4 Project Description

PG&E proposes to expand the existing Vierra Substation in the City of Lathrop and build a new, double-circuit power line west from the substation, approximately 1 mile to the existing Tesla-Stockton Cogen Junction 115 kV Power Line. The new power line and expanded substation would provide more electrical capacity and reliability for households and businesses in Lathrop, Manteca, and surrounding areas of San Joaquin County.

4.1 Project Title and Overview

The Vierra Reinforcement Project (project) would add a new double-circuit power line, connecting to the Tesla-Stockton Cogen Junction 115 kV Power Line, to reinforce the area's 115 kV and 60 kV systems connected at Kasson, Manteca, and Salado Substations. The area's existing 115 kV equipment would be replaced, upgraded, and reconfigured to accommodate the project's new 115 kV double-circuit lines within the expanded Vierra Substation. The new power line would require upgrades within ~~five~~ six substations in Alameda and San Joaquin counties, and two telecommunications towers in Contra Costa and Stanislaus counties (see Section 4.4, below).

Commented [LJL1]: Suggest you might want to refer to these as "minor modifications" since an upgraded substation is defined in GO 131-D, Section III.B as an increase in substation land area or voltage. Although this says upgrades "within" substations, there are later times when you refer to substation upgrades, and it might be better to avoid any confusion by calling them modifications.

4.2 Lead Agency Name and Address

California Public Utilities Commission
Energy Division
505 Van Ness Avenue, Fourth Floor
San Francisco, California 94102

4.3 Lead Agency Contact Person and Phone Number

Michael Rosauer, Project Manager
Energy Division, CEQA Unit
California Public Utilities Commission
505 Van Ness Avenue, Fourth Floor
San Francisco, California 94102
(415) 703-2579 or Michael.Rosauer@cpuc.ca.gov

4.4 Project Location

Vierra Substation and the new power line are located in a primarily industrial area within the City of Lathrop, in southern San Joaquin County (see **Figure 4-1**). In addition to expanding Vierra Substation, the project would require upgrades to the protection equipment and telecommunications equipment at the remote Kasson, Manteca, Tracy, Ripon Cogen, Howland Road and Tesla Substations to integrate protection of the new line into the existing system. New telecommunications equipment at the Mount Oso and Highland Peak telecommunications towers would also be installed.

The new power line would originate at the Vierra Substation, north of State Route (SR) 120 and east of Interstate 5. It would extend approximately 1,000 feet west along the north side of Vierra Road, ~~-~~then turn in a northwesterly direction for approximately 1,000 feet, crossing Union Pacific Railroad tracks at a perpendicular angle and paralleling the east side of D'Arcy Parkway. The alignment then turns west and extends along the south side of Christopher Way for approximately 2,000 feet, then northwest along Nestle Way for approximately 800 feet to where it ties into the existing Tesla-Stockton Cogen Junction

115 kV Power Line on the west side of a private spur rail line serving the Crossroads Business Park. The alignment is shown on **Figure 4-1**.

The new power line would be integrated into the existing system with new protection equipment at several area substations (see **Figure 4-2**). Upgrades would occur within the existing fence lines at the following area facilities:

- Kasson Substation, located on S Kasson Road in San Joaquin County
- Manteca Substation, located on Elm Avenue in the City of Manteca, in San Joaquin County
- Tracy Substation, located on Grant Line Road in the City of Tracy, in San Joaquin County
- Ripon Cogen Substation, located on S Stockton Avenue in the City of Ripon, in San Joaquin County
- Tesla Substation, located on Patterson Pass Road in Alameda County
- Howland Substation, located on Howland Road in the City of Lathrop

Microwave dishes would be added to existing telecommunications towers at Mount Oso and Highland Peak (see **Figure 4-2**). The Mount Oso tower is located in northwestern Stanislaus County, approximately 6 miles northwest of the intersection of Del Puerto Canyon Road and Mount Oso Road, off Mount Oso Road. The Highland Peak tower is located in southern Contra Costa County, approximately 4.5 miles west of the intersection of Morgan Territory Road and Manning Road, along a private road.

4.5 Project Sponsor's Name and Address

Pacific Gas and Electric Company
300 E. State Street, Suite 600
Redlands, California 92373

4.6 Existing System

~~The~~ Vierra Substation serves the cities of Lathrop and Manteca, and is located approximately 1 mile east of the Tesla-Stockton Cogen Junction 115 kV Power Line. This power line collects and delivers electricity to the Tesla Substation, located approximately 17 miles southwest of ~~the~~ Vierra Substation. The Tesla-Stockton Cogen Junction 115 kV Power Line also serves ~~the~~ Tesla Motors Substation in the Crossroads Industrial Park and provides a back-tie support as needed to the Lockeford/Bellota 115 kV System. The existing and proposed Tesla 115 kV system with the Vierra Reinforcement Project are depicted in **Figure 4-2**.

4.7 General Plan Designation

The new power line and Vierra Substation expansion components of the project would be located within the Lathrop city boundaries. The general land use designation for where the new power line and Vierra Substation expansion is proposed is General Industrial. Within 0.5-mile of the project area, additional land designations include Service Commercial, Limited Industrial, and Commercial Office under the Lathrop General Plan. See **Figure 5.10-1** in **Section 5.10, Land Use and Planning** for the land use designations in the vicinity of the new power line and Vierra Substation expansion.

The general plan land use designation for the remote substation sites are: General Agriculture for ~~the~~ Kasson Substation, Public/Quasi-Public for ~~the~~ Manteca Substation, Industrial for ~~the~~ Tracy Substation, Heavy Industrial for ~~the~~ Ripon Cogen Substation, General Industrial for ~~the~~ Howland Road Substation, and Large Parcel Agriculture for ~~the~~ Tesla Substation. The general plan land use designation for the Mount Oso tower site is Agricultural and the Highland Peak tower site is Agriculture.

4.8 Zoning

The new power line and Vierra Substation expansion components of the project would be located within the Lathrop city boundaries. The zoning designation for where the new power line and Vierra Substation expansion is proposed is General Industrial. Within 0.5-mile of the project area, additional zoning designations include Service Commercial Lathrop Gateway, Commercial Office Lathrop Gateway, and Limited Industrial Lathrop Gateway under the Lathrop Zoning Ordinance. See **Figure 5.10-2** in **Section 5.10, Land Use and Planning** for the zoning designations in the vicinity of the new power line and Vierra Substation expansion.

The zoning designations for the remote substations are: General Agriculture for ~~the~~ Kasson Substation, Public/Quasi-Public for ~~the~~ Manteca Substation, Light Industrial for ~~the~~ Tracy Substation, Heavy Industrial for ~~the~~ Ripon Cogen Substation, General Industrial for ~~the~~ Howland Road Substation, and Agriculture for ~~the~~ Tesla Substation. The zoning designation for the Mount Oso tower site is Exclusive Agricultural and the Highland Peak tower site is General Agriculture.

4.9 Surrounding Land Uses and Setting

The new power line and Vierra Substation expansion components of the project are in a predominantly industrial area in the City of Lathrop. The existing Vierra Substation is located adjacent to the north side of Vierra Road, approximately 0.20 mile west of McKinley Avenue, and is surrounded by agricultural land owned by the J.R. Simplot Company. The alignment of the power line extends westward from the expanded substation, crossing agricultural land and paralleling Vierra Road, and then heads northwest to cross Union Pacific Railroad tracks and a parcel owned by the City of Lathrop, currently being utilized as a sprayfield for wastewater treatment and retention. The alignment crosses D'Arcy Parkway at the intersection with Christopher Way, and continues southwest on city property along the south side of Christopher Way, adjacent to a water treatment plant and opposite warehouses associated with the commercial-industrial land use of the Crossroads Business Park. The alignment crosses Christopher Way and then Nestle Way, extending along the south side of Nestle Way, before crossing a privately owned rail spur servicing the Crossroads Business Park and terminating at the Tesla-Stockton Cogen Junction 115 kV Power Line. **Figure 4-1** shows the overall project location as well as general existing land use.

~~The~~ Howland Substation is in an industrial area in the City of Lathrop. The substation is bordered by Howland Road and Union Pacific Railroad tracks to the east and is surrounded by Industrial land uses.

~~The~~ Kasson Substation is surrounded by agricultural land uses in unincorporated San Joaquin County. The substation is adjacent to Interstate Highway 5.

~~The~~ Manteca Substation is in a residential area in the City of Manteca. The substation is 10 acres in size and partially enclosed with a wall on the north side and east sides and a fence on the southwest side of the substation. Residential yards abut the substation to the north and on the east there are residences and a small park across the street. A fence on the southwest side is bordered by the Manteca Tidewater

Bikeway paved trail, a stake park and stormwater basin. Railroad tracks parallel the southwest side of the substation, approximately 175 feet away.

~~The~~ Tracy Substation is in an industrial area in the City of Tracy. The substation is bordered by railroad tracks on the west and surrounded on all sides by industrial land uses and warehousing. A residential area is approximately 500 feet to the west of the substation, beyond the railroad tracks.

The Mount Oso Telecommunication Tower is surrounded by grassland habitat. There is no development around this facility.

The Highland Peak Telecommunication Tower is surrounded by scrub habitat and valley needlegrass grassland habitat. There is no development around this facility.

4.10 Project Overview

The new double-circuit line would be made up of the Tesla-Vierra and Vierra-Stockton Cogen Junction 115 kV power lines, located together on approximately 16 TSPs. The project would also improve reliability by upgrading the substation to a compact BAAH bus configuration. Additionally, the upgrade of Vierra Substation to a BAAH bus configuration would allow for Howland Road Substation, located approximately 0.7-mile north of Vierra Substation, to receive power directly from Vierra Substation instead of from the Vierra-Tracy-Kasson 115 kV line, which is approximately 10.5 miles in length, thereby increasing the reliability of Howland Road Substation.

4.10.1 Project Objectives

The objectives of the project are:

- Increase service reliability to electricity customers in the cities of Lathrop, Manteca, and surrounding communities by alleviating a potential overload condition due to the growing load in the existing system.
- Meet the category "P6" planning performance requirement established by NERC that the electric system would operate reliably during the loss of two transmission circuits.
- Increase electric system capacity to help meet increasing demand in and around the cities of Lathrop and Manteca.
- Design and build a California ISO-approved project in a safe, cost-effective manner that would also minimize environmental impacts.

4.10.2 Project Background

The project is an electric infrastructure project in the Tesla 115 kV system south of Stockton that is aimed at helping PG&E provide added capacity and reliability to households and businesses in San Joaquin County. The center of the heaviest electric load in this region is around the cities of Manteca and Lathrop, which are in the eastern and southeastern parts of the service area. These customers are served from the distant Tesla Substation, approximately 20 miles to the west, or the Tracy Combined Cycle Power Plant (formerly GWF Tracy Power Plant and referred to herein as "GWF Tracy"), approximately five miles closer.

Power is transmitted to the load centers on four transmission paths that start at Tesla Substation and travel generally eastward on different routes toward ~~the~~ Manteca Substation in the City of Manteca (see **Figure 4-3**). The paths (named for the substations they pass through) include:

- Tesla-Schulte-Lammers-Kasson 115 kV Power Line
- Tesla-Schulte-Kasson-Manteca 115 kV Power Line
- Tesla-Salado-Manteca 115 kV Power Line
- Tesla-Tracy-Kasson-Vierra-Manteca 115 kV Power Line[1]

Much of the power for the Tesla 115 kV system is supplied by GWF Tracy, which connects directly into the Tesla-Schulte-Lammers-Kasson and Tesla-Schulte-Kasson-Manteca power lines east of Tesla Substation. The Tesla 115 kV system also receives stepped-down power at Tesla Substation from two 230/115 kV transformers.

The rest of the generation feeding ~~the~~ Tesla Substation is connected to the Tesla-Stockton Cogen Junction 115 kV Power Line. This line begins at Stockton Cogen Junction, an open switch near ~~the~~ Stockton Cogen Substation and power plant approximately 25 miles northeast of Tesla Substation. The power line travels southerly approximately 10 miles to the San Joaquin River, where it is joined by the Ripon Cogen 115 kV Power Line, a 10-mile-long tap line from ~~the~~ Ripon Cogen Substation and power plant in the City of Ripon. The Tesla-Stockton Cogen Junction 115 kV Power Line then continues generally southwesterly from the river for approximately 15 miles to Tesla Substation, picking up additional power on the way from the Thermal Energy power plant approximately 4 miles east of Tesla Substation.

In the City of Lathrop, the Tesla-Stockton Cogen Junction 115 kV Power Line passes one mile west of Vierra Substation~~,~~ and does not connect to the substation. Vierra Substation is located at the southern edge of Lathrop, just northwest of the City of Manteca, and is connected to two other 115 kV power lines extending from Tracy, Kasson and Manteca substations: the Tracy-Kasson-Vierra and Manteca-Vierra 115 kV power lines. Vierra, Tracy, Kasson and Manteca substations are directly or indirectly connected to Tesla Substation and together serve power to over half of the electric load in the Tesla 115 kV system. At Vierra Substation, power is converted from 115 kV to 17 kV distribution voltage to serve area customers.

With electric generation and load located on opposite ends of the Tesla 115 kV system, heavy loading on sections of the four transmission paths between Tesla and Manteca substations could result from overlapping outages on two of the four transmission paths – known as a P6 planning event. If this were to happen within the existing 115 kV system, the remaining lines may not be able to handle the load.

Since 2007, the Tesla-Salado-Manteca, Tesla-Schulte-Kasson-Manteca, and Tesla-Tracy-Kasson-Vierra-Manteca power lines have experienced sustained outages ranging from an average of 9 hours to 225 hours per outage. During the summer of 2017, one of the transmission paths, the Tesla-Salado-Manteca 115 kV Power Line, remained out of service from a heavy storm. To mitigate potential overloads for the next outage, Transmission Operations was prepared to initiate rolling blackouts of up to 68 MW of load. Fortunately, the second overlapping outage did not materialize.

[1] The Tracy-Kasson-Vierra 115 kV Power Line and the Manteca-Vierra 115 kV Power Line both connect to Vierra Substation and are part of this transmission path.

To improve system reliability and increase capacity by approximately 164 MW,[2] PG&E proposes to construct a one-mile-long, double-circuit power line between the Tesla-Stockton Cogen Junction 115 kV Power Line and Vierra Substation. The increased capacity of 164 MW was determined by performing power flow simulations with pre-project and post-project system models. In each case, limiting facilities were identified for various outages while increasing the area load. The increase in capacity represents the change in system capacity from the pre-project system model to the post-project system model. California ISO approved this project in its 2010-2011 Transmission Plan and, after reassessment in 2017, reaffirmed the approval in its 2017-2018 Transmission Plan. The new connecting line would provide a shortcut from the generation sources on the Tesla-Stockton Cogen Junction 115 kV Power Line through Vierra Substation to the Manteca load centers. It would also add a fifth transmission path for power to be transmitted from Tesla Substation to the load centers in the east and southeast of the service area. The fifth transmission path would add capacity to the system and reduce the loading on the existing four transmission paths, which would prevent overloads for any overlapping outages if a P6 event takes two lines out of service.

The project would also upgrade Vierra Substation to a compact BAAH bus configuration, where each bay would have two elements (line or transformer connections) connected to three 115 kV circuit breakers. The BAAH upgrade would not only further improve reliability for the three transmission paths connecting through Vierra Substation, it would also facilitate a direct connection to Howland Road Substation, located approximately 0.7-mile north of Vierra Substation.

4.11 Project Components

The project consists of the following components:

- **New Power Line.** An approximately 1-mile-long, double-circuit 115 kV power line would be installed on approximately 16 TSPs.
- **Vierra Substation Expansion**. Vierra Substation would be expanded approximately 340 feet to the west. The existing 115 kV equipment would be replaced, upgraded, and reconfigured to accommodate the new 115 kV double-circuit lines. A new microwave tower with antenna would be installed.
- **Remote Substation Upgrades.** In addition to expanding Vierra Substation, the project would require upgrades to Kasson, Manteca, Tracy, –Ripon Cogen, Howland Road and Tesla ~~S~~substations to integrate protection of the new line into the existing system. Telecommunication equipment would be installed at Kasson, Manteca, and Tracy, including microwave dishes on new monopoles. Control room equipment would be upgraded at Howland Road, Ripon Cogen and Tesla ~~S~~substations. An antenna would be installed at Howland Road Substation, along with a new circuit switcher, voltage transformer and other minor equipment modifications.
- **Remote Telecommunication Tower Upgrades.** Microwave dishes would be installed on the existing Mount Oso and Highland Peak telecommunication towers.

Figures 4-4a through **4-4d** show the alignment of the new power line, ~~including~~ the existing power lines to be removed and relocated, and the expanded substation. The location of the pull sites, staging areas, pole work areas, and guard structure work areas are also shown.

Commented [LJL1]: Note that the existing lines are not in the new alignment so original language was not accurate

[2] The project is expected to add approximately 164 MW, based on preliminary planning estimates.

New Power Line

The new power line between Vierra Substation and the existing Tesla-Stockton Cogen Junction 115 kV Power Line would be approximately one-mile-long and a double-circuit, composed of the Tesla-Vierra 115 kV Power Line and Vierra-Stockton Cogen Junction 115 kV Power Line. The power line would be supported by approximately 16 galvanized TSPs that range in height from approximately 80 to 90 feet above ground.

Other lines being rearranged to connect with the expanded substation are the Vierra-Tracy-Kasson 115 kV Power Line, the Manteca-Vierra 115 kV Power Line, and the Howland Road 115 kV Tap. To enable the Vierra-Tracy-Kasson 115 kV Power Line and the Manteca-Vierra 115 kV Power Line to enter the expanded substation from the west, two double-circuit TSPs on the north side of Vierra Road, west of the substation expansion, would be replaced with one double-circuit TSP. Also, two single-circuit TSPs at the southwest corner of the existing substation and one single-circuit TSP at the northwest corner of the existing substation would be replaced with four single-circuit TSPs on the west side of the substation expansion. These TSPs would range in height from approximately 75 to 85 feet. Howland Road 115 kV Tap is a single-circuit line that currently branches off from the Vierra-Tracy-Kasson 115 kV Power Line at the northwest corner of the existing Vierra Substation. As part of the proposed project, the tap line would be disconnected from the power line and connected directly into Vierra Substation. To do this, the southernmost wood pole on the Howland Road 115 kV Tap (approximately 38 feet in height), would be replaced with a light-duty steel pole (LDSP) approximately 57 feet in height, and a new TSP approximately 85 feet in height and 400 feet south of the LDSP would be installed within the eastern portion of the substation expansion.

TSPs would be approximately 2 to 4 feet wide at the base and approximately 10 inches wide at the top. All TSPs would have concrete pier foundations measuring approximately 4 to 6 feet in diameter, 18 to 30 feet deep, and extending 1 to 2 feet above ground. The LDSP would be approximately 2 feet wide at the base and approximately 10 inches wide at the top and direct embedded. The preliminary locations of the new and rearranged structures are shown in **Figures 4-4a** through **4-4d**.

Drawings of typical designs for TSPs and LDSP are provided in **Figure 4-5**. Pole designs would meet raptor safety requirements with 13-foot phase spacing and an 8-foot crossarm to support phase conductors. This design provides a conductor separation distance that meets the specifications in the guidance document entitled "Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006," published by the Avian Power Line Interaction Committee.

The proposed conductor for both circuits on the new power line is 715.5 thousand circular mils[3] (kcmil) all-aluminum conductors (AAC) "Violet" double-bundle specular conductor with a summer interior rating of 1262 amperes (amps). It is a "bundled" conductor consisting of two parallel wires approximately 10 inches apart installed on the same cross-arm, creating a single phase. Three phases on three cross-arms make up one circuit. To support the double-circuit lines, three cross arms would be installed on each side of the TSPs. Nine of the TSPs on the new power line would be dead-end structures, while the remaining seven would be tangent or a running angle suspension configuration. For the single-circuit lines on the west side of Vierra Substation, typically two cross-arms would be installed on one side of the TSPs and one on the other side.

[3] A mil is 1/1000 inch. Kcmil is one thousand circular mil. A unit of the conductor's cross-sectional area divided by 1,273 to obtain the area in square inches.

On the rearranged Vierra-Tracy-Kasson 115 kV Power Line, the Manteca-Vierra 115 kV Power Line, and the Howland Road 115 kV Tap, the relocated conductor would be 477 kcmil steel supported aluminum conductor (ACSS) "Flicker," and the conductor on the Howland Road 115 kV Tap between the new TSP and Vierra Substation would be 715.5 kcmil AAC "Violet." Toughened glass or ceramic insulators would be used on all poles except the TSP connecting to the Tesla-Stockton Cogen Junction 115 kV Power Line, and the new TSP and LDSP being installed on Howland Road 115 kV Tap, which would have non-ceramic, polymer insulators with silicone rubber sheds.

When the ~~rearranged~~ TSPs are rearranged to connect with the expanded substation (those on the north side of Vierra Road supporting the Vierra-Tracy-kasson 115 kV and Manteca-Vierra 115 kV power lines), the line would be reconductored. There would be no change in conductor capacity. Also the span between the TSP and station dead end along the Howland Road 115 kV Tap on the north side of the Vierra Substation would be reconductored. There would be no change in conductor capacity.

The new conductor would be installed a minimum of 39 feet above the ground in accordance with PG&E standards, which exceed the California Public Utilities Commission (CPUC) General Order (GO) 95 minimum clearance of 30 feet. The 115 kV conductor would have a minimum radial separation distance of 8.5 feet. The span lengths between poles would be approximately 400 feet, with the longest span being approximately 520 feet between the two poles on the east side of D'Arcy Parkway, north of South Howland Road.

Vierra Substation Expansion

To accommodate the Vierra Substation expansion and future improvements to Vierra Road, three existing TSPs supporting both the Vierra-Tracy-Kasson 115 kV Power Line and the Manteca-Vierra 115 kV Power Line would be relocated, two TSPs would be installed, and two TSPs would be removed. Additionally, a minimum of one wood pole would be removed and one new single-circuit TSP and one new single-circuit LDSP would be installed to re-route the Howland Road 115 kV Tap to its new termination bay within the expanded substation. A total of six poles supporting the lines that would be relocated would be removed and be replaced with seven poles to support the relocated lines. Existing and proposed plans and profiles for Vierra Substation, based on preliminary engineering, are provided in **Figures 4-6** and **4-7**. More information on the appearance of the expanded substation, including visual simulations of the project, is provided in **Section 5.1 Aesthetics**.

New equipment to be installed at the substation consists of:

- a four-bay, compact BAAH bus arrangement;
- eleven 115 kV sulfur hexafluoride (SF6) circuit breakers;
- 24 center break disconnect switches;
- 7 vertical break disconnect switches;
- 19 coupling-capacitor voltage (CCVT) 115 kV transformers;
- a 115 kV station service transformer 100 kV ampere (kVA);
- associated support structures;
- Modular Protection, Automation, and Control (MPAC) building;
- battery building (provides backup power in the event of an outage at the Vierra Substation); and
- a new 120-foot microwave tower with one six-foot diameter microwave dishes and 3-foot long antenna.

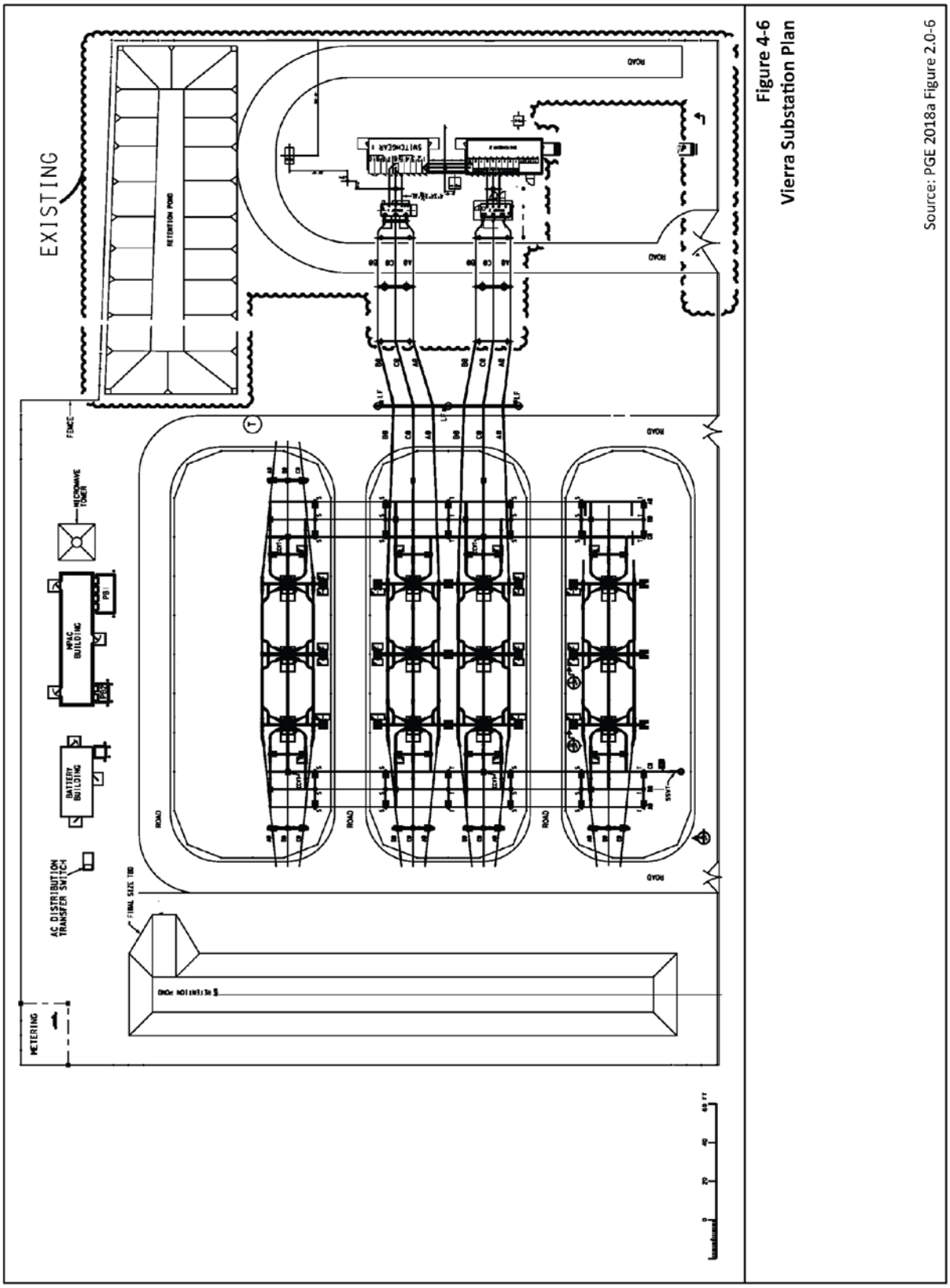


Figure 4-6
Vierra Substation Plan

Source: PGE 2018a Figure 2.0-6

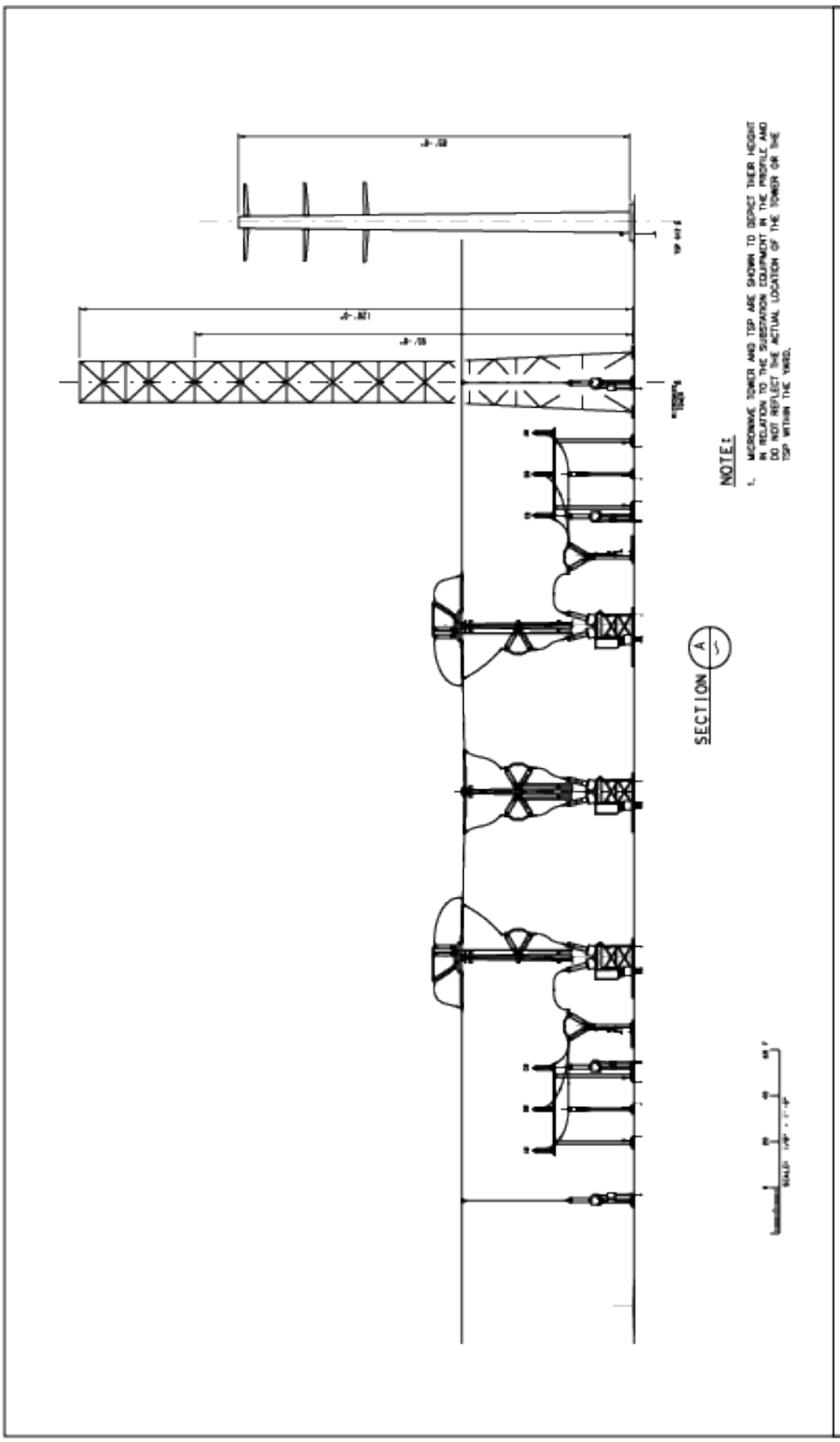


Figure 4-7
Vierra Substation Profile

Source: PGE 2019a

Equipment to be removed consists of:

- two 115 kV circuit breakers
- six 115 kV CCVT transformers
- 3 disconnect switches
- 2 bypass switches
- 2 circuit switchers
- associated structures
- string bus

The Vierra Substation expansion includes space for a third transformer and two additional 115 kV line positions, consistent with PG&E standard practice, although there are currently no plans for these facilities. A stormwater retention pond would be constructed within the expanded substation, measuring approximately 300 feet long by 40 feet wide and 3 feet deep.

The project would also improve reliability by upgrading the substation to a compact BAAH bus configuration, where each bay would have two elements (line or transformer connections) connected to three 115 kV circuit breakers. Using this configuration, only two breakers per BAAH bay are used at one time, allowing one breaker to be taken out of service without taking either of the two lines out of service. The special compact BAAH configuration would have a smaller footprint than either a standard BAAH or Ring Bus configuration.

PG&E would acquire an approximately 3.4-acre parcel for the expansion of Vierra Substation, increasing the substation from 1.6 acres to a total of 5.0 acres to accommodate the new power line and substation modifications. The expansion would extend approximately 340 feet west of the existing substation, and approximately 33 feet further back from Vierra Road than the existing substation. Substation modifications include converting the 115 kV bus into a four-bay compact BAAH bus arrangement and installing the MPAC and battery buildings and a microwave communication tower.

All new Vierra Substation equipment would be adequate to support the new 115 kV line requirements. Existing substation structures are a maximum of approximately 40 feet tall. Replacement dead-end structures would be approximately 2 to 4 feet wide at the base and approximately 42 feet tall. The prefabricated MPAC building would be approximately 64 feet long, 15 feet wide, and 11 feet tall, and be covered in steel sheeting with a sloped roof. The battery building would measure approximately 34 feet long, 15 feet wide, and 11 feet tall. The battery building at the substation would provide backup power for the substation facilities during a power outage (e.g. to switchgear), and also provide power to communication and control equipment. The battery building would not contribute power to the electrical grid or contribute to the 164 MV increase in capacity of the electrical grid.

Construction and operations power would be provided from the existing station service transformers within the substation. Portable generators may also be used during construction. The expanded substation would have a precast concrete wall along the south side facing Vierra Road, consistent with the existing substation wall, and 9-foot-tall chain link fencing consisting of an 8-foot-tall chain link fence topped with 1 foot of barbed wire on the remaining sides, or as otherwise consistent with PG&E's corporate security requirements at the time of installation. The lighting at the substation would consist

of non-glare fixtures located and designed to avoid casting light or glare toward off-site locations. The expanded substation would be unstaffed, with automated features and remote-control capabilities.

The microwave tower at the Vierra Substation would be approximately 15 feet wide at the base, approximately 9 feet wide at the top, and approximately 120 feet tall. The microwave tower would typically have a slab foundation measuring approximately 25 by 25 feet and extend approximately 4 to 6 feet below ground and 6 inches above ground.

Remote Substation Upgrades

Upgrades to telecommunications would be required as a part of the Vierra Substation expansion at remote substations. The upgrades would be conducted within the fence line of the substation and require construction personnel to enter each substation to modify existing protective telecommunications equipment to integrate protection of the new line into the existing system. Telecommunication upgrades at the Kasson, Manteca, and Tracy Substations include~~s~~ a monopole with microwave dishes. At Howland Road Substation, an antenna, up to 6' in length, would be added to a pole installed previously, and other modifications would be made to protect the new line. Telecommunication upgrades at the Ripon Cogen and Tesla Substations would be within the control room. No ground-disturbing activity is expected at the Ripon Cogen or Telsa substations. The modifications to be performed at each substation include:

- Kasson Substation: Upgrade/Replace line relay by building a 60-foot communications tower (ground disturbance) and affixing one, six-foot diameter microwave dish on the new tower;
- Manteca Substation: Upgrade/Replace line relay by building a 60-foot communications tower (ground disturbance) and affixing two, six-foot microwave dishes on the new tower;
- Tracy Substation: Upgrade/Replace line relay by building a 60-foot communications tower (ground disturbance) and affixing two, six-foot microwave dishes on the new tower;
- Howland Road Substation: Install new antenna, circuit switcher (to replace 115 kV fuses), voltage transformer, and 600-foot-long conduit duct bank; update automation equipment in the control room;
- Ripon Substation: Update automation equipment in the control room; and,
- Tesla Substation: Update automation equipment in the control room.

See **Figure 4-8** for a close-up view of the remote substations where upgrades would occur (as discussed below). A close up view of the Vierra Substation is also provided.

The monopole foundations would typically have a slab foundation measuring approximately 11 by 11 feet and extend approximately 4 feet below ground and 18 inches above ground. Minor trenching within the substation yards would be required at each microwave structure. Drawings of the typical design for microwave structures are provided in **Figure 4-9**.

The upgrade work at Howland Road Substation includes: Installing a new circuit switcher with a three-pier foundation (approximately 12.5 feet by 4 feet diameter) and a new voltage transformer with a single-pier foundation (approximately 9 feet by 2 feet diameter); removing three 115 kV fuses; trenching to install a new conduit duct bank between the new circuit switcher and the existing control building (600 feet by five feet by five feet); affixing one up-to-six-foot antenna on an existing pole; and updating protection and automation equipment in the control room.

Remote Telecommunication Tower Upgrades

PG&E IT Requirements are based on PG&E Protection Department and PG&E System Automation requirements. The protection requirements for the substation expansion specifically call for relay protection circuits to be transported. In order to do this, new microwave radio paths up to Mount Oso and to Highland Peak need to be installed in order to connect to existing microwave radio paths that connect to the other PG&E substation locations. Three, six-foot-diameter microwave dishes would be added to existing telecommunication tower at Mount Oso and one, six-foot-diameter microwave dish would be added to Highland Peak.

The Mount Oso tower is owned by PG&E and located in northwestern Stanislaus County, approximately 6 miles northwest of the intersection of Del Puerto Canyon Road and Mount Oso Road, off Mount Oso Road. The Highland Peak tower is owned by Contra Costa County and located in southern Contra Costa County, approximately 4.5 miles west of the intersection of Morgan Territory Road and Manning Road, along a private road. See **Figure 4-10** for a close-up view of the location of the microwave stations. All work would occur within the existing fence line surrounding the existing towers. Both towers would be accessed by existing roads.

4.12 Project Construction

The following discussion is preliminary and based on typical construction practices and anticipated construction needs. Final design may require modifications to the expected work areas described herein; however, impacts associated with potential refinements are not anticipated to differ.

4.12.1 Construction Methods

Power Line Construction

To install the poles, work would begin by excavating a hole for each pole. For new TSPs, the holes would measure approximately 4 to 6 feet in diameter and 18 to 30 feet deep. The holes for TSPs would be drilled and excavated using a line truck mounted with an auger. The line truck would set up adjacent to the existing pole. Excavated soils would either be feathered around the new pole site using a backhoe or loaded into a dump truck to be disposed of off-site. As outlined in **APM HM-4**, if soils to be removed during site grading or excavation are suspected of being contaminated (on the basis of visual, olfactory, or other evidence), the excavated soil would be tested according to particle testing standards, and if necessary, disposed of at a licensed waste facility. Measurements associated with pole installation are summarized in **Table 4-1**.

TABLE 4-1: SUMMARY OF TYPICAL POLE INSTALLATION METRICS

Pole Type	Diameter (inches)	Hole Depth (feet)	Average Work Area around Pole (acres)	Number	Permanent Footprint per Pole (sq. feet)
TSP	24 to 72 (base); 10 inches top	18 to 30	0.17	19 (install)	3 to 28
TSP	24 to 48 (base); 10 inches top	18 to 30	0.17	3 (relocate)	3 to 13
TSP	-	-	0.17	2 (remove)	-
LDSP	24 (base); 10 inches top	14	0.23	1 (install)	3
Wood	-	-	0.23	1 (remove)	-
				Total Permanent Footprint for Poles (acres):	0.01

Note: This table is preliminary and subject to change based on CPUC requirements, final engineering, ground conditions at time of construction, and other factors. All measurements are approximate.

Source: PGE 2018a.

Following excavation, new poles and hardware would be delivered to the pole work areas. A rigging truck would be used to deliver the TSPs. Poles typically would be delivered the same day they are to be installed, unless there is a location to place the pole within the work area that does not obstruct vehicle or pedestrian traffic. Poles, insulators, and hardware would be assembled in the pole work area.

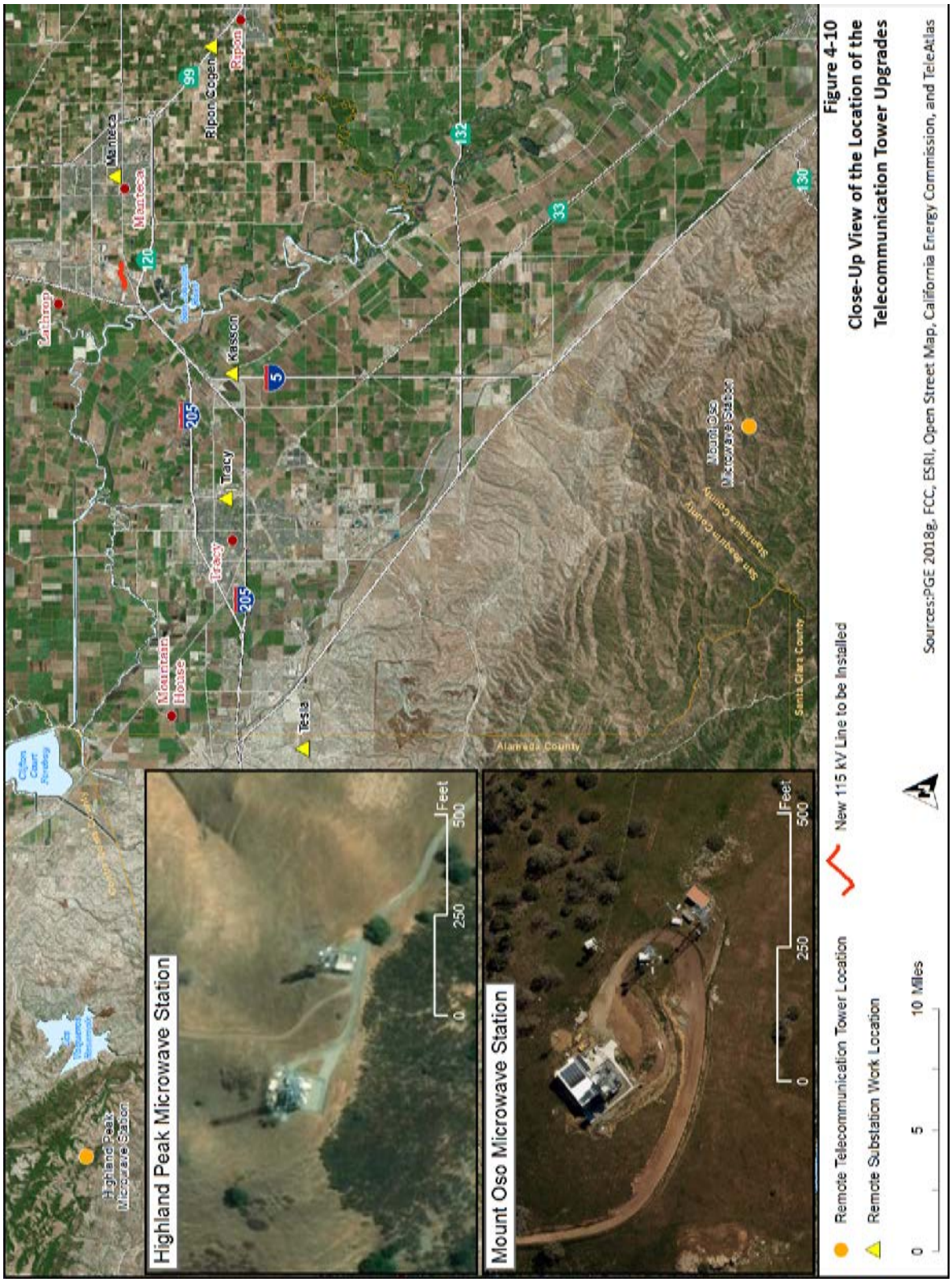


Figure 4-10
Close-Up View of the Location of the Telecommunication Tower Upgrades

A line truck would be used to place foundation forms, anchor bolts, and rebar, and a concrete truck and concrete pump would be used to deliver and pour concrete for the foundation form. Once the concrete has cured, the forms would be removed and native soil placed around the base. A crane would then be used to install the new TSP on the foundation.

The location of the pole to be installed on the east side of D'Arcy Parkway near the intersection of Christopher Way is within a percolation basin associated with the City of Lathrop's recycled water system. The location was determined in coordination with the Engineering Department of the City of Lathrop, and it was agreed that the pole should be installed immediately adjacent to the side of the basin through the placement of fill, and not on the access road surrounding the basin. Approximately 100 cubic yards of soil would be imported and compacted against the side of the basin, filling an area extending approximately 20 feet out from the corner of the basin and approximately three feet deep, within which the foundation for the pole would be installed. If required by the City of Lathrop, a reinforced 40-mil high density polyethylene pond liner, consistent with the existing pond design and best practicable treatment and control measures, would be installed on the surface of the fill. The City of Lathrop asked to receive a drawing of the in-fill prior to PG&E conducting the work.

The existing poles removed as part of the relocation of the Vierra-Tracy-Kasson 115 kV Power Line, the Manteca-Vierra 115 kV Power Line, and the Howland Road 115 kV Tap, would be removed using a backhoe and crane or similar equipment. The poles would be lowered to the ground and then transported by truck to a recycling facility. Existing foundations for the TSPs would be removed by jackhammers to approximately three feet below ground surface, and filled in with the soils excavated from the new foundation locations.

One small helicopter would be used to install stringing rollers on the cross-arms at each pole where conductor is being installed, and to place a pulling line between each TSP. When the pulling line is in place for the length of the pull, it would be connected to the new conductor. The new conductor would be on a reel tensioner, typically located on a line truck or semi-truck trailer in an established project pull site. The pulling line would then pull back the new conductor. Tension would be maintained between the tensioner and puller to keep the new conductor properly elevated and away from obstacles. The conductor would then be sagged and clipped into the new insulators, and the stringing rollers removed using aerial lift equipment.

Vierra Substation Expansion

Surveyors would establish grading limits and set grade stakes for the expanded Vierra Substation pad. PG&E would begin site preparation for the substation expansion by relocating three distribution poles on the west side of the existing substation to a new alignment outside of or under the substation expansion area. The existing poles supporting the Vierra-Tracy-Kasson 115 kV Power Line and Manteca-Vierra 115 kV Power Line along Vierra Road would also be relocated onto temporary (shoofly) poles (**Figure 4-12**) within the work area west of the substation expansion. The existing Howland Road 115 kV Tap would be re-routed to a new termination bay within the expanded substation. Any crop present at the time of construction would be cleared, and any other organic material would be removed. This material would be stockpiled within the work area, and eventually hauled to a PG&E-approved disposal facility. The rough grade would be established by importing fill to closely match the elevation of the existing substation, and engineered fill would be spread and compacted on the pad surface. It is anticipated that approximately 10,000 cubic yards of fill would be required. PG&E would acquire the fill from a source available at that time of construction. PG&E generally attempts to find fill in close

proximity to the work site, and anticipates the source would likely be within a ten-mile radius of the project location.

For the 120-foot microwave tower in the expanded Vierra Substation, a 25 foot by 25 foot hole, approximately 4-6 feet deep, would be excavated for setting a concrete slab foundation that would have an aboveground height of approximately 6 inches. A 6-foot diameter dish and 3-foot long antenna would be installed on the tower. The microwave tower would be located at the northeast corner of the expansion area. Due to the presence of a eucalyptus tree, the tower would need to be 120-feet in height; however, if the property owner agrees that the tree can be trimmed or removed, the microwave tower could be reduced to approximately 100 feet. **Figure 4-7** shows the tower at 120 feet. The holes would be drilled and excavated using a truck-mounted digger and the excavated soils would be removed with a backhoe and loaded into a dump truck at each structure location. As outlined in **APM HM-4**, if soils to be removed during excavation are suspected of being contaminated (on the basis of visual, olfactory, or other evidence), the excavated soil would be tested according to particle testing standards, and if necessary, disposed of at a licensed waste facility.

A rigging truck would be used to deliver the tower, typically on the same day that it is to be installed, and the tower, insulators, and hardware would be assembled in the pole work area. A line truck would be used to place foundation forms, anchor bolts, and rebar. A cement truck would be used to deliver and pour concrete for the foundation form. Once the concrete has set, the form would be removed and gravel placed around the base. A crane would then be used to install the new structures on the foundation. The microwave dish would be installed on the completed tower.

Peak construction traffic would occur for approximately one week during substation construction when 20 trucks per day would be required to import the 10,000 cubic feet of fill needed for the expansion (assuming one belly truck would hold 25 cubic yards of fill). Rough grading would be followed by installing a 9-foot-tall security fence, excavating and installing the subsurface ground grid, forming and pouring concrete footings and foundations for all the aboveground structures, and installing aboveground steel structures, switches, MPAC building, battery building, retention pond, and other electrical equipment associated with the expansion. A final layer of aggregate would be spread on all unpaved areas in the expanded substation. Paved roads would be constructed within the expanded substation to provide access to substation equipment and tie into the asphalt roadways within the existing substation.

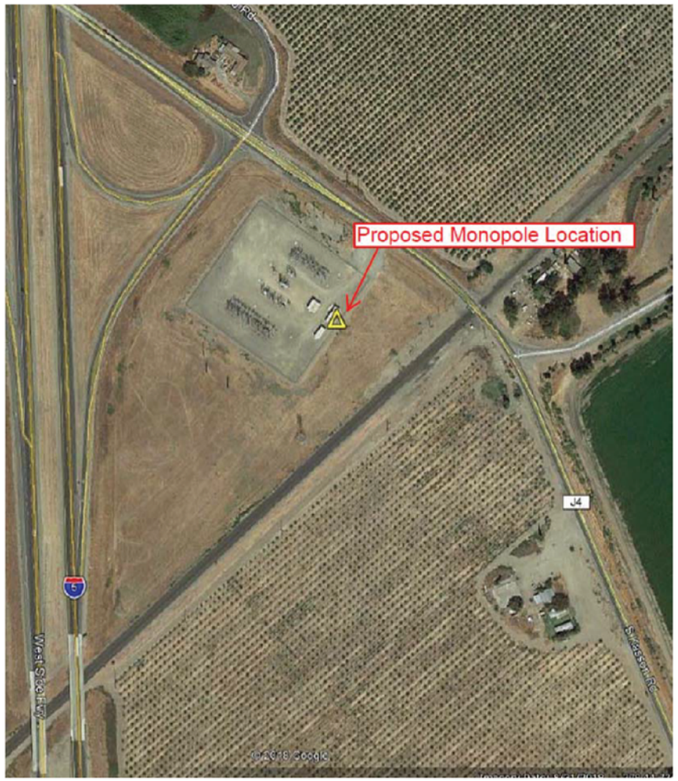
Remote Substation Upgrades

For the approximate 60-foot monopoles at Kasson, Manteca, and Tracy substations, an 11 foot by 11 foot hole, approximately 4 feet deep, would be excavated for setting a concrete slab foundation that would have an aboveground height of approximately 18 inches. As described for the Substation Expansion project component, like the microwave tower, a rigging truck, line truck, and craned would be used to install the monopoles. **Figure 4-11** presents the proposed location of the monopole for each of the remote substations.

The new direct connection integration at Howland Substation will require~~;~~ a new 600 foot by 5 foot by 5 foot conduit trench, a new circuit switcher with 3 pier foundations, 12.5 foot by 4 foot in diameter, and a new voltage transformer with one pier 9 foot by 2 foot diameter foundation.

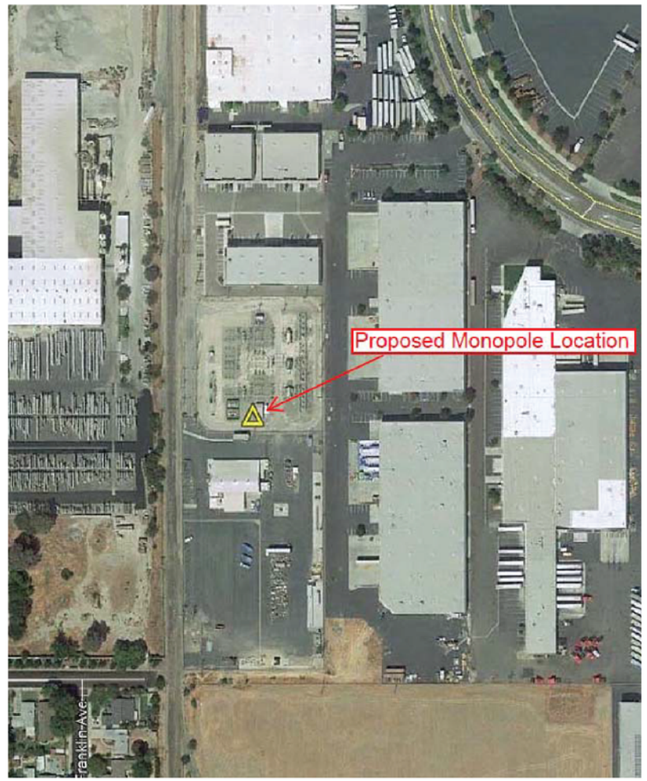
Remote Telecommunication Tower Upgrades

The microwave dishes that would be added (co-located) on to existing telecommunication towers at Mount Oso and Highland Peak would require construction personnel to climb the existing towers and install 3, 6-foot diameter microwave dishes at Mount Oso and 1, 6-foot diameter microwave dish at Highland Peak towers. No ground disturbance would be required.



Kasson Substation

Manteca Substation



Tracy Substation

Figure 4-11
Proposed Locations of Microwave Monopoles
(Approximate, Preliminary, and Subject to Change)

Source: PGE 2019a

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4.12.2 Right-of-Way Requirements

New Power Line and Vierra Substation Expansion

PG&E has existing land rights along portions of the project area, which include fee-owned lands for ~~the~~ Vierra Substation and franchise rights for the existing power line facility installed along Vierra Road, in addition to an existing overhang easement on the north side of Vierra Road. Additional easements—measuring approximately 30 to 100 feet wide and 3,900 feet in total length—would be required for the new power line facilities (**Figure 4-12**). Along the north side of Vierra Road, the new easement would be approximately 100 feet wide to accommodate the new line and moving the existing power line out of the road franchise. Along Christopher Way and Nestle Way, the majority of new power line facilities, including all structures, would be installed within easements of varying widths to be acquired by PG&E, and the remainder would overhang the road franchise. PG&E's land rights include ingress and egress to the power lines, vegetation removal, pole installation, and reconstruction.

While no land rights are needed where the new power line crosses the Union Pacific railroad and spur line (see **Figures 4-4b** and **4-4d**), Union Pacific has right of way requirements necessary for the safe operation of their railroad signal equipment. For more details about Union Pacific's requirements for new transmission lines in proximity to their railroad right of way see **Section 5.16 Transportation and Traffic**.

Land rights issues are generally determined after CPUC approval of a project, as they are not part of the regulatory proceeding in which the CPUC considers whether to grant or deny an application for a Permit to Construct (PTC). Any land rights issues for this project would be resolved in subsequent negotiations and/or condemnation proceedings in the proper jurisdiction, following the issuance of a decision by the CPUC on PG&E's PTC application (see, for example, the Jefferson-Martin 230 kV Transmission Project, A.02-04-043, D.04-08-046).

Remote Substation Upgrades and Remote Telecommunication Tower Upgrades

No land rights would need to be acquired for these project components.

4.12.3 Temporary Structures

New Power Line and Vierra Substation Expansion

Shoofly Poles

To accommodate the substation expansion and future improvements to Vierra Road, three existing TSPs supporting both the Vierra-Tracy-Kasson 115 kV Power Line and the Manteca-Vierra 115 kV Power Line would be relocated, two TSPs would be installed, and two TSPs would be removed. Approximately four temporary shoo-fly structures would be installed to support the relocation of these lines. **Figure 4-13** shows a typical shoo-fly structure.

Guard Structures

To prevent the conductor from sagging onto other utility lines or roads, temporary guard structures—consisting of either vertical wood poles with cross-arms and nets, or staged construction equipment—would be installed or mobilized at crossings of energized electric lines, railroad crossings, and/or major roadways, including Nestle Way, Christopher Way, South Howland Road, and D'Arcy Parkway. **Figure 4-14** shows a typical guard structure with and without netting.

Remote Substation Upgrades and Remote Telecommunication Tower Upgrades

No temporary structures are anticipated to be necessary for these project components.

4.12.4 Construction Work Areas

The following work areas are preliminary and based on typical construction practices and anticipated construction needs. Final design may require modifications to the expected work areas described in the following paragraphs; however, impacts associated with potential project refinements are not anticipated to change.

New Power Line

Pole Work Areas

TSP installation for the new line would require an approximately 0.1- to 0.5-acre work area at each TSP location (typically ranging from approximately 100 by 40 feet to 185 by 90 feet). Construction materials would be delivered by line truck and staged at pole work locations. Construction crews would access work areas by truck or on foot. Approximately half of the pole work areas would be on paved surfaces, while the other pole work areas are either immediately adjacent to a paved road or would be accessed using existing dirt roads. If necessary, site preparation, including use of gravel and/or matting on non-paved work areas, would be utilized for construction work in the winter or during rain events. Ground vegetation may need to be mowed, and recently planted landscaping such as along Nestle Way and Christopher Way, including trees and shrubs, may need to be removed. Currently there are approximately 2 pine trees, 2 oak trees, and one eucalyptus tree that would need to be removed, and based on the City of Lathrop's landscape plan for D'Arcy Parkway, an additional three eucalyptus trees may need to be removed. As the trees are container stock planted in 2017 or later, they can all be removed by hand digging. PG&E would coordinate with the City of Lathrop regarding tree replacement with species compatible with power line easements.

Guard Structure Work Areas

A work area up to approximately 0.03 acre in size (typically approximately 60 by 20 feet) would be required for each guard pole at crossings of energized electric lines, railroad crossings, and/or major roadways, including Nestle Way, Christopher Way, South Howland Road, and D'Arcy Parkway.

Pull Sites

Pull and tension sites are required to install the new conductor onto the TSPs. Approximately five pull sites would be located generally in line with the proposed power line alignment, typically at locations where the alignment changes direction. The longest distance between pull and tension sites is approximately 3,500 feet, between the Vierra Substation and the western end of Christopher Way. Along Nestle Way, a pull and tension site is located at each pole as the alignment changes direction between each pole. The exact location of each site would depend on ground conditions and would not be determined until just prior to construction. Each pull site would have a footprint of up to approximately 0.2 to 0.5 acre (typically approximately 200 by 100 feet). The majority of pull sites would be located on paved areas, and no blading, grading, or filling is anticipated to be required. Where appropriate, materials such as fiberglass mats, metal plates, or gravel would be laid down at the pull sites to minimize ground disturbance.

Pull sites would be used to stage conductor-pulling trucks and conductor reel trucks. Construction vehicles and equipment needed at the pull sites are expected to be parked or staged within sidewalks and adjacent paved roads, which may require a lane closure.

Helicopter Landing Zone

One light-type helicopter landing zone would be required for the approximately two days of helicopter operation to install the pulling line on the new TSPs. The landing zone would be approximately 0.5 acre in size, within a designated staging area on the west side of Vierra Substation (SA-1). If this area is not available at the time of construction, the north side of South Howland Road, east of D'Arcy Parkway (SA-2) would be used. A staging area could also be used as a landing zone. The flight path of the helicopter would be directly over the top of the new line. Where appropriate, materials such as fiberglass mats or gravel would be laid down at the landing zone to minimize ground disturbance.

Vierra Substation Expansion

The work area for the Vierra Substation expansion would consist of the existing substation, which is an area of approximately 1.6 acres, and an approximately 3.4-acre parcel on the west side of the existing substation. Temporary work areas outside of the expanded substation parcel may be required for construction of the substation expansion. The area of the substation expansion and adjacent possible temporary work area is approximately 1,100 by 415 feet.

Remote Substation Upgrades and Remote Telecommunication Tower Upgrades

No work areas are anticipated to be necessary for these project components.

4.12.5 Construction Access Roads

New Power Line and Vierra Substation Expansion

The Vierra Substation currently has one entrance gate, located along Vierra Road. Two additional entrance gates along Vierra Road would be installed as part of the expansion. The majority of project work areas for the pole line work would be accessed using public roads. No new roads are expected to be established for these project components, as existing access roads would provide access to and/or near most of the poles. Temporary lane and sidewalk closures would occur during construction when equipment is needed to work on poles adjacent to roads. Nestle Way, Christopher Way, and D'Arcy Parkway would each need to be closed for up to approximately five minutes when the helicopter is passing over the road with the new line. A width of up to approximately 16 feet would be required for passage of construction vehicles. The existing dirt access road extending from South Howland Road may require vegetation trimming and removal, and may require placement of gravel to improve traction and all-weather access. Road types and approximate mileage anticipated for project use are provided in **Table 4-2**. Minor adjustments to access may be necessary at the time of construction due to land use changes, unanticipated impacts, and other factors. Existing roads would be used to access the remote-end work locations.

TABLE 4-2 UNPAVED ACCESS ROADS

Type of Road	Improvements Required	Approximate Width (feet)	Approximate Length (feet)	Total Approximate Area (acres)
Existing Unpaved	Vegetation removal, minor grading, and gravel	14-18	808	0.26-0.33

Notes This table is subject to change based on California Public Utilities Commission requirements, final engineering, ground conditions at time of

construction, and other factors. Source: PGE 2018a

Remote Substation Upgrades
Access to the Kasson, Manteca, or Tracy Substations would be via an existing entrance off public paved roads. No new access roads are anticipated.

Remote Telecommunication Tower Upgrades
Access to the towers would be via existing unpaved roads. No new access roads are anticipated.

4.12.6 Construction Staging Areas

New Power Line and Vierra Substation Expansion
Temporary staging areas would be used for a variety of purposes, including as conductor pull sites, storing construction materials and equipment, landing zones, parking of vehicles and equipment, and meeting areas. Any staging area that would store material would typically be fenced using cyclone-type fencing with a double gate. Various existing PG&E industrial facilities and private parcels in the general project area may be used as temporary staging areas. These are identified along the new power line route in **Figures 4-4a** through **4-4d**, and include:

- An area of up to 6 acres west of Vierra Substation
- A 1.6-acre area on the north side of South Howland Road, east of D'Arcy Parkway
- A 2.5-acre area on the west side of D'Arcy Parkway, north of South Howland Road

Other areas may be identified closer to construction. Staging areas range in size from approximately 1 to 6 acres. The footprint would vary depending on the area available for use at the time of construction and project needs. The project staging areas are located on flat lands and preparation may require mowing of vegetation and minor grading. Minor ground disturbance at staging areas would occur, and some staging areas may need to be graveled prior to use. Temporary electrical service may be required at staging areas, and security fencing may be installed. **Table 4-3** shows temporary staging information for the project.

TABLE 4-3 TEMPORARY STAGING AREAS

Staging Area/ Pull Site	Description	Figure No.	Currently Existing Land Cover
PS-1	200 ft. x 100 ft.	4-4d	Undeveloped
TWS-1	185 ft. x 90 ft.	4-4d	Undeveloped
PS-2	200 ft. x 100 ft.	4-4d	Developed/ Paved
TWS-2	160 ft. x 90 ft.	4-4d	Developed/ Paved
PS-3	299 ft. x 75 ft.	4-4d	Developed/ Paved
TWS-3	150 ft. x 70 ft.	4-4d	Developed/ Paved
PS-4	200 ft. x 50 ft.	4-4d & 4-4c	Developed/ Unpaved
TWS-4	4,216 sq. ft.	4-4d	Developed/ Unpaved
TWS-5	100 ft. x 40 ft.	4-4c	Developed/ Unpaved
TWS-6	100 ft. x 40 ft.	4-4c	Developed/ Unpaved

TABLE 4-3 TEMPORARY STAGING AREAS

Staging Area/ Pull Site	Description	Figure No.	Currently Existing Land Cover
TWS-7	100 ft. x 40 ft.	4-4c	Developed/ Unpaved
TWS-8	100 ft. x 40 ft.	4-4c & 4-4b	Developed/ Unpaved
TWS-9	150 ft. x 100 ft.	4-4b	Undeveloped
TWS-10	50 ft. x 50 ft.	4-4b	Undeveloped
TWS-11	2.88 acres	4-4b & 4-4a	Undeveloped
TWS-12	200 ft. x 340 ft.	4-4a	Undeveloped
TWS-13	100 ft. x 100 ft.	4-4a	Undeveloped
TWS-14	100 ft. x 100 ft.	4-4a	Undeveloped
SA-1	1,100 ft. x 415 ft.	4-4a	Undeveloped
SA-2	1.6 acres	4-4b	Undeveloped/vegetated
SA-3	2.5 acres	4-4b	Undeveloped/vegetated

Source: PGE 2018a Appendix A

Remote Substation Upgrades
Staging areas would be in open areas within the existing graveled substation yards. The size of the staging area would depend upon the size of the substation yard, the area within the yard to be used safely, and may consist of multiple smaller areas, rather than one single stating area.

Remote Telecommunication Towers Upgrades
A staging area of approximately 30 feet by 30 feet at the base of the tower would be needed at the telecommunication towers to off load the materials.

4.12.7 Helicopter Use

New Power Line
One small helicopter would be used to install the stringing rollers on the cross-arms at each TSP and a pulling line between each TSP. Use of the helicopter to install the pulling line would decrease the duration of construction. The pulling line would be connected to the conductor and would pull the new conductor through the stringing rollers, to be clipped into the insulators.

The typical payload would be human load, small minor materials, tools, and pulling of the sock line, and the helicopter would be used approximately four hours per day, on two days in separate weeks. Helicopter refueling would take place at the helicopter landing zone carried out by a fuel truck provided by the helicopter company. The fuel truck would be equipped with a spill kit. Fuel would not be stored on the project site.

Commented [LJL1]: workers?

PG&E's helicopter operator would obtain all necessary FAA permits, comply with all applicable regulations regarding air traffic within 2 miles of the project alignment, and coordinate all project helicopter operations with the local airport before and during project construction. All employees involved with helicopter work methods would be required to have formal training and carry a card that the pilot of the helicopter reviews prior to performing the work. ~~Additionally, PG&E has a manual for helicopter procedures.~~ The helicopter would follow a designated flight path to the project and along the

alignment, to the extent possible, to avoid potential risk to the public. Helicopters that are carrying equipment or construction materials would not pass over major highways, and they would pass near, but not directly over, a limited area containing habitable structures. Where appropriate, materials such as fiberglass mats or gravel would be laid down at the landing zone to minimize ground disturbance. In addition, the implementation of dust control in the area through watering or use of a soil stabilizer, as needed with the implementation of **APM AIR-1**, would control fugitive dust at the landing zone.

With the implementation of **MM TRA-2**, PG&E would comply with all applicable FAA regulations regarding air traffic within 2 miles of the project alignment and PG&E's helicopter operator would coordinate all project helicopter operations with the local airport before and during project construction.

Vierra Substation Expansion, Remote Substation Upgrades, and Remote Telecommunication Tower Upgrades

Helicopters would not be used for the Vierra Substation expansion, remote substation upgrades or the remote telecommunication towers upgrades components of the project.

4.12.8 Vegetation Clearance

New Power Line and Vierra Substation Expansion

PG&E has contacted landowners about vegetation clearance requirements on their property. Mowing may be required at staging areas and pull sites, and recently planted landscaping along Nestle Way and Christopher Way may need to be removed and replaced to establish construction work areas, project access, and provide clearance along the reconductored line to comply with CPUC GO 95 requirements. Also, if the property owner agrees, the eucalyptus that is along the microwave path of the new microwave tower could be either trimmed or removed; thereby possibly allowing the new microwave tower to stand at approximately 100 feet instead of the proposed height of 120 feet.

Remote Substation Upgrades

No vegetation clearance is anticipated at ~~the~~ Kasson, Manteca, Howland Road or Tracy ~~S~~substations as there is no vegetation within these substations and work would occur within these substations.

Remote Telecommunication Tower Upgrades

No vegetation clearance is anticipated at these towers as the new microwave dishes would be installed by a construction worker climbing the structure.

4.12.9 Erosion and Sediment Control and Pollution Prevention during Construction

New Power Line and Vierra Substation Expansion

Construction of ~~the~~ these project components would require ground-disturbing activities of approximately 2.8 acres at Vierra Substation and 0.4 acre at each pole location, including minor vegetation trimming, tree removal, and pole installation and removal. Because these activities would result in disturbance of more than 1 acre in total, PG&E would obtain coverage under the State Water Resource Control Board (SWRCB) General Permit for Storm Water Discharges Associated with Construction Activity Order No. 2009-0009-DWQ.[1] To obtain coverage under the permit, PG&E would develop and submit permit registration documents to the SWRCB prior to initiating construction

[1] Order No. 2009-0009-DWA-
https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf

activities, including a Notice of Intent, Stormwater Pollution Prevention Plan (SWPPP), risk assessment, site map, certification, and annual fee.

PG&E would implement the SWPPP during construction to prevent polluting storm drains with sediment or other polluted runoff related to project construction. The SWPPP would outline best management practices (BMPs) for each activity that has the potential to degrade surrounding water quality through erosion, sediment runoff, and other pollutants. Refer to **Section 5.9, Hydrology** for more information.

Remote Substation Modifications~~Upgrades~~

Work at the remote substations with monopole installations would require ground disturbance of approximately an 11-foot square hole for each of 3 monopoles. Work at Howland Road Substation requires an approximately 600 foot by 5 foot conduit trench, an approximately 12 foot by 4 foot three pier circuit switcher foundation and an approximately 9 foot by 2 foot diameter voltage transformer pier foundation. No additional areas of ground disturbance are anticipated. Work would be covered under the project's SWPPP.

Remote Telecommunication Tower Upgrades

No ground disturbance would occur at either tower. Work would be covered under the project's SWPPP.

4.12.10 Cleanup and Post-Construction Restoration

Crews would be required to maintain clean work areas for all components of the project as they proceed through construction, and they would be instructed that no debris may be left behind at any stage of the project.

New Power Line and Vierra Substation Expansion

Poles used as guard structures would be taken to appropriate disposal facilities to be reused, recycled, or disposed of in accordance with applicable law. Restoration activities would be conducted as needed and in coordination with landowners, and would consist of restoring landscaped areas along Christopher Way and Nestle Way, and applying a native seed mix or other seed mix—as approved by landowners—in areas of ground disturbance. On the south side of Christopher Way, existing fence panels opposite the new TSPs would be replaced with non-conductive fencing. PG&E would conduct a final survey to ensure that cleanup activities have been successfully completed.

Remote Substation Upgrades

Clean up at the remote substations with monopole installations and other ground-disturbing activities would include approximately 575 cubic yards of soil, which would be excavated and, after testing, would be disposed of at the appropriate location. Should dewatering be required during foundation construction, the water would be removed from the site and/or tested prior to discharge.

Remote Telecommunication Tower Upgrades

No additional cleanup is identified for this project component.

4.12.11 Construction Workforce and Equipment

Construction on the new power line would require approximately 15 workers, the Vierra Substation expansion would require up to 19 workers, each of the telecommunications work at the Vierra Substation and remote substations would require up to 8 workers, and 3 workers for the telecommunications towers.

Construction hours would typically occur between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and between 9:00 a.m. and 7:00 p.m. Saturday, although some nighttime construction is anticipated to take advantage of line clearances during off-peak hours. Some Sunday work may also occur between 9:00 a.m. and 7:00 p.m. It is anticipated that construction crews would work concurrently, either 4 to 6 10-hour days per week, or on a rotating schedule of 11 days on and 3 days off.

Equipment typically used during project construction is identified in **Table 4-3a**. **Table 4-3a** also describes a breakdown of typical duration of use during construction, including days per week of operation, hours per day of operation, and the total duration of use (in weeks). **Table 4-3b** details the equipment that is planned for use. Not all equipment would be used during all stages of the project activity.

TABLE 4-3a TYPICAL CONSTRUCTION EQUIPMENT AND DURATION OF USE

Activity	Total Number of On-Site Workers	Estimated Quantity and Type of Equipment		Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)
Vegetation trimming	2	1	Leaf blower	2	10	1
		1	Weed mover	2	10	1
		1	Pickup truck	2	10	1
Traffic control	4	2	Work site protection type vehicles	6	2	12
		2	Flasher board	6	8	12
TSP installation (includes foundation and augur TSP holes)	6	1	40-ton crane	4	1	8
		1	Tractor trailer	4	2	8
		1	Construction digger	2	6	8
		1	Crane with 120 boom	2	4	8
		1	Backhoe	4	2	8
		1	Dump truck	2	6	8
		1	Foreman pickup truck	6	1	8
		1	Crew-cab truck	6	1	8
		2	Cement truck	2	6	6
Conductor installation	15	1	V-Groove puller attached to line truck	3	6	5
		1	Helicopter (small)	1	3	2
		1	Tensioner attached to line truck	3	6	5
		1	40-ton crane	6	6	5
		2	Bucket truck	6	6	5
		2	Boom truck	6	6	5
		3	Crew-cab truck	6	2	5
		3	Foreman pickup truck	6	3	5
		1	Forklift	6	2	5
		1	Hardline puller	3	6	5

TABLE 4-3a TYPICAL CONSTRUCTION EQUIPMENT AND DURATION OF USE

Activity	Total Number of On-Site Workers		Estimated Quantity and Type of Equipment		Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)
			2	Crane with 120 boom	6	6	5
Vierra Substation expansion A	19		2	Concrete truck	3	3	8
			2	D-3 Bulldozer	5	6	2
			1	Bucket truck	5	6	2
			1	Line truck	5	6	2
			1	50-ton crane	5	6	1
			2	Water truck	5	6	8
			2	Compactor	5	6	6
			1	Road grader, six wheel	5	6	2
			1	Elevating scraper	5	6	2
			2	Mini excavator	5	8	8
			1	Large excavator drill	5	6	4
Vierra Substation Expansion B	18		3	Aerial man lift	5	5	20
			2	2-ton flatbed truck	5	4	20
			2	Fork lift	5	5	20
			2	Backhoe	5	6	20
			2	Skid-steer bobcat	5	4	30
			1	Boom truck	5	6	20
			2	Air compressor	5	2	30
			1	Portable generator	5	4	30
Vierra Substation Expansion C	0		2	Dump truck	5	NA	4
Vierra Substation Expansion D	7		5	Pickup truck	5	4	52
Telecom: Vierra Substation	MW Tower/Monopole Foundation Work (Digging, Framing, Rebar, Concrete pour, Concrete test, Concrete curing)	8	1	Backhoe	4	10	2
			1	Pickup truck	5	4	52
			1	Dump truck	2	10	1
			1	Concrete truck	2	10	1
	MW Tower/Monopole Stacking and Waveguide Bridge	4	1	Crane	4	10	2
			1	Pickup truck	4	10	2
	MW Antenna and Waveguide Installation	3	1	Crane	2	10	1
Telecom: Kasson Substation	MW Tower/Monopole Foundation Work (Digging, Framing, Rebar, Concrete pour, Concrete test, Concrete curing)	8	1	Backhoe	4	10	2
			1	Pickup Truck	4	10	2
			1	Dump Truck	1	10	1
			1	Concrete Truck	1	10	1
	MW Tower/Monopole Stacking and	4	1	Crane	4	10	2

TABLE 4-3a TYPICAL CONSTRUCTION EQUIPMENT AND DURATION OF USE

Activity	Total Number of On-Site Workers		Estimated Quantity and Type of Equipment		Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)
	Waveguide Bridge		1	Pickup Truck	4	10	2
	MW Antenna and Waveguide Installation	3	1	Crane	2	10	1
Telecom: Tracy Substation	MW Tower/Monopole Foundation Work (Digging, Framing, Rebar, Concrete pour, Concrete test, Concrete curing)	8	1	Backhoe	4	10	2
			1	Pickup Truck	4	10	2
			1	Dump Truck	1	10	1
			1	Concrete Truck	1	10	1
	MW Tower/Monopole Stacking and Waveguide Bridge	4	1	Crane	4	10	2
			1	Pickup Truck	4	10	2
	MW Antenna and Waveguide Installation	3	1	Crane	2	10	1
Telecom: Manteca Substation	MW Tower/Monopole Foundation Work (Digging, Framing, Rebar, Concrete pour, Concrete test, Concrete curing)	8	1	Backhoe	4	10	2
			1	Pickup Truck	4	10	2
			1	Dump Truck	1	10	1
			1	Concrete Truck	1	10	1
	MW Tower/Monopole Stacking and Waveguide Bridge	4	1	Crane	4	10	2
			1	Pickup Truck	4	10	2
	MW Antenna and Waveguide Installation	3	1	Crane	2	10	1
Telecom: Howland Road Substation	Circuit Switcher Installation and voltage transformer installation	8	2	Backhoe	4	10	2
			1	Pickup Truck	4	10	2
			1	Dump Truck	4	10	2
			1	Concrete Truck	1	10	1
	Conduit Duct Bank installation	4	2	Backhoe	4	10	2
			1	Dump Truck	4	10	2
			1	Pickup Truck	4	10	2
			1	Fork Lift	4	10	2
	MW Antenna and Waveguide Installation	3	1	Crane	2	10	1
Telecom: Mount Oso	MW Antenna and Waveguide Installation	3	1	Pickup truck	2	10	1
Telecom: Highland Peak	MW Antenna and Waveguide Installation	3	1	Pickup truck	2	10	1
Notes: Duration of use in weeks is rounded up to the closest week. Source: PGE 2018f~~Telecom: Mount Oso~~	~~MW Antenna and Waveguide Installation~~	~~3~~	~~1~~	~~Pickup truck~~	~~2~~	~~10~~	~~1~~
~~Telecom: Highland Peak~~	~~MW Antenna and Waveguide Installation~~	~~3~~	~~1~~	~~Pickup truck~~	~~2~~	~~10~~	~~1~~

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TABLE 4-3a TYPICAL CONSTRUCTION EQUIPMENT AND DURATION OF USE

Activity	Total Number of On-Site Workers	Estimated Quantity and Type of Equipment	Estimated Days per Week of Operation	Estimated Hours per Day of Operation	Estimated Duration of Use (weeks)

~~Notes: Duration of use in weeks is rounded up to the closest week. Source: PGE 2018f~~

TABLE 4-3b ANTICIPATED CONSTRUCTION EQUIPMENT

Equipment	Use
Crane	Lift heavy equipment and materials
Backhoe	Excavation
Bucket truck	Aerial lift for construction personnel
Cement truck and pump	Deliver cement to worksite
Construction digger	Install poles
Compressor	Operate tools
Dump truck	Remove garbage
Flasher board	Traffic control
Foreman pickup truck, crew-cab truck, boom truck	Transport workers, material, equipment, and supplies
Forklift	Lift materials
Generator	Portable power generation
Hardline puller	Install conductor
Helicopter (light)	Install conductor
Jackhammer	Excavate holes
Leaf blower	Vegetation removal
Tensioner attached to line truck	Install conductor
Tractor trailer	Deliver poles to the site
V-Groove trailer puller attached to line truck	Install conductor
Weed mower	Vegetation trimming
Work site protection type vehicle	Traffic control

Source: PGE 2018a

4.12.12 Construction Schedule

Constructing the Vierra Substation expansion would take approximately 12 to 18 months to complete and would likely begin prior to construction of the new power line, which is estimated to take approximately 3 to 4 months to complete. The scheduling of clearances would determine the overall schedule of the project. Although very little site development would be required due to the urban nature of ~~the~~ where the new power line and Vierra Substation expansion project component are located, some staging area and access road preparation would be required prior to installing poles and conductors. The pole installation crew would take approximately three days to complete one foundation and pole installation. Once all the poles have been installed, the new conductor would be installed within a period of five weeks. Construction at the remote substations would take approximately 2 weeks to complete for each substation except for Howland Substation, where work will take approximately 4-6 weeks. Construction at the remote telecommunication towers would take less than a week for each tower. The earliest construction is estimated to commence is in Spring 2020, pending issuance of project

approvals and acquisition of land rights. The project is expected to be operational in 2023 or earlier depending how long it takes to acquire land rights and other factors.

4.13 Operation and Maintenance

4.13.1 System Monitoring and Control

PG&E would operate the expanded 115 kV substation remotely from its Grid Control Center located in Vacaville, California, consistent with current procedures. Station and line alarms would be transmitted by the dedicated phone line to the control center. If an alarm is triggered that requires an on-site visit, personnel would be dispatched from PG&E's local maintenance center in Stockton.

4.13.2 Facility Inspection

Regular inspection of equipment and electrical lines, support systems, and instrumentation and controls is critical for the safe, efficient, and economical operation of the project. Under normal circumstances, routine inspections of the substation by PG&E personnel would continue to occur on a monthly basis or as needed under emergency conditions. The power line would be inspected annually or as needed when driven by an event, such as an emergency. The current PG&E facility inspection process involves three types of inspections: (1) ground inspections, (2) aerial inspections, and (3) climbing, if ground inspections indicate a need. Typically, power line inspections occur annually, rotating between ground inspections and flyovers. Maintenance of the power line would generally be conducted on an as-needed basis, when equipment is discovered in need of repair during inspections, or in response to an emergency. A benefit of using TSPs for the project is that they generally require less maintenance than wood poles.

Facility inspection of the remote substations and telecommunication towers would not change from current practices.

4.14 Other Permits and Approvals

The CPUC is the lead agency for CEQA review of this project. In accordance with CPUC GO 131-D Section III.B (GO-131-D), PG&E prepared and submitted a PEA as part of its application for a PTC. The CPUC has exclusive authority to approve or deny PG&E's application; however, various permits from other agencies may also need to be obtained by PG&E for the project. In addition to the PTC, **Table 4-4** summarizes the permits from other federal, State, and local agencies that may be needed for the project.

TABLE 4-4 PERMITS AND APPROVALS THAT MAY BE REQUIRED FOR THE PROJECT

Agency	Jurisdiction	Requirements
FEDERAL/STATE AGENCIES		
California Public Utilities Commission	Construction, modification, or alteration of substations and power line facilities.	PTC (GO-131-D) - A PTC is required under the CPUC's General Order No. 131-D, Section III.B.
State Water Resources Control Board	Construction activities disturbing 1 acre or more of soil must submit a Notice of Intent to comply with the terms of the general permit.	National Pollution Discharge Elimination System Storm Water Permit (ministerial) - The project would develop and implement a State Water Pollution Prevention Plan.
Federal Communications Commission	Operation of microwave bands	License to operate

TABLE 4-4 PERMITS AND APPROVALS THAT MAY BE REQUIRED FOR THE PROJECT

Agency	Jurisdiction	Requirements
LOCAL/REGIONAL AGENCIES		
City of Lathrop	For construction activities completed within city road rights-of-way.	Encroachment Permit (ministerial) - Pull sites and work areas would be located within city roads.
	Cuts or fills in excess of 50 cubic yards.	Grading Permit (ministerial) - Grading of substation site.
	Construction of a wall.	Building Permit (ministerial) - Substation perimeter wall.
	Construction of a storm water control system.	Building Permit (ministerial) – Storm water retention pond.
Union Pacific Railroad	For construction activities completed within or over Union Pacific Railroad rights-of-way.	Encroachment Permit (ministerial) - The new line would cross a segment of Union Pacific Railroad.

Source: PGE 2018a, PGE 2019a

Commented [LJL2]: This is not required; ministerial grading permit only

4.15 Applicant Proposed Measures

PG&E proposes to implement measures to ensure the project would occur with minimal environmental impacts in a manner consistent with applicable rules and regulations. PG&E proposes to implement these measures during the design, construction, and operation of the project in order to avoid or minimize environmental impacts.