30.4258
5.0	81.6737	67.795	56.3313	47.0708	40.3162	34.226	29.3165
5.5	73.2671	61.9225	52.2335	44.1872	38.1903	32.6885	28.1863
6.0	65.8818	56.5832	48.3973	41.4217	36.1146	31.1623	27.0493
6.5	59.4051	51.7551	44.8342	38.7939	34.1079	29.663	25.9172
7.0	53.7257	47.4049	41.5443	36.3153	32.1838	28.2027	24.8001
7.5	48.7404	43.4932	38.5193	33.9909	30.3509	26.7908	23.7061
8.0	44.3563	39.9789	35.7462	31.8206	28.6144	25.4337	22.6414
8.5	40.4918	36.8217	33.209	29.8011	26.976	24.1357	21.6109
9.0	37.0761	33.9837	30.8902	27.9265	25.4355	22.8995	20.6181
9.5	34.0484	31.4298	28.772	26.1894	23.9908	21.7259	19.6653
10.0	31.3564	29.1284	26.8372	24.5816	22.6386	20.6148	18.7538
10.5	28.9556	27.0511	25.069	23.0945	21.3749	19.5652	17.8841
11.0	26.808	25.1726	23.4521	21.7194	20.1951	18.5754	17.0562
11.5	24.881	23.4707	21.9722	20.448	19.0944	17.643	16.2695
12.0	23.1469	21.9256	20.6163	19.272	18.0679	16.7658	15.5231
12.5	21.5819	20.5201	19.3723	18.1839	17.1107	15.941	14.8158
13.0	20.1656	19.2389	18.2296	17.1763	16.218	15.1658	14.146
13.5	18.8804	18.0688	17.1785	16.2427	15.3853	14.4375	13.5122
14.0	17.7111	16.9978	16.2103	15.3768	14.6083	13.7532	12.9129
14.5	16.6448	16.0158	15.3171	14.5731	13.8829	13.1102	12.3462
15.0	15.6699	15.1135	14.492	13.8263	13.2052	12.506	11.8106
15.5	14.7765	14.2828	13.7286	13.1316	12.5717	11.9381	11.3042
16.0	13.9561	13.5169	13.0213	12.4848	11.9792	11.404	10.8257
16.5	13.2012	12.8093	12.3651	11.882	11.4244	10.9016	10.3732
17.0	12.505	12.1545	11.7554	11.3194	10.9047	10.4287	9.9454
17.5	11.8618	11.5474	11.1881	10.7939	10.4173	9.9833	9.5407
18.0	11.2664	10.9838	10.6596	10.3024	9.96	9.5637	9.1578
18.5	10.7142	10.4597	10.1665	9.8423	9.5304	9.168	8.7954
19.0	10.2014	9.9716	9.7059	9.4111	9.1265	8.7947	8.4522
19.5	9.7242	9.5163	9.2751	9.0066	8.7465	8.4422	8.1271
20.0	9.2795	9.091	8.8717	8.6267	8.3886	8.1093	7.8189
20.5	8.8644	8.6932	8.4934	8.2696	8.0513	7.7945	7.5267
21.0	8.4764	8.3207	8.1384	7.9334	7.7332	7.4967	7.2494
21.5	8.1133	7.9713	7.8047	7.6168	7.4327	7.2148	6.9862
22.0	7.7729	7.6433	7.4908	7.3183	7.1489	6.9477	6.7362
22.5	7.4535	7.335	7.1951	7.0366	6.8804	6.6946	6.4986
23.0	7.1533	7.0448	6.9163	6.7704	6.6263	6.4544	6.2726
23.5	6.8709	6.7714	6.6533	6.5187	6.3856	6.2264	6.0577
24.0	6.6049	6.5135	6.4047	6.2806	6.1574	6.0098	5.853
24.5	6.3541	6.27	6.1697	6.055	5.9409	5.804	5.6581
25.0	6.1172	6.0398	5.9473	5.8411	5.7354	5.6081	5.4723
25.5	5.8935	5.8221	5.7366	5.6382	5.5401	5.4217	5.2952
26.0	5.6818	5.6159	5.5368	5.4456	5.3544	5.2442	5.1262
26.5	5.4813	5.4205	5.3472	5.2625	5.1777	5.075	4.9648
27.0	5.2914	5.2351	5.1671	5.0884	5.0095	4.9137	4.8107
27.5	5.1112	5.059	4.9959	4.9227	4.8491	4.7598	4.6634
28.0	4.94	4.8917	4.833	4.7649	4.6963	4.6128	4.5226
28.5	4.7774	4.7326	4.678	4.6145	4.5505	4.4724	4.3879
29.0	4.6227	4.5811	4.5303	4.4711	4.4112	4.3381	4.2589
29.5	4.4755	4.4368	4.3895	4.3342	4.2782	4.2097	4.1354
30.0	4.3353	4.2992	4.2551	4.2034	4.151	4.0869	4.0171
30.5	4.2016	4.168	4.1268	4.0785	4.0294	3.9692	3.9036
31.0	4.074	4.0427	4.0043	3.959	3.913	3.8565	3.7948
31.5	3.9522	3.9231	3.8871	3.8447	3.8016	3.7484	3.6904
32.0	3.8359	3.8086	3.775	3.7353	3.6948	3.6448	3.5902
32.5	3.7246	3.6992	3.6677	3.6305	3.5924	3.5454	3.4939

Peak value found at:

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
0.0	192.7413	129.3247	92.8363	69.9179	55.8729	44.7361	36.6429



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	0.0	4.031	290.0	0.0
1	B	-0.833	4.864	290.0	-120.0
1	C	0.0	4.864	290.0	120.0
2	A	0.833	4.026	1.0	0.0
3	A	0.833	4.859	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet
Y Max: 1.0 feet
Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Default Ok Cancel

FIGURE 11: CASE 201R 290A EMF PLOT

**ALSO SHOWN IN FIGURES 3, 5, AND 7

MAGNETIC FLUX DENSITY [mG]

Study : EMF Plan
Execution: EMF Plan Case 201R

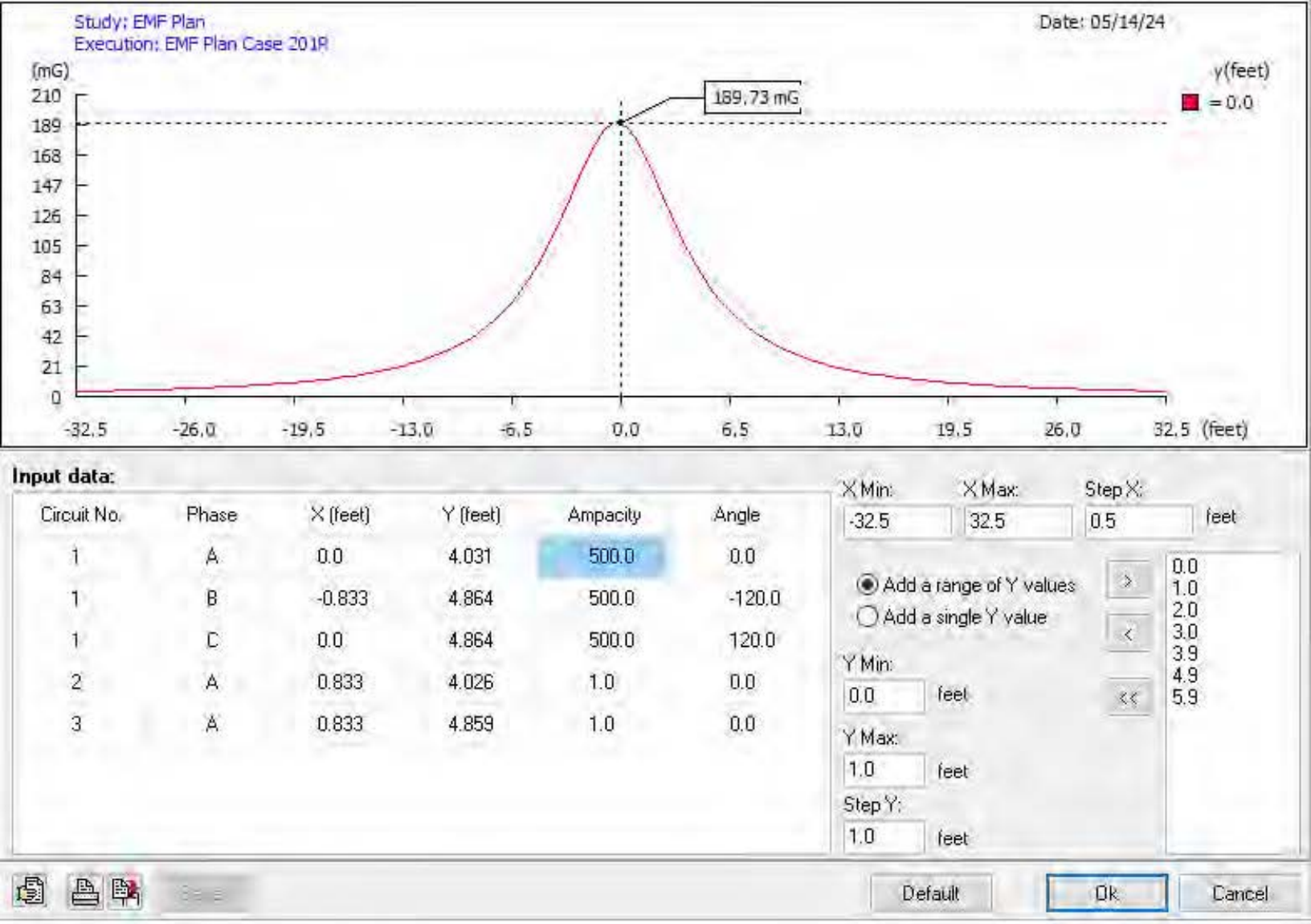
Report created on: 05/14/24 2:12:31 PM

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	2.0575	2.0472	2.0334	2.0162	1.998	1.9751	1.9496
-32.0	2.1227	2.1115	2.0965	2.0779	2.0584	2.0339	2.0065
-31.5	2.1911	2.1788	2.1625	2.1425	2.1215	2.0952	2.0659
-31.0	2.2628	2.2493	2.2317	2.2101	2.1875	2.1592	2.1278
-30.5	2.338	2.3233	2.3041	2.2808	2.2564	2.226	2.1924
-30.0	2.417	2.4009	2.3801	2.3548	2.3286	2.2959	2.2599
-29.5	2.4999	2.4824	2.4598	2.4324	2.4042	2.369	2.3304
-29.0	2.5872	2.568	2.5434	2.5139	2.4833	2.4455	2.4041
-28.5	2.679	2.658	2.6313	2.5993	2.5664	2.5256	2.4811
-28.0	2.7758	2.7528	2.7237	2.689	2.6534	2.6096	2.5617
-27.5	2.8777	2.8526	2.821	2.7833	2.7449	2.6976	2.6461
-27.0	2.9853	2.9578	2.9234	2.8825	2.8409	2.7898	2.7344
-26.5	3.099	3.0688	3.0313	2.9869	2.9419	2.8867	2.827
-26.0	3.2191	3.1861	3.1451	3.0969	3.0481	2.9885	2.9241
-25.5	3.3463	3.31	3.2652	3.2128	3.1598	3.0954	3.026
-25.0	3.481	3.4411	3.3922	3.3351	3.2776	3.2078	3.1329
-24.5	3.6238	3.58	3.5265	3.4643	3.4018	3.3262	3.2452
-24.0	3.7754	3.7272	3.6686	3.6008	3.5328	3.4508	3.3632
-23.5	3.9365	3.8835	3.8192	3.7451	3.6711	3.5821	3.4873
-23.0	4.1079	4.0495	3.979	3.8979	3.8172	3.7205	3.6178
-22.5	4.2905	4.226	4.1486	4.0598	3.9718	3.8666	3.7552
-22.0	4.4853	4.414	4.3288	4.2316	4.1354	4.0208	3.8999
-21.5	4.6933	4.6145	4.5206	4.4139	4.3087	4.1837	4.0524
-21.0	4.9158	4.8284	4.7249	4.6076	4.4924	4.356	4.2131
-20.5	5.1541	5.0571	4.9427	4.8136	4.6873	4.5383	4.3828
-20.0	5.4097	5.3019	5.1752	5.033	4.8943	4.7313	4.5618
-19.5	5.6842	5.5642	5.4238	5.2668	5.1143	4.9357	4.7508
-19.0	5.9796	5.8457	5.6898	5.5162	5.3483	5.1525	4.9505
-18.5	6.2979	6.1483	5.9749	5.7826	5.5975	5.3825	5.1616
-18.0	6.6416	6.474	6.2807	6.0675	5.863	5.6266	5.3849
-17.5	7.0132	6.8251	6.6093	6.3724	6.1462	5.8859	5.621
-17.0	7.4159	7.2042	6.9628	6.699	6.4485	6.1614	5.8709
-16.5	7.853	7.6144	7.3436	7.0494	6.7713	6.4545	6.1353
-16.0	8.3285	8.0587	7.7544	7.4256	7.1165	6.7662	6.4153
-15.5	8.8468	8.5411	8.1982	7.83	7.4859	7.098	6.7117
-15.0	9.4131	9.0655	8.6783	8.2651	7.8813	7.4512	7.0256
-14.5	10.0331	9.6369	9.1984	8.7338	8.3049	7.8274	7.358
-14.0	10.7137	10.2605	9.7627	9.239	8.759	8.2281	7.7098
-13.5	11.4624	10.9425	10.3758	9.7842	9.246	8.6549	8.082
-13.0	12.2883	11.6898	11.0428	10.373	9.7684	9.1095	8.4758
-12.5	13.2018	12.5103	11.7694	11.0093	10.3289	9.5935	8.8919
-12.0	14.2149	13.4129	12.5619	11.6974	10.9304	10.1086	9.3313
-11.5	15.3415	14.4077	13.4273	12.4417	11.5756	10.6563	9.7947
-11.0	16.5981	15.5064	14.3733	13.2469	12.2676	11.2382	10.2828
-10.5	18.0037	16.7219	15.4081	14.1182	13.0092	11.8556	10.7958
-10.0	19.5805	18.0689	16.5408	15.0604	13.8029	12.5094	11.3339
-9.5	21.3547	19.5639	17.781	16.0786	14.6512	13.2004	11.8967
-9.0	23.3564	21.2253	19.1386	17.1775	15.5559	13.9285	12.4835
-8.5	25.621	23.0732	20.6238	18.3613	16.5183	14.6933	13.0931
-8.0	28.1892	25.1291	22.2465	19.6333	17.5385	15.4933	13.7232
-7.5	31.1076	27.4159	24.0157	20.9953	18.6153	16.3259	14.3713
-7.0	34.4285	29.9564	25.9385	22.4472	19.7458	17.1875	15.0336
-6.5	38.2094	32.7721	28.019	23.9858	20.9248	18.0725	15.7055
-6.0	42.5112	35.8806	30.2565	25.6042	22.1444	18.9739	16.381
-5.5	47.3936	39.2922	32.6434	27.2909	23.3936	19.8827	17.0534
-5.0	52.9081	43.0045	35.1627	29.028	24.6575	20.7877	17.7145
-4.5	59.0858	46.9965	37.7854	30.7913	25.9176	21.6759	18.3554
-4.0	65.9175	51.2187	40.4669	32.5483	27.1511	22.532	18.9658
-3.5	73.3292	55.5863	43.1455	34.2592	28.3316	23.3394	19.5351
-3.0	81.148	59.97	45.7418	35.8768	29.4297	24.0804	20.0524
-2.5	89.0687	64.1922	48.1594	37.3487	30.4141	24.7368	20.5067
-2.0	96.6327	68.032	50.2904	38.6198	31.2535	25.2911	20.8878
-1.5	103.2406	71.2404	52.0242	39.6369	31.9188	25.7274	21.1865
-1.0	108.2211	73.5719	53.259	40.3534	32.385	26.0324	21.3953
-0.5	110.9632	74.8236	53.9158	40.7342	32.6339	26.1965	21.5089
0.0	111.0816	74.8769	53.95	40.7602	32.6555	26.2147	21.5244
0.5	108.5438	73.7245	53.3594	40.4305	32.4494	26.0865	21.4416
1.0	103.6884	71.4731	52.1844	39.7624	32.0244	25.8166	21.263
1.5	97.1186	68.3203	50.5015	38.7895	31.3979	25.414	20.9936
2.0	89.5298	64.5137	48.4118	37.5578	30.5943	24.8914	20.6404
2.5	81.5566	60.3082	46.0269	36.1204	29.6424	24.2645	20.2125
3.0	73.6856	55.9324	43.4563	34.5324	28.5735	23.5506	19.7199

3.5	66.2371	51.5697	40.7984	32.847	27.4189	22.7678	19.1733
4.0	59.3882	47.3532	38.1343	31.1118	26.2082	21.9339	18.5838
4.5	53.2107	43.3695	35.5269	29.3675	24.9681	21.0657	17.962
5.0	47.7083	39.6675	33.0213	27.6466	23.7216	20.1783	17.318
5.5	42.8449	36.2678	30.6467	25.974	22.4875	19.285	16.6609
6.0	38.5656	33.1721	28.4207	24.3677	21.2809	18.3971	15.9989
6.5	34.8075	30.3691	26.3505	22.8396	20.1131	17.5238	15.3391
7.0	31.508	27.8404	24.4367	21.3967	18.992	16.6723	14.6872
7.5	28.6084	25.5641	22.6752	20.042	17.9231	15.8481	14.0481
8.0	26.056	23.517	21.0588	18.776	16.9093	15.0552	13.4256
8.5	23.8041	21.6763	19.5785	17.5968	15.952	14.2962	12.8225
9.0	21.8122	20.0202	18.2245	16.5014	15.0511	13.5727	12.241
9.5	20.0451	18.5288	16.9866	15.4854	14.2056	12.8853	11.6824
10.0	18.473	17.1839	15.8551	14.5444	13.4136	12.234	11.1477
10.5	17.07	15.9691	14.8203	13.6735	12.6729	11.6184	10.6372
11.0	15.8142	14.8699	13.8735	12.8676	11.981	11.0373	10.1508
11.5	14.6868	13.8735	13.0064	12.122	11.3351	10.4897	9.6884
12.0	13.6718	12.9684	12.2114	11.432	10.7323	9.9742	9.2494
12.5	12.7554	12.1446	11.4817	10.7932	10.1699	9.4892	8.8331
13.0	11.9256	11.3934	10.8111	10.2014	9.6451	9.0331	8.4387
13.5	11.1723	10.707	10.1939	9.6527	9.1554	8.6044	8.0653
14.0	10.4867	10.0784	9.6252	9.1436	8.6982	8.2013	7.712
14.5	9.8612	9.5018	9.1003	8.6708	8.2711	7.8225	7.3778
15.0	9.2891	8.9718	8.6152	8.2314	7.872	7.4663	7.0617
15.5	8.7647	8.4838	8.1662	7.8224	7.4988	7.1313	6.7628
16.0	8.283	8.0336	7.75	7.4415	7.1495	6.8162	6.4802
16.5	7.8395	7.6175	7.3638	7.0862	6.8223	6.5197	6.2129
17.0	7.4304	7.2323	7.0048	6.7547	6.5157	6.2404	5.96
17.5	7.0523	6.8751	6.6706	6.4448	6.2281	5.9773	5.7208
18.0	6.7023	6.5434	6.3592	6.1549	5.9581	5.7294	5.4943
18.5	6.3775	6.2347	6.0686	5.8835	5.7044	5.4954	5.2798
19.0	6.0758	5.9472	5.797	5.629	5.4658	5.2747	5.0767
19.5	5.795	5.679	5.5429	5.3901	5.2412	5.0662	4.8842
20.0	5.5332	5.4284	5.3049	5.1657	5.0296	4.8691	4.7016
20.5	5.2888	5.1939	5.0817	4.9547	4.8302	4.6828	4.5284
21.0	5.0603	4.9742	4.8721	4.7561	4.6419	4.5065	4.3641
21.5	4.8463	4.7682	4.675	4.5689	4.4642	4.3395	4.208
22.0	4.6457	4.5746	4.4896	4.3924	4.2962	4.1812	4.0597
22.5	4.4575	4.3927	4.3149	4.2257	4.1372	4.0312	3.9187
23.0	4.2805	4.2214	4.1502	4.0683	3.9867	3.8888	3.7846
23.5	4.1139	4.0599	3.9946	3.9193	3.8441	3.7535	3.657
24.0	3.957	3.9076	3.8477	3.7783	3.7089	3.6251	3.5354
24.5	3.809	3.7637	3.7087	3.6447	3.5806	3.5029	3.4197
25.0	3.6692	3.6277	3.5771	3.5181	3.4587	3.3867	3.3093
25.5	3.5371	3.499	3.4524	3.3979	3.3429	3.276	3.204
26.0	3.4121	3.3771	3.3341	3.2837	3.2327	3.1706	3.1035
26.5	3.2937	3.2615	3.2218	3.1752	3.1278	3.0701	3.0075
27.0	3.1815	3.1519	3.1152	3.0719	3.028	2.9742	2.9158
27.5	3.075	3.0477	3.0137	2.9737	2.9328	2.8827	2.8282
28.0	2.9738	2.9487	2.9173	2.88	2.842	2.7953	2.7444
28.5	2.8777	2.8545	2.8254	2.7908	2.7554	2.7118	2.6642
29.0	2.7862	2.7648	2.7378	2.7056	2.6727	2.6319	2.5874
29.5	2.6991	2.6793	2.6543	2.6244	2.5936	2.5555	2.5138
30.0	2.6161	2.5978	2.5746	2.5467	2.518	2.4824	2.4433
30.5	2.537	2.5201	2.4985	2.4725	2.4457	2.4124	2.3757
31.0	2.4615	2.4458	2.4257	2.4015	2.3765	2.3452	2.3108
31.5	2.3894	2.3749	2.3562	2.3336	2.3101	2.2809	2.2486
32.0	2.3205	2.307	2.2896	2.2685	2.2466	2.2192	2.1888
32.5	2.2546	2.2421	2.2259	2.2062	2.1856	2.1599	2.1314

Peak value found at:

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
0.0	111.0816	74.8769	53.95	40.7602	32.6555	26.2147	21.5244



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	0.0	4.031	500.0	0.0
1	B	-0.833	4.864	500.0	-120.0
1	C	0.0	4.864	500.0	120.0
2	A	0.833	4.026	1.0	0.0
3	A	0.833	4.859	1.0	0.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet
Y Max: 1.0 feet
Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Default Ok Cancel

FIGURE 12: CASE 201R 500A EMF PLOT

MAGNETIC FLUX DENSITY [mG]
==========

Study : EMF Plan
Execution: EMF Plan Case 201R

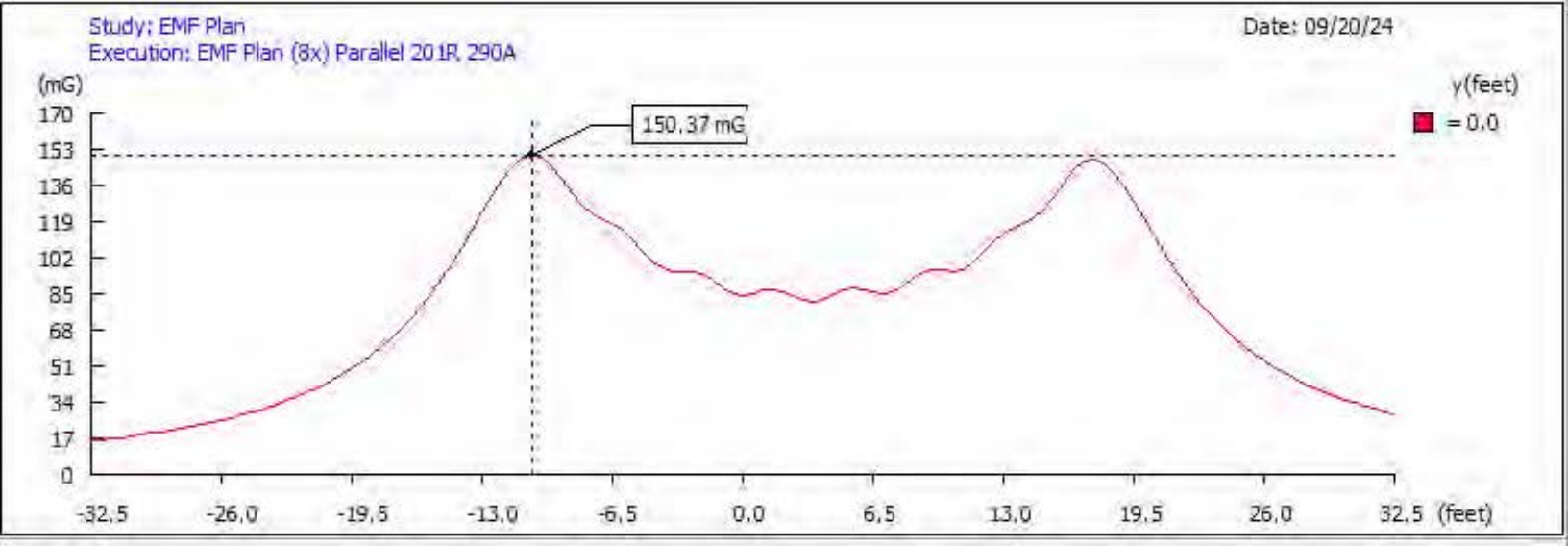
Report created on: 05/14/24 2:10:53 PM

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	3.5787	3.5538	3.5228	3.4861	3.4486	3.4023	3.3517
-32.0	3.6919	3.665	3.6318	3.5926	3.5525	3.5032	3.4493
-31.5	3.8104	3.7815	3.7458	3.7039	3.6611	3.6085	3.5511
-31.0	3.9346	3.9035	3.8652	3.8203	3.7745	3.7183	3.6572
-30.5	4.0649	4.0314	3.9903	3.9421	3.8931	3.8331	3.7679
-30.0	4.2017	4.1656	4.1214	4.0696	4.0172	3.953	3.8834
-29.5	4.3454	4.3064	4.2588	4.2033	4.1471	4.0785	4.0041
-29.0	4.4965	4.4544	4.4031	4.3434	4.2832	4.2097	4.1302
-28.5	4.6555	4.61	4.5547	4.4905	4.4258	4.3471	4.262
-28.0	4.8229	4.7737	4.714	4.6449	4.5754	4.4909	4.3999
-27.5	4.9994	4.946	4.8816	4.8071	4.7324	4.6417	4.5443
-27.0	5.1855	5.1277	5.0581	4.9777	4.8973	4.7999	4.6954
-26.5	5.382	5.3193	5.244	5.1573	5.0705	4.9658	4.8537
-26.0	5.5898	5.5217	5.44	5.3463	5.2528	5.1401	5.0197
-25.5	5.8096	5.7355	5.647	5.5455	5.4446	5.3232	5.1937
-25.0	6.0423	5.9617	5.8655	5.7557	5.6466	5.5157	5.3764
-24.5	6.2891	6.2012	6.0967	5.9776	5.8595	5.7182	5.5682
-24.0	6.551	6.455	6.3413	6.212	6.0841	5.9314	5.7697
-23.5	6.8292	6.7243	6.6004	6.4598	6.3212	6.156	5.9815
-23.0	7.1252	7.0104	6.8751	6.7221	6.5716	6.3927	6.2043
-22.5	7.4404	7.3146	7.1668	7.0	6.8364	6.6424	6.4387
-22.0	7.7766	7.6385	7.4766	7.2947	7.1166	6.9061	6.6856
-21.5	8.1356	7.9837	7.8063	7.6074	7.4133	7.1845	6.9456
-21.0	8.5194	8.352	8.1573	7.9396	7.7278	7.4789	7.2197
-20.5	8.9303	8.7457	8.5315	8.2928	8.0614	7.7902	7.5088
-20.0	9.371	9.1669	8.9309	8.6689	8.4155	8.1197	7.8139
-19.5	9.8443	9.6182	9.3578	9.0696	8.7919	8.4688	8.1359
-19.0	10.3534	10.1024	9.8144	9.4969	9.1921	8.8387	8.4761
-18.5	10.9019	10.6228	10.3037	9.9533	9.6181	9.2311	8.8355
-18.0	11.4939	11.1827	10.8285	10.4411	10.072	9.6475	9.2155
-17.5	12.1339	11.7863	11.3922	10.963	10.5559	10.0896	9.6173
-17.0	12.8273	12.4379	11.9984	11.5221	11.0723	10.5594	10.0424
-16.5	13.5798	13.1425	12.6513	12.1216	11.6237	11.0588	10.4921
-16.0	14.3982	13.9058	13.3555	12.7652	12.2131	11.59	10.9681
-15.5	15.29	14.7341	14.1161	13.4568	12.8436	12.1551	11.472
-15.0	16.2642	15.6345	14.9387	14.2007	13.5183	12.7566	12.0053
-14.5	17.3306	16.6153	15.8297	15.0018	14.2411	13.397	12.5698
-14.0	18.5007	17.6854	16.796	15.8652	15.0155	14.0789	13.1671
-13.5	19.7879	18.8554	17.8456	16.7966	15.8457	14.805	13.799
-13.0	21.2074	20.1371	18.9871	17.8021	16.7361	15.578	14.4671
-12.5	22.7769	21.544	20.2304	18.8885	17.6912	16.4008	15.1729
-12.0	24.5171	23.0912	21.586	20.0628	18.7157	17.2762	15.9179
-11.5	26.452	24.7961	23.0659	21.3328	19.8145	18.2067	16.7033
-11.0	28.6095	26.6784	24.683	22.7063	20.9923	19.1949	17.5301
-10.5	31.0221	28.7603	26.4515	24.1919	22.254	20.2428	18.3988
-10.0	33.7281	31.0668	28.3867	25.7979	23.604	21.3522	19.3096
-9.5	36.7717	33.6261	30.5047	27.5328	25.0463	22.524	20.2617
-9.0	40.2049	36.4691	32.8226	29.4044	26.5839	23.7583	21.254
-8.5	44.0878	39.6302	35.3574	31.4198	28.2186	25.0541	22.284
-8.0	48.49	43.1461	38.1257	33.5844	29.9507	26.4088	23.3483
-7.5	53.4907	47.0554	41.1426	35.9011	31.7779	27.818	24.4422
-7.0	59.1793	51.3967	44.42	38.3693	33.6952	29.2751	25.5592
-6.5	65.6538	56.2062	47.9645	40.9835	35.6934	30.7709	26.6914
-6.0	73.0174	61.5135	51.7744	43.7317	37.7591	32.2932	27.829
-5.5	81.3712	67.3353	55.8363	46.5938	39.8732	33.8266	28.96
-5.0	90.8022	73.6668	60.1208	49.5393	42.0105	35.3522	30.071
-4.5	101.3622	80.4709	64.5777	52.5265	44.1392	36.8477	31.1464
-4.0	113.0332	87.6622	69.1304	55.5	46.2204	38.2872	32.1691
-3.5	125.6863	95.0948	73.6737	58.3918	48.2093	39.6426	33.1212
-3.0	139.0232	102.5468	78.0715	61.1217	50.056	40.8838	33.9841
-2.5	152.5198	109.7148	82.1597	63.6005	51.7075	41.9802	34.7395
-2.0	165.3905	116.2212	85.7549	65.735	53.111	42.9023	35.3701
-1.5	176.6109	121.6426	88.6691	67.4351	54.2172	43.6232	35.8605
-1.0	185.0359	125.5612	90.7303	68.6222	54.9842	44.121	36.1985
-0.5	189.6267	127.634	91.8051	69.2377	55.3817	44.3797	36.3751
0.0	189.7317	127.6619	91.8196	69.2499	55.3934	44.3909	36.3856
0.5	185.3035	125.6358	90.7715	68.6581	55.019	44.1545	36.2301
1.0	176.9272	121.7408	88.7311	67.4926	54.2741	43.6785	35.9129
1.5	165.6372	116.3158	85.8301	65.8115	53.1887	42.9784	35.4426
2.0	152.6231	109.7845	82.2411	63.6933	51.8044	42.0764	34.8315
2.5	138.9676	102.5816	78.1546	61.2284	50.1706	40.9989	34.0948
3.0	125.5	95.0963	73.7572	58.5108	48.3404	39.7755	33.2496

3.5	112.7644	87.6405	69.2155	55.6308	46.3669	38.4369	32.3143
4.0	101.0606	80.4397	64.6678	52.6693	44.3005	37.0132	31.3074
4.5	90.5093	73.6407	60.2202	49.6948	42.1862	35.5329	30.2471
5.0	81.1149	67.3257	55.9489	46.7627	40.0629	34.0215	29.1502
5.5	72.8144	61.529	51.9033	43.9147	37.9623	32.5014	28.0322
6.0	65.5132	56.2527	48.1125	41.1812	35.91	30.9917	26.907
6.5	59.1031	51.4769	44.5885	38.582	33.9247	29.5079	25.7862
7.0	53.4766	47.17	41.3321	36.1288	32.02	28.062	24.6798
7.5	48.5336	43.294	38.3358	33.8267	30.2046	26.6633	23.5957
8.0	44.1834	39.8093	35.5873	31.676	28.4837	25.3183	22.5404
8.5	40.3464	36.6767	33.0709	29.6735	26.8593	24.0314	21.5185
9.0	36.953	33.8592	30.7699	27.8137	25.3312	22.8052	20.5337
9.5	33.9434	31.3224	28.6669	26.0896	23.8975	21.6406	19.5881
10.0	31.2664	29.0353	26.7449	24.4931	22.555	20.5376	18.6832
10.5	28.8779	26.97	24.9879	23.0158	21.2999	19.4953	17.8197
11.0	26.7406	25.1017	23.3806	21.6494	20.1278	18.512	16.9973
11.5	24.8222	23.4084	21.9089	20.3855	19.0338	17.5855	16.2157
12.0	23.0954	21.8707	20.56	19.216	18.0132	16.7136	15.4738
12.5	21.5365	20.4715	19.3221	18.1336	17.0613	15.8935	14.7706
13.0	20.1254	19.1957	18.1848	17.1311	16.1733	15.1225	14.1046
13.5	18.8447	18.0302	17.1383	16.2019	15.3448	14.398	13.4742
14.0	17.6793	16.9633	16.1741	15.34	14.5715	13.7171	12.8779
14.5	16.6163	15.9848	15.2845	14.5397	13.8494	13.0772	12.3141
15.0	15.6443	15.0855	14.4625	13.796	13.1747	12.4758	11.781
15.5	14.7534	14.2576	13.7018	13.104	12.5438	11.9103	11.2769
16.0	13.9352	13.494	12.997	12.4596	11.9536	11.3784	10.8004
16.5	13.1822	12.7885	12.3429	11.8589	11.401	10.878	10.3499
17.0	12.4877	12.1355	11.7351	11.2983	10.8831	10.407	9.9238
17.5	11.846	11.5301	11.1695	10.7745	10.3975	9.9633	9.5207
18.0	11.2519	10.9679	10.6425	10.2846	9.9417	9.5451	9.1393
18.5	10.7009	10.4451	10.1508	9.8259	9.5134	9.1508	8.7782
19.0	10.1891	9.9581	9.6914	9.3959	9.1108	8.7787	8.4362
19.5	9.7129	9.5038	9.2617	8.9925	8.732	8.4274	8.1121
20.0	9.269	9.0795	8.8593	8.6137	8.3751	8.0955	7.805
20.5	8.8547	8.6825	8.4819	8.2574	8.0388	7.7816	7.5137
21.0	8.4674	8.3108	8.1277	7.9222	7.7215	7.4847	7.2372
21.5	8.1049	7.9621	7.7947	7.6063	7.4218	7.2036	6.9748
22.0	7.7651	7.6347	7.4815	7.3085	7.1387	6.9372	6.7255
22.5	7.4462	7.3269	7.1864	7.0274	6.8708	6.6847	6.4885
23.0	7.1465	7.0373	6.9082	6.7618	6.6173	6.4451	6.2632
23.5	6.8645	6.7643	6.6457	6.5107	6.3772	6.2177	6.0488
24.0	6.5989	6.5069	6.3976	6.273	6.1495	6.0017	5.8446
24.5	6.3484	6.2638	6.163	6.0479	5.9335	5.7963	5.6502
25.0	6.1119	6.034	5.941	5.8344	5.7284	5.6009	5.4649
25.5	5.8884	5.8166	5.7306	5.6319	5.5335	5.4149	5.2881
26.0	5.677	5.6107	5.5311	5.4396	5.3482	5.2378	5.1195
26.5	5.4768	5.4155	5.3418	5.2569	5.1718	5.0689	4.9585
27.0	5.2871	5.2304	5.162	5.0831	5.0039	4.9079	4.8047
27.5	5.1071	5.0546	4.9911	4.9177	4.8439	4.7543	4.6578
28.0	4.9362	4.8875	4.8285	4.7601	4.6913	4.6076	4.5172
28.5	4.7737	4.7286	4.6737	4.61	4.5457	4.4674	4.3828
29.0	4.6193	4.5773	4.5262	4.4668	4.4067	4.3334	4.254
29.5	4.4722	4.4332	4.3856	4.3301	4.2739	4.2052	4.1308
30.0	4.3321	4.2958	4.2514	4.1995	4.1469	4.0826	4.0127
30.5	4.1985	4.1647	4.1233	4.0748	4.0255	3.9651	3.8994
31.0	4.0711	4.0396	4.0009	3.9555	3.9093	3.8526	3.7908
31.5	3.9494	3.9201	3.8839	3.8413	3.798	3.7447	3.6866
32.0	3.8332	3.8058	3.7719	3.732	3.6914	3.6413	3.5865
32.5	3.7221	3.6965	3.6648	3.6274	3.5891	3.542	3.4904

Peak value found at:

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
0.0	189.7317	127.6619	91.8196	69.2499	55.3934	44.3909	36.3856



Input data:

Circuit No.	Phase	X (feet)	Y (feet)	Ampacity	Angle
1	A	-1.832	4.032	290.0	0.0
1	B	-2.666	4.865	290.0	-120.0
1	C	-1.832	4.865	290.0	120.0
2	A	-1.0	4.026	1.0	0.0
3	A	-1.0	4.859	1.0	0.0
4	A	1.833	4.032	290.0	0.0
4	B	1.0	4.864	290.0	-120.0
4	C	1.833	4.864	290.0	120.0

X Min: -32.5 X Max: 32.5 Step X: 0.5 feet

Add a range of Y values
Add a single Y value

Y Min: 0.0 feet
Y Max: 1.0 feet
Step Y: 1.0 feet

0.0
1.0
2.0
3.0
3.9
4.9
5.9

Default Ok Cancel

FIGURE 13: CASE 201R 290A P EMF PLOT

MAGNETIC FLUX DENSITY [mG]
==========

Study : EMF Plan
Execution: EMF Plan (8x) Parallel 201R 290A

Report created on: 09/23/24 5:27:54 PM

X (feet)	Y=0.0 (feet)	Y=1.0 (feet)	Y=2.0 (feet)	Y=3.0 (feet)	Y=3.9 (feet)	Y=4.9 (feet)	Y=5.9 (feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-32.5	15.7182	15.6015	15.4518	15.272	15.0873	14.8596	14.6117
-32.0	16.2501	16.1212	15.9571	15.7611	15.5605	15.3143	15.047
-31.5	16.8103	16.6679	16.4878	16.274	16.0561	15.7896	15.5013
-31.0	17.4009	17.2434	17.0458	16.8123	16.5754	16.2866	15.9754
-30.5	18.0241	17.8499	17.6328	17.3777	17.1198	16.8067	16.4705
-30.0	18.6825	18.4897	18.2509	17.9719	17.691	17.3512	16.9878
-29.5	19.3789	19.1651	18.9023	18.5968	18.2905	17.9215	17.5283
-29.0	20.1161	19.879	19.5894	19.2545	18.9202	18.5191	18.0933
-28.5	20.8976	20.6343	20.3148	19.9472	19.5821	19.1456	18.6841
-28.0	21.7269	21.4343	21.0814	20.6775	20.2781	19.8027	19.3022
-27.5	22.6083	22.2825	21.8921	21.4478	21.0104	20.4921	19.9489
-27.0	23.5462	23.1829	22.7505	22.261	21.7815	21.2159	20.6256
-26.5	24.5455	24.1398	23.6601	23.1201	22.5938	21.9758	21.3341
-26.0	25.6118	25.158	24.6249	24.0284	23.45	22.7742	22.0757
-25.5	26.7514	26.2428	25.6494	24.9894	24.3528	23.613	22.8523
-25.0	27.971	27.4	26.7382	26.0068	25.3054	24.4945	23.6653
-24.5	29.2787	28.636	27.8967	27.0849	26.3109	25.4212	24.5166
-24.0	30.6828	29.958	29.1302	28.2276	27.3725	26.3953	25.4076
-23.5	32.1932	31.3737	30.445	29.4398	28.4937	27.4193	26.3401
-23.0	33.8208	32.8919	31.8478	30.7263	29.678	28.4956	27.3155
-22.5	35.5779	34.5221	33.3456	32.0921	30.9292	29.6265	28.3354
-22.0	37.4785	36.2751	34.9462	33.5427	32.2508	30.8143	29.4011
-21.5	39.5382	38.1624	36.6578	35.0835	33.6464	32.0611	30.5135
-21.0	41.7748	40.1968	38.4892	36.7201	35.1197	33.3689	31.6735
-20.5	44.2083	42.3925	40.4495	38.4581	36.6738	34.7391	32.8815
-20.0	46.8611	44.7644	42.5482	40.3028	38.3116	36.1727	34.1375
-19.5	49.7586	47.3292	44.795	42.2593	40.0353	37.6701	35.4408
-19.0	52.9291	50.1039	47.1992	44.3318	41.8463	39.231	36.7901
-18.5	56.4043	53.1067	49.7697	46.5235	43.7449	40.8538	38.1832
-18.0	60.2187	56.3558	52.5141	48.836	45.7299	42.5358	39.6169
-17.5	64.4099	59.8688	55.4382	51.2686	47.7979	44.2728	41.0871
-17.0	69.0175	63.6613	58.5444	53.8179	49.9434	46.0587	42.5882
-16.5	74.0817	67.7452	61.8308	56.4764	52.1577	47.8856	44.1132
-16.0	79.6403	72.1258	65.2889	59.2318	54.4288	49.7429	45.6539
-15.5	85.7241	76.7981	68.9018	62.0658	56.7406	51.6178	47.2003
-15.0	92.3498	81.742	72.6413	64.9531	59.0724	53.495	48.741
-14.5	99.5086	86.9156	76.4654	67.8603	61.3994	55.3565	50.2635
-14.0	107.1482	92.2471	80.315	70.7453	63.6913	57.182	51.7538
-13.5	115.1531	97.6279	84.1133	73.558	65.9146	58.9497	53.1975
-13.0	123.315	102.9051	87.7649	76.2409	68.0328	60.6368	54.5797
-12.5	131.3032	107.8782	91.1585	78.7321	70.0078	62.2203	55.8861
-12.0	138.6433	112.3055	94.1739	80.9692	71.8033	63.6788	57.103
-11.5	144.7216	115.9228	96.6935	82.8949	73.3865	64.9933	58.2188
-11.0	148.8438	118.481	98.6184	84.4637	74.7318	66.1487	59.2239
-10.5	150.3742	119.7995	99.8861	85.6475	75.823	67.135	60.1115
-10.0	148.9582	119.8271	100.4866	86.4406	76.655	67.9478	60.8781
-9.5	144.7752	118.6863	100.4694	86.8607	77.234	68.5884	61.5231
-9.0	138.6865	116.672	99.9361	86.9455	77.5764	69.0636	62.0494
-8.5	132.1032	114.1844	99.0189	86.7456	77.706	69.3843	62.4621
-8.0	126.479	111.6041	97.8481	86.3158	77.6506	69.5647	62.7688
-7.5	122.602	109.1622	96.5235	85.7069	77.4394	69.6209	62.9785
-7.0	120.1712	106.8789	95.101	84.961	77.1003	69.5698	63.1015
-6.5	118.0533	104.6137	93.6009	84.1115	76.659	69.4284	63.1484
-6.0	115.0499	102.2014	92.0325	83.1872	76.1396	69.2131	63.1301
-5.5	110.6377	99.5925	90.4197	82.216	75.5642	68.9399	63.0575
-5.0	105.2993	96.9153	88.8115	81.227	74.9536	68.6232	62.9409
-4.5	100.304	94.4206	87.2722	80.2481	74.3267	68.2767	62.7899
-4.0	96.9645	92.34	85.8558	79.3025	73.6994	67.9122	62.6135
-3.5	95.721	90.7404	84.5823	78.4039	73.0838	67.5398	62.4197
-3.0	95.7826	89.4798	83.4318	77.5572	72.4886	67.1681	62.2156

-2.5	95.6881	88.2978	82.362	76.7611	71.9199	66.8042	62.0076
-2.0	94.2689	86.9814	81.3382	76.0143	71.3827	66.4539	61.801
-1.5	91.3207	85.498	80.3571	75.3201	70.8817	66.1225	61.6006
-1.0	87.7176	84.0146	79.4503	74.6869	70.4223	65.8145	61.4105
-0.5	84.9281	82.7909	78.6642	74.1248	70.009	65.5337	61.2343
0.0	84.0596	82.0072	78.0297	73.6407	69.6454	65.2831	61.0748
0.5	85.0167	81.6398	77.5412	73.2342	69.3328	65.0648	60.9343
1.0	86.5664	81.473	77.1596	72.8988	69.0711	64.8805	60.8148
1.5	87.2446	81.241	76.8365	72.6262	68.8593	64.7309	60.7175
2.0	86.2801	80.799	76.5456	72.4116	68.6969	64.617	60.6438
2.5	84.0179	80.2138	76.2984	72.2572	68.5845	64.5393	60.5942
3.0	81.7405	79.7214	76.1366	72.1699	68.5237	64.4983	60.5694
3.5	80.904	79.5732	76.1038	72.1571	68.516	64.4945	60.5695
4.0	82.1053	79.867	76.2163	72.2211	68.5613	64.5276	60.5945
4.5	84.6091	80.4794	76.4513	72.3571	68.6583	64.597	60.6439
5.0	86.9271	81.1481	76.7611	72.5557	68.8042	64.7016	60.7171
5.5	87.8445	81.6446	77.1032	72.8084	68.9965	64.8401	60.8132
6.0	87.1229	81.9195	77.4675	73.1124	69.2335	65.0114	60.9309
6.5	85.6248	82.1324	77.8816	73.4715	69.5151	65.2142	61.0689
7.0	84.8354	82.5496	78.3923	73.8931	69.8415	65.447	61.2256
7.5	85.9048	83.3707	79.0352	74.3825	70.2125	65.7082	61.399
8.0	88.7947	84.596	79.8109	74.9389	70.6262	65.9956	61.5867
8.5	92.3206	86.0285	80.6852	75.555	71.0792	66.3061	61.786
9.0	95.0299	87.408	81.6117	76.2207	71.567	66.6363	61.9934
9.5	96.12	88.5813	82.5622	76.9292	72.0853	66.9821	62.2053
10.0	95.8807	89.602	83.5455	77.6793	72.6305	67.3391	62.4173
10.5	95.5483	90.7005	84.6024	78.4747	73.1989	67.702	62.6245
11.0	96.5967	92.1447	85.7796	79.3193	73.7861	68.0648	62.8211
11.5	99.7639	94.0733	87.0994	80.2105	74.3848	68.4197	63.0005
12.0	104.5353	96.4121	88.5438	81.1366	74.9842	68.7576	63.1553
12.5	109.5683	98.9284	90.0614	82.0765	75.5698	69.0674	63.2771
13.0	113.628	101.3808	91.5919	83.0042	76.1241	69.3364	63.3566
13.5	116.3165	103.6603	93.091	83.8925	76.6272	69.5504	63.3838
14.0	118.2592	105.836	94.539	84.7146	77.0575	69.6941	63.3484
14.5	120.7155	108.0814	95.9276	85.442	77.3912	69.7512	63.2395
15.0	124.7793	110.5263	97.2332	86.0403	77.6024	69.7048	63.0466
15.5	130.6191	113.1236	98.3935	86.4656	77.6626	69.5379	62.7595
16.0	137.3023	115.6104	99.3009	86.6654	77.5423	69.2343	62.3691
16.5	143.3013	117.5849	99.8194	86.5832	77.213	68.7797	61.8678
17.0	147.2153	118.6438	99.8157	86.1682	76.651	68.1631	61.2504
17.5	148.2531	118.5062	99.1914	85.3835	75.8401	67.3779	60.5142
18.0	146.333	117.0751	97.9039	84.2135	74.7748	66.4229	59.6595
18.5	141.9006	114.429	95.9716	82.6665	73.4611	65.3027	58.69
19.0	135.6514	110.7701	93.4641	80.7729	71.9158	64.0273	57.6123
19.5	128.2984	106.3596	90.4856	78.5799	70.1653	62.6121	56.4359
20.0	120.4411	101.4627	87.1552	76.1456	68.2424	61.0757	55.1723
20.5	112.5209	96.3144	83.5917	73.532	66.1832	59.4395	53.8348
21.0	104.8306	91.1035	79.9027	70.7995	64.025	57.7259	52.4376
21.5	97.5445	85.9699	76.1787	68.0036	61.8032	55.9571	50.995
22.0	90.7517	81.01	72.4913	65.192	59.5502	54.1543	49.5211
22.5	84.4847	76.2848	68.8939	62.4041	57.2946	52.3369	48.0293
23.0	78.7406	71.8281	65.4243	59.6709	55.0599	50.522	46.5317
23.5	73.4961	67.6545	62.1069	57.0156	52.8655	48.7243	45.0392
24.0	68.7173	63.7652	58.956	54.4546	50.7263	46.9559	43.5613
24.5	64.3657	60.1528	55.978	51.999	48.6535	45.2266	42.106
25.0	60.4018	56.8042	53.1735	49.655	46.6548	43.5439	40.6796
25.5	56.7883	53.704	50.5396	47.4258	44.7355	41.9136	39.2878
26.0	53.4896	50.8349	48.0703	45.3113	42.8984	40.3396	37.9343
26.5	50.4733	48.1795	45.7579	43.3099	41.1444	38.8243	36.6223
27.0	47.7102	45.7206	43.5939	41.4182	39.4732	37.3692	35.3537
27.5	45.1742	43.442	41.5692	39.6322	37.8835	35.9745	34.1299
28.0	42.8421	41.3285	39.6749	37.9472	36.3731	34.6399	32.9514
28.5	40.693	39.3659	37.9019	36.3579	34.9391	33.3645	31.8183
29.0	38.7087	37.5413	36.2417	34.8592	33.5787	32.1468	30.7303
29.5	36.8729	35.8427	34.6862	33.4458	32.2885	30.9851	29.6867
30.0	35.1713	34.2593	33.2276	32.1127	31.065	29.8774	28.6864
30.5	33.591	32.7815	31.8588	30.8546	29.9049	28.8215	27.7283
31.0	32.1208	31.4002	30.5732	29.6671	28.8048	27.8154	26.8111
31.5	30.7506	30.1075	29.3645	28.5454	27.7614	26.8567	25.9332
32.0	29.4714	28.896	28.2271	27.4852	26.7713	25.9431	25.0933
32.5	28.2751	27.7593	27.1558	26.4827	25.8316	25.0726	24.2898

Peak value found at:

X	Y=0.0	Y=1.0	Y=2.0	Y=3.0	Y=3.9	Y=4.9	Y=5.9

(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)
	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)	B(mG)
-10.5	150.3742	119.7995	99.8861	85.6475	75.823	67.135	60.1115

ATTACHMENT 3
FIELD MANAGEMENT PLAN FOR PG&E ASSET ACQUISITION PROJECT, VARIANT-NEW CITY SUBSTATION AT DALY CITY YARD, AECOM, NOVEMBER 25, 2024

PAGE INTENTIONALLY BLANK

AECOM

Field Management Plan for PG&E Asset Acquisition Project

Variant-New City Substation at Daily City Yard

November 25, 2024

Delivering a better world

1.1 INTRODUCTION

In 1993, the California Public Utilities Commission (CPUC) introduced a policy regarding electromagnetic fields (EMF) associated with electric utility facilities and power lines. At that time, the CPUC concluded that there was not sufficient scientific evidence to substantiate claims of adverse health effects from EMF exposure at power grid frequencies. Consequently, the CPUC opted against establishing a specific numerical standard for EMF exposure. Subsequently, in 2004, the CPUC initiated a rulemaking process to assess potential enhancements to the existing EMF policy.

By 2006, the CPUC issued Decision 06-01-042, which reiterated the absence of a proven direct link between EMF exposure and adverse health effects. Additionally, in July 2006, the CPUC adopted the EMF Design Guidelines for Electrical Facilities, requiring the preparation of a substation field management plan (FMP) for the construction of any new substation rated 50 kilovolts (kV) or above. It is noteworthy that these guidelines specifically exclude the requirement of conducting magnetic field modeling for new substation projects. Instead, we will prepare a checklist for this new substation project.

1.2 PROJECT DESCRIPTION

The New Substation project is a proposed gas-insulated substation, which is served by PG&E's Martin Substation and supplies power to San Francisco County. Existing transmission lines from the south, in San Mateo County, as well as the transmission system in San Francisco, would be connected to the New City Substation at several voltage levels: 12kV, 115kV and 230 kV.

The New City Substation has step-down transformers (which reduce the input voltage to a lower voltage) including two 230/115 kV, 420MVA transformers, and four 115/12 kV, 45MVA transformers. These transformers convert system voltage from 230 kV to 115 kV and 115 kV to 12 kV, respectively.

As part of the new City Substation, the City would build gas-insulated switchgear buildings that would contain high-voltage components (e.g., circuit breakers and disconnect switches). Gas-insulated switchgear refers to high-voltage equipment in which the major conducting facilities are contained within a sealed environment. The equipment's sealed design provides excellent insulation, allowing for a compact footprint for the new City Substation. The storage, use, and disposal of the insulating medium would comply with local, state, and federal laws and regulations. Apart from the gas-insulated switchgear, the functions of the individual equipment would be nearly identical to those at an outdoor substation (such as the adjacent PG&E Martin Substation).

1.3 FMP INFORMATION

Per the FMP Guidelines, construction of a new substation rated 50 kV or above requires the preparation of a substation FMP in the form of a checklist. In accordance with the EMF Design Guidelines, filed with the CPUC in compliance with CPUC Decisions 93-11-013 and 06-01-042, the proposed project would implement the following "no-cost and low-cost" magnetic field reduction measures. See Table 1 for a checklist of no-cost field reduction measures.

Table 1 – Checklist Evaluation of No-Cost Field Reduction Measures

No.	Magnetic Field Reduction Measures Evaluated for the Proposed Project	Measure Adopted? (Yes/No)	Reason(s) if Not Adopted

1	Locate high-current devices-transformers away from the substation property lines.	Yes	-
2	Ensure the distance from underground duct banks to adjacent property lines is as far as practical	Yes	-
3	Locate new substations close to existing power lines to the extent practical.	Yes	-
4	Increase the substation property boundary to the extent practical.	Yes	-
5	Locate the New City Substation-Project Variant close to the Existing Martin Substation to the extent practical.	Yes	-
6	Arrange the high-voltage cables in a triangular formation to reduce EMF	Yes	-
7	Install high voltage switchgear inside of the GIS building	Yes	-

1.4 Preliminary Layout and Description of the Checklist

Below is a checklist of magnetic field reduction measures for the New Substation project, per the FMP guidelines:

- Transformers will be located **away from the substation property lines**.
- Underground cables would be placed as far from adjacent properties as practical and at a depth that minimized electromagnetic field (EMF) exposure to the public, aligning with industries best practices.
- Site can accommodate for all connections to be installed underground inside the substation and the main equipment is inside the loop of vehicle access.
- Project Variant increases the substation property boundary to the extent practical, with a vehicle access gap between major equipment and fence.
- The property is adjacent to PG&E Martin Substation.
- The duct bank is designed with each cable installed in its own conduit and the conduits are arranged in a triangular formation rather than horizontally to minimize electromagnetic field effects.
- High voltage switchgear is installed inside the GIS building, which reduces the EMF compared to an outdoor switchgear installation.

Figure 1 – Proposed Variant Substation 3D View

1.5 References:

1. CPUC Electromagnetic Field (EMF) Design Guidelines for Electrical Facilities