

## **1.0 PROJECT DESCRIPTION**

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### **1.1 PROJECT OVERVIEW**

Pacific Gas & Electric (PG&E) proposes to construct and operate a three-bank, 115-12 kilovolt (kV) distribution substation in the Fulton-Fitch Mountain Distribution Planning Area (DPA), known as the Windsor Substation Project (project). The project is needed to relieve the electric system deficiency projected to occur in the Town of Windsor, Sonoma County, and to ensure safe and reliable electric service to existing and approved development. The project site is located 0.25 mile west of the intersection of Conde Lane and Mitchell Lane in the Town of Windsor, and is bounded by Mitchell Lane to the north and the Northwestern Pacific Railroad (NWPRR) right-of-way to the west (see Figure 1-1).

Currently, the Fulton-Fitch Mountain 12 kV DPA is served by two substations in Sonoma County: the Fulton Substation located on River Road at Highway 101 in Fulton, and the Fitch Mountain Substation located on Bailhache Road east of Healdsburg Avenue in southern Healdsburg. The DPA serves northern Santa Rosa, Windsor, and the greater Larkfield-Wikiup area.

With continuing residential, commercial, and light-industrial electric growth in the area, the demand for electricity is expected to exceed the available capacity of the existing facilities. With an annual growth rate of approximately 2.5 Megawatts per year (MW/year), the need for increased capacity in this area is forecasted to occur in 2011 (1.7 percent deficiency) and intensify by 2012 (4.4 percent deficiency). The greatest concentration of the load to be served is located west of Highway 101 within and around the Windsor town limits. The proposed three-bank, 115-12 kV distribution substation will bring the necessary electric supply to the area and meet the projected demand.

The project includes:

- installing a new three-bank, 115-12 kV distribution substation, initially constructed as a 60-12 kV substation,
- connecting the new substation to an existing 60 kV power line that is rated for 115 kV operation and will eventually be converted to 115 kV, and
- installing new 12 kV distribution lines and reconductoring existing distribution lines.

Section 1.5 Project Facilities provides a complete description of the project and the facilities to be constructed.

### **1.2 PROJECT LOCATION AND REGIONAL CONTEXT**

The project is located in the Town of Windsor in Sonoma County (see Figure 1-1). The site of the proposed substation is west of Highway 101, 0.25 mile west of the intersection of Conde Lane and Mitchell Lane, and is bounded by Mitchell Lane to the north and the NWPRR right-of-way to the west. The 3.2-acre parcel is flat land, previously graded along with adjacent parcels for industrial development, and owned in fee by PG&E. The site and surrounding lands to the

north, east, and south are zoned Light-Industrial, while lands to the west of the NWPRR are zoned Surrounding Residential with single family homes. To the north of Mitchell Lane is Wilson Ranch Soccer Park; immediately south of the substation site is the Conde Lane Mitigation Site, which is part of the Santa Rosa Plains Conservation Strategy, and further south is Pool Creek, which flows generally in a westerly direction. At its closest, Pool Creek is approximately 0.25 mile from the substation site. Figure 1-2 depicts current land uses and the boundaries of the 3.2-acre parcel. Detailed information on land use is provided in Chapter 11: Land Use and Planning, Recreation, and Agricultural Resources.

## **1.3 EXISTING REGIONAL ELECTRIC SYSTEM**

### **1.3.1 Background**

An electric power system typically consists of power plants, transmission substations, distribution substations, and overhead or underground electric lines. Power is delivered from the generating plants to customers through wires and cables, but the power is converted to higher and lower voltages several times for different purposes.

At the generating plants, the electric power is stepped up to a higher voltage, known as the transmission voltage. Stepping up to a higher voltage reduces the amount of current that flows through the wires, thereby allowing power to be delivered from generating plants to major load centers with fewer wires. Once the power has been delivered to the major load centers, it is stepped down to a voltage level suitable for delivery to individual customers.

Transmission and distribution substations are used to step up or step down the voltage and to route the power over the transmission and distribution lines. In the PG&E transmission system, power is transmitted at 500 kV, 230 kV, 115 kV, 70 kV, and 60 kV.

In the Sonoma County area, electric power is transmitted to regional substations at voltages of 230 kV, 115 kV, and 60 kV. The power is then stepped down at substations and distributed to customers using overhead or underground distribution lines at voltages of 21 kV, 12 kV, and 4 kV. The local delivery system voltage is stepped down further for individual customer use.

### **1.3.2 Transmission System**

PG&E's transmission system in the project area mainly consists of two 60 kV power lines, the Fulton No. 1 and the Fulton-Hopland lines, which originate at Fulton Substation. These lines mainly provide electric power to PG&E's distribution substations at Fitch Mountain and Geyserville, and also to the City of Healdsburg's Badger Substation.

### **1.3.3 Distribution System**

The electric distribution system in the Fulton-Fitch Mountain 12 kV DPA is comprised of eight 12 kV distribution circuits.

**Figure 1-1: Project Overview Map**

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**Figure 1-2: Proposed Substation Site Aerial Map**

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**INSERT 1-PAGE, 8.5 X 11 COLOR PROJECT LOCATION AERIAL MAP**

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**[BACK PAGE OF COLOR FIGURE 1-2]**

### ***1.3.3.1 12-kV System***

Two major substations supply the existing 12 kV distribution system: Fulton and Fitch Mountain. These substations and the surrounding area within a 4-mile radius for each are shown on Figure 1-3. Optimally, substations in suburban areas are located approximately three to five miles from each other in order to create back-ties and support for adjacent substations in the event of outages. Fitch Mountain and Fulton Substations are presently built out to maximum capacity, and are not able to pick up the additional load as demand in the DPA increases.

#### ***1.3.3.1.1 Fitch Mountain 60-12 kV Substation***

Fitch Mountain Substation serves northern Windsor and the distribution facilities east and west of the City of Healdsburg. Healdsburg operates its own municipal electric distribution system and obtains its power from PG&E via a connection at Badger Substation. Fitch Mountain Substation has two transformer banks. The substation site is small and there is no room to install additional banks or circuits at the site.

#### ***1.3.3.1.2 Fulton Substation***

Fulton Substation is the point of interconnection for much of the Geyser's geothermal power generation and serves as a regional electrical switching station. It includes 230 kV, 115 kV and 60 kV switching and voltage transformation facilities, with a small portion of the substation site in the southeast corner dedicated to the 12 kV distribution transformer yard. The two distribution transformers serve northern Santa Rosa, the unincorporated area of Larkfield, the Airport Business Park, and the majority of the Town of Windsor. However, the distribution transformers are circuit-limited with no practical outlets to feed additional load in the Windsor area.

### ***1.3.3.2 Adjacent DPAs***

In suburban areas, the electric distribution system forms a highly interconnected network with relatively few natural boundaries. Often adjacent suburban DPAs are highly interconnected, and loads near a DPA boundary occasionally are transferred from one DPA to another. Transfers are most common across connected boundaries between high-growth DPAs.

The Fulton-Fitch Mountain 12 kV DPA is between two PG&E DPAs, as noted below:

- The Santa Rosa DPA lies immediately south of the Fulton-Fitch Mountain 12 kV DPA and includes 12 kV substations at Monroe, Santa Rosa Station A, and Rincon. Load transfers between the Santa Rosa 12 kV DPA and the Fulton-Fitch Mountain 12 kV DPA have been uncommon due to bank and circuit-loading restrictions in both DPAs, and because there are few circuit ties between the DPAs.
- The Cloverdale-Geyserville 12 kV DPA is a very small DPA that lies north of the Fulton-Fitch Mountain 12 kV DPA. It is supplied by two 12 kV substations, Cloverdale and Geyserville. There are few circuit ties between the DPAs because Healdsburg's municipal electric distribution system separates the two areas.

### 1.3.3.3 Other Substations

There are no other transmission or distribution substations in the area of the project site, and the need for new distribution substations other than Windsor is not anticipated for ten or more years.

## 1.4 PROJECT PURPOSE AND NEED

### 1.4.1 Project Objectives

The basic objectives of the Windsor Substation Project are as follows:

- **Meet Immediate Capacity Needs:** Provide the necessary electric distribution capacity to serve existing and new customers within and around the Town of Windsor in the Fulton-Fitch Mountain 12 kV DPA.
- **Meet Long-Term Capacity Needs:** Eliminate electric distribution capacity deficiencies expected to occur beyond 2011.
- **Construct a New Substation To Reinforce Existing System:** Maximize system efficiency and increase future flexibility by constructing a new distribution substation within the limits of the DPA and approximately three to five miles from the existing distribution substations.
- **Construct a New Substation Near Load Growth:** Minimize ratepayer costs and environmental impacts, and maximize system efficiency and reliability by locating the new substation near the center of the load growth so that distribution circuit routes are short.

### 1.4.2 Project Need

The basis for PG&E's conclusion that the Windsor Substation Project is needed is beyond the scope of this Permit to Construct (PTC) Application. (See, for example, Assigned Commissioner's Ruling dated October 16, 2002, A.01-07-004, p. 5 ["the need for the project is outside the scope of this [Atlantic-Del Mar PTC] proceeding"]; D.94-06-014, 55 CPUC 2d 87, 92 [PTC review "focuses solely on environmental concerns, unlike the CPCN process which considers the need for and economic cost of a proposed facility"]; GO 131-D, Section IX.B.1.f ["an application for a permit to construct need not include . . . a detailed analysis of purpose and necessity"]). Nonetheless, PG&E provides the following discussion of the purpose and need for the project for informational purposes.

As described above, the Fulton-Fitch Mountain 12 kV DPA is currently served by the Fulton and Fitch Mountain Substations. The electric demand in the DPA has a historic annual growth rate of approximately 2.5 MW/year, resulting in a projected summer 2011 area deficiency of 1.5 MW (1.7 percent) and a summer 2012 area deficiency of 3.9 MW (4.4 percent). Even with the downturn in the economy and subsequent slowing of development, the area has experienced continued electric growth. The greatest concentration of the load to be served is within the limits of the Town of Windsor.



**Figure 1-3: Distribution Planning Area with Existing Substation Layout**

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Service interruptions can occur because of increased electric demand. As demand increases, power line conductors and power transformers will reach and exceed their rated capacities. When the demand on the equipment exceeds its rated capacity, the equipment becomes overheated and may be damaged<sup>1</sup>. The electric system is designed with protective and control equipment to prevent this type of damage. Circuit breakers disconnect equipment from service during equipment failures or when pre-set design limits are reached. Removing equipment from service leads to power outages in the areas served by the affected power lines and transformers.

The Windsor Substation Project proposes to meet the projected electric demand by constructing a new three-bank substation and installing new 12 kV distribution circuits, which will provide a capacity increase of 89.1 MW at ultimate build-out. The project will relieve the electric system deficiency that is projected to occur in the Town of Windsor, and ensure the ability of the system to safely and reliably serve the area without interruptions or emergency conditions that would otherwise result from the deficiency.

The proposed substation site is located near the center of the Town of Windsor's load growth. Figure 1-3 shows the proposed substation site in relation to the existing Fulton and Fitch Mountain Substations.

### **1.4.3 Area Load Growth**

#### ***1.4.3.1 Residential, Commercial, and Light Industrial Development***

The Town of Windsor continues to experience load growth due to a general increase in demand, and not specific residential and commercial developments. Planned future residential and commercial development will contribute to demand as well.

#### ***1.4.3.2 Voluntary Use Reduction***

PG&E uses a program of voluntary reduction in electricity use, known as Customer Energy Efficiency (CEE). This program has been active over the past two decades and its cumulative reduction of electricity use has been substantial. The Town of Windsor has an active CEE program. For any given planning area, the historical CEE energy and peak demand impacts have been subsumed within the peak load demands experienced year by year and, thus, their reductions are included in the forecasts of peak growth.

#### ***1.4.3.3 Recent Load Trends and Projections***

In 2008, PG&E experienced reduced peak loads across its entire system because of a number of factors, including:

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<sup>1</sup> The electrical and mechanical properties of materials in the equipment will irreversibly degrade when the heat build-up exceeds design thresholds. For example, prolonged overheating of power line conductors will cause the conductors to lose elasticity and eventually fail mechanically. The conductors can then drop to the ground and become a safety hazard. Likewise, when a power transformer becomes overheated, the insulating materials in the transformer are degraded and may not be capable of preventing permanent damage and equipment failure.

- a general economic slowdown in its service area;
- a downturn in high-tech industries, particularly in the San Francisco Bay Area;
- the impact of rising retail electric rates resulting from the increased cost of purchasing power, and perhaps even more importantly, the expectation of further increases;
- a strong conservation message from the utilities, regulators, and the State of California, reinforced by PG&E's Customer Energy Efficiency Programs and by mandatory rotating outages in the early summer; and
- a mild summer with only one brief hot spell between a weekend and the July 4th holiday.

Although PG&E's system-wide loads were reduced, the Fulton-Fitch Mountain 12 kV DPA load continued to grow, albeit at a lower rate than in previous years.

In 2006, the Fulton-Fitch Mountain 12 kV DPA loads jumped significantly compared to those of 2005 due to an abnormally hot year in 2006. Since air conditioning contributes significantly to peak load in the area, and an increase in peak demand is typical in a temperature sensitive area, this increase was expected. In 2008, summer peak temperatures were close to "average" in this area, yet the load was higher than the 2006 summer peak—pointing to continued growth in the area.

## **1.4.4 Electric System Requirements**

### ***1.4.4.1 Distribution System Requirements***

Construction of the new substation and the initial two new 12 kV circuits will eliminate the projected capacity deficiency in 2012. Furthermore, two additional transformer banks and ten new 12 kV circuits can be installed in the future as needed, which is anticipated to eliminate any distribution capacity deficiencies expected to occur in 12 or more years beyond 2012. At ultimate build-out, the substation can support three transformers and 12, 12 kV distribution circuits.

### ***1.4.4.2 Power Line System Requirements***

The increase in electric demand and the resulting need to build a new distribution substation between the Fitch Mountain and Fulton substations requires construction of a double-circuit looped interconnection, approximately 120 feet long, to connect this substation to the existing Fulton No. 1 60 kV power line on the west side of the NWPRR tracks. One existing wood pole located along the Fulton No. 1 60 kV power line will be replaced with a new weathered Tubular Steel Pole (TSP). In addition, one galvanized steel TSP will be installed on PG&E's property to carry the conductor over the railroad tracks into the substation.

## 1.5 PROJECT FACILITIES

PG&E proposes to construct and operate a substation that includes up to 12 distribution circuit outlets at full site development and interconnect with the existing electric transmission system in the Fulton-Fitch Mountain 12 kV DPA. Major elements of the project, at ultimate build-out, include:

- installing a new, three-bank, 115-12 kV distribution substation, initially energized at 60 kV voltage;
- replacing an existing wood pole located along the Fulton No. 1 60 kV (eventually 115 kV) power line with a new weathered TSP and installing one additional new TSP within PG&E's property, to support a new power line between the new substation and the Fulton No. 1 power line;
- installing 12 distribution circuits;
- replacing five existing approximately 45-foot-tall wood distribution poles located along Mitchell Lane with approximately 1,000 feet of underground cable in conduit;
- reconductoring approximately 4,500 feet of existing overhead distribution line along Mitchell Lane, across Highway 101, and along Hembree Lane (involves replacement of 18 wood poles with new wood poles); and
- installing approximately 3,230 feet of underground distribution line along Mitchell Lane and Hembree Lane.

### 1.5.1 Proposed Substation

The proposed substation property is approximately 3.2 acres in size. The permanent footprint of the substation (walled and fenced areas) will measure approximately 268 feet by 220 feet. A typical three-bank substation layout and corresponding profile is provided in Figure 1-4 and Figure 1-5, respectively.

Although the substation at ultimate build-out will consist of a three-bank distribution substation, only one 60-12 kV transformer bank will initially be installed to connect to the existing Fulton No. 1 60 kV power line. When the 115 kV upgrade takes place at some point in the future, PG&E will remove the existing 60-12 kV transformer bank and replace it with a new 115-12 kV transformer. Because the proposed substation connection to the Fulton No. 1 60 kV power line will be built to a standard that would support 115 kV capacity (as all PG&E 60 kV power lines are currently built), no further work will be necessary during the future 115 kV upgrade.

The proposed substation will require installation of steel bus support racks, high voltage breakers, power transformers, and switchgears. Major equipment to be installed at ultimate build-out includes:

- 115 kV bus structures for up to six (6) element bus sections in a ring bus configuration for up to three 115 kV power line circuits and up to three 115-12 kV power transformers,
- six (6) 115 kV circuit breakers (for switching and protecting the power line and transformers),
- three 115-12 kV power transformers,

- eighteen 115 kV disconnecting switches,
- three 12 kV metal-clad switchgear enclosures,
- 12, 12 kV distribution circuits (4 circuits per switchgear enclosure), and
- two approximately 42-foot-high dead-end structures supporting the power line where it enters and exists the substation.

PG&E will install related electric equipment at the substation, including neutral grounding reactors, instrument transformers, protective relaying, metering and control equipment, remote supervisory control and data acquisition equipment, telemetering equipment, an auxiliary alternating current and direct current power system, an electric grounding system, and underground conduits or trench systems. The unmanned substation will have automated features and remote control capabilities.

The tallest substation equipment will be the approximately 42-foot-tall dead-end structures that support the 115 kV looped lines. Ultimate build-out will include three 12 kV metal-clad switchgear enclosures: one switchgear enclosure approximately 75 feet long, 18 feet wide, and 12 feet high, and two switchgear enclosures 28 feet long, 18 feet wide, and 12 feet high. The switchgear enclosures are used to house sensitive recording and communication equipment that require weather protection. They will also house the controls and relays for the 115 kV lines and circuit breakers, and the 12 kV switchgear for the initial distribution circuits. Switchgear enclosures will be covered in steel sheeting with a sloped roof. These structures and all the equipment in the substation will be gray in color with a non-reflective treatment. An 8-foot-tall, wall will border the northern side of the substation along Mitchell Lane, as requested by the Town of Windsor, and the remaining sides will be enclosed by a chain linked mesh fabric fence for security. Double swing entry and exit gates on the west side of the substation will be made from similar chain linked mesh fabric, while the double swing entry and exit gate at the north east corner of the substation will be a steel frame and wood faced gate which would be designed to blend with the wall bordering the northern side of the substation. An earth-tone-colored, decorative wall design and landscaping plan will be submitted for review by the Town of Windsor.

Construction power to the site will be provided from an existing pole-mounted 15 kilovolt ampere (kVA) distribution transformer located on Mitchell Lane fronting the project site. A temporary overhead construction service tap and meter set will be installed just inside the substation property.

**Figure 1-4: Typical Three Bank Substation Layout**

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**Figure 1- 5: Profile of Typical Three-Bank Substation**

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A telephone line will be used for remote communication. All telecommunication equipment will be located within conduits, switchgear enclosures, and pull boxes (i.e., no microwave dish and/or poles are needed). Security lighting for the substation arrangement will consist of five sodium vapor lamps mounted on structures and equipment within the substation. Exterior lighting will include the use of non-glare light bulbs. Lighting fixtures will be located and designed to avoid casting light or glare toward off-site locations. On the north side of the substation, there will be free-standing light poles, approximately 12 feet tall. In addition, the switchgear enclosure doors will have fixed lights. More information on the appearance of the substation and landscaping, including a visual simulation of the project, is included in Chapter 4: Aesthetics.

The substation will have three 30-MVA (29.7 MW at 0.99 power factor (PF)) transformers with four distribution circuits per transformer, as capacity needs dictate. Each transformer will contain a maximum of 5,000 gallons of mineral oil. The mineral oil, which is circulated to cool the transformer, does not contain polychlorinated biphenyls (PCBs). A spill prevention control and countermeasure (SPCC) basin will be installed to contain the mineral oil in the unlikely event of a release. At PG&E substations, SPCC basins are designed to contain 110 percent of the substation's largest transformer's coolant volume. The initial transformer will contain 5,000 gallons of coolant, so the basin will be designed to contain 5,500 gallons. As capacity needs dictate, two additional transformer banks will be installed within the substation and the SPCC basin will be enlarged to contain a greater volume if either of the future transformers has a larger coolant volume. See Chapter 9: Hazards and Hazardous Materials for greater detail on hazardous material releases.

## **1.5.2 Power Line Interconnection and Distribution Lines**

### ***1.5.2.1 Power Lines***

The project will include looping the existing Fulton No. 1 60 kV circuit into and out of the substation. PG&E will replace an existing wood pole located on Eagle Drive approximately 120 feet west of the substation property with a 95-foot tall new weathered TSP (pole no. 3/11), install one new 95-foot tall TSP (pole no. 3/11A) within the substation parcel, and loop the circuits to the dead-end structures in the substation. The existing wood pole on the Fulton No. 1 60 kV power line will not be replaced in the same location, but placed approximately 20 feet to the north to comply with Sonoma Marin Area Rail Transit (SMART) track crossing requirements, to minimize its visibility, and to avoid tree trimming. Figure 1-6 depicts a typical design for TSP poles 3/11 and 3/11A. More information on the appearance of the TSPs, including a visual simulation of the new replacement TSP (pole no. 3/11), is included in Chapter 4: Aesthetics.

### ***1.5.2.2 Distribution Lines***

Table 1-1 summarizes the length of the initial two 12 kV distribution circuits (i.e., Circuit 1 and 2) and the future distribution circuits. Circuit 1 will extend underground west from the substation on the south side of Mitchell Lane to the western curb cut, then turn northwest into the west-bound travel lane of Mitchell Lane, cross under the railroad by jack and bore construction technique, and finally turn southwest back across Mitchell Lane to rise up on the existing pole on the west side of the railroad tracks. Circuit 2 will extend underground east in the public utility easement (PUE) on the south side of Mitchell Lane approximately 450 feet, bore under Mitchell

Lane to the north side approximately 100 feet, and rise up on an overhead pole (one of the 18 existing poles that will be replaced). The overhead line will continue east along the north side of Mitchell Lane until it crosses Conde Lane and north across Highway 101. After crossing Highway 101, Circuit 2 will continue southeast on replaced poles along the west side of Hembree Lane until it crosses Victory Lane, and then will extend south underground for approximately 1,200 feet to intercept the existing main feeder line that crosses Highway 101 on Shiloh Road.

At the present rate of growth in electric demand, the remaining ten circuits would be installed roughly every other year. However, to minimize future disruption to the mature substation landscaping, on Mitchell Lane and the adjacent parcel to the east, partial extension of all ten future distribution circuit conduits will be installed as part of the initial development. All ten future circuit conduits will be extended from within the substation wall to vaults along the edge of the sidewalk. From there, three future circuit conduits will be extended west, parallel to the initial circuits along Mitchell Lane in a separate trench offset approximately six feet from the initial circuits, and be stubbed and capped in the street just west of the railroad tracks. Seven future circuit conduits will extend east in a separate trench in the PUE to the east edge of the adjacent parcel where they will be stubbed and capped.

PG&E will coordinate with the Town of Windsor regarding construction techniques; however, PG&E anticipates undergrounding construction methods to be similar to those outlined in Section 1.6.5.3 Underground Installation.

**Figure 1-6: Typical TSP 3/11 and 3/11A**

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**Table 1-1: Distribution Circuits**

Circuit	Approximate Length of Circuit Installation (feet)		
	Underground	Overhead	Total
1	400 (west from the substation on the south side of Mitchell Lane)	0	400
2	1,750 (450 feet east from the substation on the south side of Mitchell Lane, then 100 feet crossing to the north side, and 1,200 feet south from the intersection of Hembree Lane and Victory Lane on the west side of Hembree Lane)	4,500 (east on the north side of Mitchell Lane until reaching Conde Lane, north along Conde Lane crossing Highway 101, and continuing southeast on the west side of Hembree Lane)	6,250
Future 3, 4 & 5	500 (west from the substation within Mitchell Lane)	0	500
Future 6, 7, 8, 9, 10, 11 & 12	580 (east from the substation in the PUE on the south side of Mitchell Lane, terminating at the eastern edge of the adjacent parcel to the east)	0	580

**1.5.3 Access and Laydown Areas**

During construction, access to the substation site will be via Highway 101, Shiloh Road, Conde Lane, and Mitchell Lane as described in Chapter 14: Transportation and Traffic. Access to the substation site parcel will be directly off of Mitchell Lane via the existing curb cut and driveway on the west side of the parcel. The entire 3.2-acre site will be used during construction for parking and lay down, and staging for construction materials and equipment; no additional lay down areas will be required.

**1.6 GENERAL CONSTRUCTION METHODS**

**1.6.1 Typical Construction Equipment**

Typical construction equipment and machinery that will be used during construction of the substation, access road, power line loop, and distribution lines are listed in Table 1-2. Table 1-2 also describes a breakdown of typical duration of use during construction activities, including days per week of operation, hours per day of operation, and the total duration of use (in weeks.)

**Table 1-2: Typical Construction Equipment**

<b>Equipment</b>	<b>Use</b>	<b>Number of Vehicles</b>	<b>Days per Week of Operation</b>	<b>Hours per Day of Operation</b>	<b>Duration of Use (weeks)</b>
<b><i>Access Road and Substation</i></b>					
3/4-ton pickup trucks	Transport construction personnel	3	5	8	8
1-ton Truck	Tools, supplies and equipment	1	5	8	8
Truck-mounted Digger	Light excavation	1	5	8	8
Concrete Truck	Transport concrete	1	5	8	8
Man Lift	Elevation of personnel	2	5	8	8
Water Truck	Water Site	1	5	8	8
Fork Lift	Elevation of materials	1	5	8	8
Crawler Backhoe	Excavation of foundation	1	5	8	8
D-3 Bulldozer	Grading of site	1	5	8	8
<b><i>Transmission Line Substation Interconnection</i></b>					
3/4-ton pickup trucks	Transport construction personnel	3	4	3	2
Crew-cab trucks (3/4 to 1 ton)	Transport construction personnel	1	4	3	2
Bucket truck	All line construction activities	2	4	5	2
Puller	Pull conductor wire	1	2	2	1
Line Truck	Install shoo-fly poles	1	2	4	2
50-ton crane	Lift transmission conductors	1	1	6	1
Water Truck	Water Site	1	4	8	2



<b>Equipment</b>	<b>Use</b>	<b>Number of Vehicles</b>	<b>Days per Week of Operation</b>	<b>Hours per Day of Operation</b>	<b>Duration of Use (weeks)</b>
<b><i>TSP Replacement and Installation</i></b>					
3/4-ton pickup trucks	Transport construction personnel	3	5	3	1
Crew-cab trucks (3/4 to 1 ton)	Transport construction personnel	3	5	3	1
Boom truck	All construction activities	1	1	6	1
50- and/or 70- ton mobile cranes	Erect structures/install transformers	1	1	4	1
Lo-Drill	Excavate foundations	1	2	12	1
Backhoe or Bobcat	Load excavated dirt	1	2	7	1
Concrete trucks	Transport concrete	8	1	2	1
Air Compressor	Operate pneumatic equipment	1	2	2	1
Dump Truck	Haul excavated material (5 truck-loads per hole)	5	2	3	1
2-ton flat-bed truck	Haul equipment and materials to job site	1	5	3	1
Potholer and vacuum truck	Hydro probe of excavation site to confirm no subsurface utilities	2	2	2	1
Water Truck	Water site	1	5	12	1
<b><i>Distribution Line Installation (Overhead)</i></b>					
3/4-ton pickup trucks	Transport construction personnel	3	5	8	10
Crew-cab trucks (3/4 to 1 ton)	Transport construction personnel	3	5	8	10

<b>Equipment</b>	<b>Use</b>	<b>Number of Vehicles</b>	<b>Days per Week of Operation</b>	<b>Hours per Day of Operation</b>	<b>Duration of Use (weeks)</b>
Line Truck	Drill hole and install poles	3	5	8	10
Puller Rig	Pull conductor wire	1	5	8	1
Bucket truck	String conductor wire	5	5	8	1
Splicing Van	Make splices in conductor	5	5	8	5
Crane Truck	Pole & Conductor Delivery	6	5	8	2
Water Truck	Water Site	1	5	8	10
Puller Rig	Pull conductor wire	1	5	8	1
Bucket truck	String conductor wire	5	5	8	1
Splicing Van	Make splices in conductor	5	5	8	5
Crane Truck	Pole & Conductor Delivery	6	5	8	2
Water Truck	Water Site	1	5	8	10
<b><i>Distribution Line Installation (Underground)</i></b>					
3/4-ton pickup trucks	Transport construction personnel	1	4	3	8
Crawler backhoe	Excavate trench	1	4	8	8
Dump trucks	Haul trench spoils from site & deliver clean backfill	1	4	5	8
HDD Rig	Directional Drilling	1	4	8	5
Bore Rig	For jack & bore under railroad tracks	1	4	8	5
Excavator	For large volume excavations	1	4	8	2
Crew truck	Tools and equipment	1	4	2	8

### **1.6.2 General Construction Sequence**

Construction activities will generally occur in the following order:

- Rough grading and compaction of the substation subgrade
- Installation of the interior asphalt road and placement of gravel on the remaining surfaces

- Construction of the security wall and fence and all buswork structure, building and equipment foundations and SPCC basin
- Construction of the overhead buswork, and the switchgear enclosures with the system control and data acquisition equipment
- Construction and installation of the transformer, switchgear, and 60 power line interconnection
- Construction and installation of 12 kV distribution circuits
- High voltage connection and testing
- Cleanup and landscaping
- Substation released to operations

### **1.6.3 Substation Construction**

While the substation will be constructed on a site previously graded for development, site preparation will still begin with clearing of vegetation (re-established plants and grasses) and grading of the substation pad. The northern portion of the site where the transformers are located will be graded to drain towards the SPCC basin location, and the balance of the site graded to slope to the southeast corner to an existing storm water drop inlet. A net import of approximately 950 cubic yards of soil and aggregate will be needed to achieve the drainage described above and bring the substation to its final grade. The estimated amount of material on-site to be excavated and reused on-site during site grading is approximately 150 cubic yards. Foundation excavations will be initiated once site grading is complete and will result in excess soils. During installation of the first transformer bank and other initial substation structures, approximately 200 to 250 cubic yards of soil will be generated. The ultimate build out (installation of the remaining transformers and related structures) will result in the generation of approximately 400 to 425 cubic yards of excess soil. Representative samples of excess soil will be collected, analyzed, and profiled for disposal in accordance with all federal, state, and local regulations.

Grading will be followed by excavation and construction of the subsurface ground grid, installation of an 8-foot-tall security wall along the north side of the site, fencing along the remaining three sides, installation of the paved interior road, and placement of aggregate on the remainder of the fenced site. Once the surrounding wall and fencing secures the site, excavation for subsurface footings for all the aboveground structures will begin. Reinforced concrete footings and slabs will be constructed to support structures and equipment. After the concrete has cured, the aboveground steel structures, circuit breakers, transformers, switchgears, buses, dead ends and other electrical equipment, including associated control system hardware, will be installed.

Structures will be erected to support buses, switches, overhead conductors, instrument transformers, and other electrical equipment, as well as to terminate incoming 60 kV power line. Supports for the aluminum bus structures will be fabricated from low profile, tubular steel structures. Structures within the substation will be grounded to the station-grounding grid. Equipment will be placed on slabs and footings, and either bolted or welded securely to exceed the Uniform Building Code seismic requirements. Equipment slated for installation includes high-voltage circuit breakers and air switches, tie structures and buswork, high-voltage

instrument transformers and line traps, control and power cables, metering, relaying, and communication equipment. Landscaping and an irrigation system will then be installed. The project is located in the Town of Windsor's recycled water service area; therefore, irrigation will be with reclaimed water supplied by the Town of Windsor as required by Municipal Code (Section 12-7-105.)

The site's irrigation system will connect to an existing recycled water valve box located at the north-eastern front of the substation (refer to Figure 1-4). Water used for construction purposes, such as dust control, will come from the fire hydrant located on the northeast corner of Mitchell and Cameron Drive. Drinking water for crew members will be bottled.

Prior to commissioning Windsor Substation to service, two 600 Ampere (Amp) pole-mounted air switches (No. 57 and No. 59) at the Healdsburg Substation on the Healdsburg Tap (which is a 60 kV transmission line serving the City of Healdsburg from the Fitch Mountain Substation) will be replaced with 1,200 Amp switches. In addition, protection technicians at Fulton Substation will check routine protection relay settings to confirm they are adequate to handle the new substation and will make any necessary adjustments.

#### **1.6.4 Power Line Interconnection Construction**

The construction for the power line interconnection work is divided into two phases: (1) replacing the existing pole on the Fulton No. 1 60 kV power line and installing one new TSP within the substation property, and (2) installing the conductor.

##### ***1.6.4.1 Pole Installation and Replacement***

Pole 3/11 on the Fulton No. 1 60 kV power line is located on the east side of Eagle Drive in a landscaped area adjacent to a recreational bike and walking path. Pole 3/11 also supports two 12kV distribution circuits that will need to be detached from the wood pole and transferred to the new TSP. This existing wood pole will be removed and replaced with a TSP approximately 20 feet north of the existing pole's location to accommodate the interconnecting lines crossing over the NWPRR. The TSP will be weathered steel with a diameter of approximately 33 inches at the base, tapering to approximately 29 inches at the top. The TSP will be a maximum of approximately 95 feet in height and will have six cross arms. PG&E will install one additional TSP (pole no. 3/11A) east of the NWPRR right of way, within the PG&E parcel, immediately across the railroad tracks from the new pole 3/11 and will have a similar height and configuration. Preliminary designs for both TSPs can be seen in Figure 1-6.

A semi-truck with trailer will deliver the TSPs to the pole sites and a crane will off load TSP sections. Each TSP will consist of two or three sections which will be assembled at the site. An equipment set-up area, approximately 50 feet by 50 feet, will be required for the installation of the replacement TSP along Eagle Drive. The crane will be positioned within Eagle Drive to access the pole site. This will require temporary lane closure along Eagle Drive for a short duration and will be coordinated with the Town of Windsor. For further detail regarding Transportation and Traffic Impacts, see Chapter 14: Transportation and Traffic.

As noted above, the existing Fulton No. 1 60 kV Power Line includes two distribution circuits mounted under the 60 kV conductors. In order to create an opening between these circuits with sufficient horizontal and vertical clearance to allow equipment movement needed for the installation of the replacement TSP, temporary wood poles (termed a 'shoo-fly') will be installed near the existing wood pole (pole no. 3/11). The two 12 kV circuits will be temporarily transferred over to the shoo-fly poles. One shoo-fly pole will be offset about 10 feet to the east side of the existing line to support the distribution conductors on that side of the line, and the other shoo-fly pole will be similarly offset to support the conductors on the west side of the existing line. A brace support and/or guy may be required to counter the lateral tension resulting from offsetting the shoo-fly poles from the existing alignment. The proposed shoo-fly offsets will create an opening with sufficient horizontal and vertical clearance to allow the equipment movement needed for the installation of the foundation and first/bottom section of the new TSP (as described below) while the distribution circuits are energized. The existing 60 kV circuit will remain in its current position on the top of the wood pole until a circuit clearance can be scheduled to make the final attachment of all conductors to the new TSP. At that time, a crane or bucket truck will be used to lift the transmission conductors up from their current position and out of the way, a second crane will lower the remaining sections of the new TSP into place, and line crews will transfer the distribution circuits from the shoo-fly poles and attach them to the TSP. The crane will then lower the suspended transmission conductors to the new TSP.

Once the shoo-fly is installed, the foundation for the TSP will be excavated by a tracked drilling rig. The foundation holes will be between approximately 5 feet and 8 feet in diameter and from 15 to 20 feet deep, depending on soil characteristics. Soil excavated from these large holes will be tested and disposed of in accordance with applicable regulations. The augered pole holes will be covered with the end piece of a conductor spool until the new foundation is installed. Once the hole is completed, the reinforcing bar cage will be lowered into the hole and the foundation bolts attached to the cage. Wood forms will be constructed around the foundation and the concrete will be poured. Foundation excavation and concrete pouring will take about three days to complete.

The existing wood pole (pole no. 3/11) and the temporary shoo-fly poles to be removed do not have foundations. A hydraulic jack mounted on a line truck will be used to loosen the poles as needed. When the wooden poles are removed, the soil removed while augering the new TSP foundation hole will be used to backfill the existing hole; some unused soil will be used to backfill around the concrete foundation and feathered in around the new pole site. The wood poles and any sawdust from cutting the pole will be taken to the designated Santa Rosa Service Center collection bin for ultimate disposal to a licensed Class 1 or a composite-lined portion of a solid waste landfill.

Once the concrete has cured, the bottom section of the TSP will be delivered to the site and placed on the foundation by a crane. The remaining sections will be installed later as described above. Once all the pole and line work is completed, PG&E will install landscaping around the base of TSP compatible with the existing landscaped strip along the bike path.

The installation of the new TSP (3/11A) adjacent to the substation is not constrained by the presence of existing energized circuits (i.e., no shoo fly required), but will otherwise follow a similar installation process.

#### ***1.6.4.2 Stringing Conductor***

The conductor stringing operation begins with the installation of sheaves or stringing blocks. Sheaves are rollers attached to the cross arms of the new TSP (pole no. 3/11A) located on the substation parcel. The sheaves allow the individual conductor to be pulled through each structure until the conductor is ready to be pulled up to the final tension position.

When the pull and tension equipment is in place, a sock line (a small cable used to pull the conductor) is pulled from pole to pole using ground equipment. After the sock line is installed, the conductor is attached to the sock line and pulled in, or strung, using the tension-stringing method. This involves pulling the conductor through each sheave under a controlled tension to keep the conductor elevated above the railroad.

After the conductor is pulled into place, sag is adjusted to a pre-calculated level. The conductor is then clamped to the end of each insulator and the sheaves are removed. The final step of the conductor installation is to install vibration dampers and other accessories.

#### **1.6.5 Distribution Line Installation**

The increased capacity provided by the new substation will require replacing approximately 7,730 feet of conductor and 18 wooden poles along two existing 12kV distribution lines (see Figure 1-7). New 12 kV distribution lines will extend underground from within the perimeter of the substation to connect with existing lines. One underground circuit will go west approximately 400 on the south side of Mitchell Lane, bore under the railroad, and rise up on the existing pole on the west side of the railroad. The second underground circuit will go east on the south side of Mitchell Lane approximately 450 feet, cross Mitchell Lane to the north side approximately 100 feet, and rise up on an overhead pole (one of the 18 existing poles that will be replaced). The overhead line will continue east along the north side of Mitchell Lane until it crosses Conde Lane and then north across Highway 101. After crossing Highway 101, the line will continue southeast on replaced poles along the west side of Hembree Lane until it crosses Victory Lane, and then will extend south underground for 1,200 feet to intercept the existing main feeder line that crosses Highway 101 on Shiloh Road. The distribution line work will not involve any grading activities and/or slope stabilization work. Overhead and underground distribution line installation is expected to take approximately six weeks and five weeks, respectively.

##### ***1.6.5.1 Pole Replacement***

Distribution line installation will require the replacement of 18 existing wood poles, approximately 45 feet in height, with new wood poles, approximately 55 to 60 feet in height. New wood poles will use an avian-safe design to protect raptors and other birds from being electrocuted, which may include installation of perch devices.

**Figure 1-7: Reconductoring of Existing Distribution Lines**

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**BACK OF FIGURE 1-7**



Construction techniques for pole placement will consist of installing the replacement poles as close as possible to the existing poles, usually within 3 to 6 feet. Distances between wood poles (spans) will be similar to the existing lengths, approximately 265 feet. Wood poles will be delivered to each new pole site on a standard line truck with trailer. The standard line truck, with auger attachment, will be used to auger the hole to the appropriate depth. The replacement wood pole will be framed with the necessary insulators and hardware, and then installed in the hole with use of the line truck or crane. Excavated soil will be covered with plastic tarps for later use, when it will be feathered around the pole base or removed from the site. Work will be confined to the previously disturbed areas around the base of the existing poles to the greatest extent possible and, at most pole locations, crews will be working in paved streets.

The existing wood poles along Mitchell Lane, Conde Lane, and Hembree Lane currently support cable television lines. Collocated utility lines will be detached from the existing wood poles and re-attached to the new replacement poles.

A boom mounted on the line truck will be used to loosen old poles as needed. Crews will pull the old wood poles directly out of the ground using the line truck. However, in some instances, the old wood poles will be cut at the base or cut 6 to 12 inches below the surface and left in place due to site-specific conditions. Pole removal activities will utilize bucket trucks to remove cross arms and wires. All old poles, associated hardware, and any other debris generated from project activities will be removed from the project and disposed of properly.

### ***1.6.5.2 Reconductoring***

The 4,500 feet of overhead distribution line reconductoring will involve the replacement of the existing conductor with a heavier-duty 1100 KCMil all aluminum conductor that will increase the capacity of the line (Aluminum Conductor Steel Reinforced line will be replaced with all aluminum). Approximately seven pull and tension locations along the public streets will be necessary for the reconductoring operation; pull and tension sites will be located at dead end or angle pole locations and will require approximately 400 to 500 square feet (40 to 50 feet long by 10 feet wide). Reconductoring will also include installing and replacing insulators.

New insulators will be placed on poles with conductor rollers at their end. A cable from the puller truck will be attached to the existing conductor at one end of the pull section, and the new conductor attached to the existing conductor on the opposite end. As the puller truck reels in the old conductor, the new conductor will be pulled into place. The conductor will be pulled through each structure under a controlled tension to keep it elevated and away from obstacles, thereby preventing damage to the line and protecting the public.

Once the new conductor is pulled into place and the sags between structures are adjusted to a precalculated level, it will be removed from the rollers and clipped into the end of each insulator. The rollers will then be removed, and vibration dampers and other accessories installed. The conductor would be a minimum of 25 feet above ground level at maximum sag. Old conductor will be removed from the site by line truck and brought to a PG&E construction storage yard located at 101 Airport Boulevard, in Santa Rosa, Sonoma County.

Conductor splicing will be necessary to tie-in the new conductor to the existing line. Conductor surfaces will be prepared, conductors will be joined using connectors, and for the underground circuits the cable will be insulated, shielded, and jacketed.

### ***1.6.5.3 Underground Installation***

Underground installation techniques may involve horizontal directional drilling, jack and bore, or open trenching. For all three underground segments, the 12 kV underground distribution line will be installed pursuant to PG&E's established franchise agreements with the Town of Windsor. Underground installation will include three 1100 KCmil all aluminum EPR CONC ENCAP PE conductor cables (ethylene-, propylene-, and rubber-insulated concentrically wrapped shield wire encapsulated with polyethelene) in each conduit. Each conductor cable will be approximately 2 inches in diameter and will fit into a 6-inch diameter conduit. PG&E will coordinate with the Town of Windsor regarding construction techniques; however, PG&E anticipates using the following methods for the underground installation:

- The 400-foot segment west (Circuit 1) and 500-foot segment west (Circuits 3, 4, and 5) along Mitchell Lane would be completed using open trenching, except crossing under the NWPRR tracks would require jack and bore techniques.
- The 450-foot underground segment (Circuit 2) and 580-foot segment (Circuits 6, 7, 8, 9, 10, 11, and 12) that will both extend east on Mitchell Lane will be installed using open trenching techniques in the Public Utility Easement (PUE) located behind the sidewalk.
- The 100-foot underground crossing of Mitchell Lane to the north may require the use of open trenching or horizontal directional drilling techniques, depending on consultations with the Town of Windsor.
- The 1200-foot underground segment along Hembree Lane will require three to four horizontal directional bores, each 400 to 500 feet long, or open trenching techniques, depending on consultations with the Town of Windsor.

#### ***1.6.5.3.1 Horizontal Directional Bore***

HDD uses a hydraulically-powered horizontal drilling rig supported by a drilling mud tank and a power unit for the hydraulic pumps and mud pumps. The variable-angle drilling unit will be adjusted to the proper design angle for the particular bore. During the bore, drilling fluid is pumped under high pressure through the drill stem to rotate the cutting head and return the soils to a pit at the entry point. Drilling fluids are comprised of a water/bentonite (dehydrated clay) mixture. The HDD contractor will be responsible for proper disposal of any soil cuttings, drilling mud, fluids, or waste in accordance with all federal, state, and local regulations. Drilling mud, fluids and waste is typically non-hazardous and is disposed of at a local landfill. Soil removed from the entry and exit pits will be transported to the proposed substation site or the PG&E construction storage yard located at 101 Airport Boulevard, in Santa Rosa, Sonoma County for temporary storage, testing, and disposal. If classified as non-hazardous, soils from drilling may be used as backfill on site, or at another permitted construction site. Any remaining unused soil will be disposed of at a landfill in accordance with all federal, state, and local regulations.

Exact locations for entry and exit pits have not yet been determined for this project and will be subject to PG&E engineering design and a Town of Windsor encroachment permit. As part of the bore design process, geotechnical surveys of the subsurface conditions may be conducted to determine the underlying strata along the bore path. Infrequently, the geologic strata above the bore may be weaker than anticipated and/or unconsolidated and the high pressure of the drilling mud results in fracture of these strata, allowing mud to rise to the surface. The boring process will be stopped immediately when this occurs. The HDD contractor will be responsible for a contingency plan to account for detecting and avoiding “fracturing-out” (frac-outs) during HDD operations. Additionally, a PG&E inspector will be observing HDD operations at each HDD location. The inspector will have the authority to shut down HDD operations at any time. Although the HDD alignments are designed to minimize the potential for HDD frac-outs, a frac-out may still occur. The HDD contractor will be responsible for minimizing the potential for frac-outs by maintaining the drill drilling fluid pressure at a reasonable level. The HDD contractor will immediately report to the inspector any of the following conditions: an observed frac-out occurrence, abnormal drilling fluid pressures, changes to drilling fluid composition, and/or sudden loss of drilling fluid return. The HDD contractor will pull back on the drill head (to relieve pressure) and stop HDD operations in the event that a frac-out occurs. Pool Creek is located approximately 250 feet north of where the Hembree Lane underground segment begins and is therefore too distant to be affected by the HDD operations. Conditions and requirements as prescribed in an approved Town of Windsor encroachment permit will also dictate these activities.

Boring will begin by digging an entry pit (approximately 4 feet long by 2 feet wide) and exit pit (approximately 20 feet long by 4 feet wide). In addition, relief holes (approximately 4 feet long by 2 feet wide) will be drilled every 100 feet depending on ground conditions. While the boring is occurring, sections of steel casings will be welded together. PVC conduit bundles will be assembled and pulled through the steel casings. After boring has occurred and the bore hole is the correct diameter, the steel casings containing conduit will be pulled through the bore until they surface to the other side. Shoring pits will not be required within the entry and exit pits.

During construction, PG&E will implement BMPs outlined in the *PG&E Horizontal Directional Drilling Manual*, which addresses issues such as pre-job planning practices (e.g., avoid situations that involve drilling through known or suspected contamination and provide management with a contingency plan for containing and cleaning possible drilling fluids), safety-related issues (e.g., use of personal protective equipment such as insulated rubber boots, use of proper grounding techniques, and work area protection), and safe construction and grounding procedures (e.g., stop boring activities anytime a person is observed in contact with metal fencing.) A copy of this manual will be provided to CPUC staff.

#### 1.6.5.3.2 Jack and Bore

Jack and bore techniques will likely be used for the undergrounded segment extending across the NWPRR tracks west outside of the substation. The exact locations of entrance and exit pits for jack and bore techniques have not yet been determined for this project and will be subject to PG&E engineering design and a Town of Windsor encroachment permit. Boring will begin by digging an entry and an exit pit (approximately 24 feet long, 16 feet wide by 6 feet deep) using

an excavator or a backhoe. Entry and exit pits may require shoring depending on the depth and the size of the pits that are required to do the tie-in of the conduits. For pits that require shoring, large steel cages will be placed into entry and exit pits. Relief holes will not require shoring. The bore equipment will then be installed in the bore pit, and steel casing will be welded in sections and jacked into the bore. Conduits will be assembled and pulled through the steel casings.

The amount of soil to be excavated from the pits will be approximately 171 cubic yards. PG&E will obtain a Town of Windsor road encroachment permit and comply with the associated conditions and requirements. Soils removed from the pits will be transported to the proposed substation site; Syar Industries at 13666 Healdsburg Avenue, Healdsburg; or a private property at 40887 River Road, Cloverdale for temporary storage, testing, and disposal. If classified as non-hazardous, soils may be used as backfill on site, or at another permitted construction site. Any remaining unused soil will be disposed of at a landfill in accordance with all federal, state, and local regulations.

Regional groundwater occurs at a depth of approximately 80 feet, which is deeper than any of the proposed bores. If significant volumes of perched groundwater are encountered during excavation of horizontal directional drilling or jack and bore entrance or receiver pits, water will be evacuated using a sump pump, transferred into water storage tanks (to be sited at the proposed substation site), sampled, analyzed, transported, and disposed in accordance with all federal, state, and local regulations. If any worker observes potential contamination or signs of pre-existing hazardous wastes during excavation, work in that area will be stopped until the contamination is mitigated. This contamination could consist of man-made materials, discolored soil (such as soil darkened by oil staining), or soil that exhibits chemical odor. Any potential contamination will be sampled, analyzed, transported and disposed of in accordance with all federal, state, and local regulations. As part of final construction activities, PG&E will restore all paved surfaces, and restore landscaping or vegetation as necessary and in compliance with the road encroachment permit.

#### 1.6.5.3.3 Open Trenching

Trenches will be approximately 48 to 56 inches deep and 18 to 24 inches wide. Trenching will begin by marking the trench route, saw-cutting and/or breaking the pavement for removal, and digging the trench with the use of a backhoe. Once the trench is complete, cable conduit will be installed with reinforcement bar, ground wire, and concrete conduit encasement. Finally, thermal select or controlled backfill will be imported, installed, and compacted. A road base backfill or slurry concrete cap will then be installed. The 400-foot segment west (Circuit 1) and 500-foot segment west (Circuits 3, 4, and 5) along Mitchell Lane would be completed using open trenching resulting in excavation of approximately 140 cubic yards and 170 cubic yards, respectively. The 450-foot underground segment (Circuit 2) and 580-foot segment (Circuits 6, 7, 8, 9, 10, 11, and 12) that will both extend east on Mitchell Lane will be installed using open trenching, resulting in the excavation of approximately 150 cubic yards and 400 cubic yards, respectively. If the 1200-foot underground segment along Hembree Lane is completed using open trenching techniques, this would result in excavation of approximately 400 cubic yards. Soils excavated will be transported to the proposed substation site for temporary storage, testing, and disposal. If classified as non-hazardous, soils removed from trenches may be used as backfill

or on site. Any remaining unused soil will be disposed of in accordance with all federal, state, and local regulations. PG&E will obtain a Town of Windsor road encroachment permit and comply with the associated conditions and requirements. Figure 1-8 depicts a typical 24-inch wide joint trench. Approximately 19 vaults (four Type 5 vaults and 17 Type 7 vaults) will be installed at a variety of location along the open trenches (refer to Figure 1-7). Vaults will be either be Type 5, approximately 5 feet long by 7 feet wide by 6 feet deep, or Type 7, 6.5 feet long by 10.5 feet wide by 8.5 feet deep. Type 5 vaults will require excavation of approximately 30 cubic yards of soil, and Type 7 vaults will require excavation of approximately 330 cubic yards. Excavation and disposal of soils from vaults will be addressed as described above.

Comcast® will require installation of additional underground vaults along the open trenches to access its collocated cable television line, which will be undergrounded within the joint trench. The number of vaults and locations of vaults are not available at this time.

Dewatering of the trenches, will be addressed as described in Section 1.6.5.3.2.

To ensure no contamination will occur to nearby storm drains and water sources, PG&E construction crews will implement BMPs outlined in PG&E's *Water Quality Construction Best Management Practices Manual*, a copy of which will be provided to CPUC staff. These include the following BMPS:

- Evaluate, mark and protect important trees and associated rooting zones, unique areas (e.g., wetlands), and other areas to be preserved.
- Designate parking and fueling areas.
- Control vehicle speed and access near sensitive areas or waterways.
- Begin excavation, trenching, or grading after installing applicable sediment and runoff control measures.

#### 1.6.5.3.4 Pole Removal

The 450-foot underground segment and 580-foot underground segment that will both extend from the substation east on Mitchell Lane will require the removal of five existing 45-foot wood poles. The existing poles do not have foundations and will be removed as described in Section 1.6.5.1. The existing poles are jointly occupied with cable television lines; collocated utility lines will be detached from the existing poles prior to pole removal and undergrounded in a joint trench. After removal of all electric lines and attachments, poles will be removed as described in Section 1.6.5.1. Remaining holes will be backfilled after pole removal. PG&E will obtain a Town of Windsor encroachment permit and comply with the associated conditions and requirements. As part of final construction activities, PG&E will restore all paved surfaces, and restore landscaping or vegetation, as necessary and in compliance with the encroachment permit.

#### **1.6.5.4 Highway 101 Crossing and Traffic Deviation**

In accordance with Caltrans requirements, PG&E will use the California Highway Patrol to hold traffic for brief periods of time while the existing overhead line is removed and then reinstalled across Highway 101. In addition, PG&E may use flaggers to hold traffic for brief periods of time

while the overhead line is installed across local roads within the Town of Windsor. Temporary lane closures along streets as required for pole replacement, reconductoring, and undergrounding would be coordinated with the Town of Windsor as described in Chapter 14 Transportation and Traffic. PG&E will obtain ministerial encroachment permits to conduct work in public rights-of-way in accordance with State and the Town of Windsor requirements for the associated distribution line installation and substation construction.

### **1.6.6 Vegetation Clearance**

While the substation will be constructed on a site previously graded for development, site preparation will still begin with clearing of vegetation (re-established plants and grasses) and grading of the substation pad. Vegetation will be mowed and shredded using an ASV mower or similar equipment. PG&E will use BMPs during vegetation removal. Tree trimming will be avoided when feasible within the substation property and along the existing distribution alignment; however, tree trimming will be performed to meet clearances as required under GO 95-D. Although five mature oak trees located along the northern front of the substation will be preserved, one smaller valley oak (6-inch dbh) is anticipated for removal. One pine tree located along Conde Lane within private property is also anticipated for removal; PG&E will coordinate appropriately with property owners. PG&E will coordinate with the Town of Windsor regarding mature and historical oak tree protection. Any protected trees that must be removed will be replaced consistent with the Town of Windsor's Ordinance for Tree Mitigation; as follows:

- All protected trees, determined by the project arborist to be in good (4) or excellent (5) health, and/or with moderate (3) to good (4) structure, shall be replaced on a one-to-one trunk diameter basis. (Example: A 24-inch protected tree in good or excellent condition must be replaced with new trees totaling 24 inches in trunk diameters.)
- All protected trees, determined by the project arborist to have fair (3) or marginal (2) health, and/or with marginal (2) structure, shall be replaced on a two-to-one trunk diameter basis. (Example: A 24-inch protected tree in fair-to-marginal condition must be replaced with new trees totaling 12 inches in trunk diameter.)
- All protected trees, determined by the project arborist to have poor (1) health or poor (1) structure, are not required to be replaced.
- Smaller trees may also be protected under special circumstances where Planning Commission/Town Council approval is not required; determination will be made at the direction of the Planning Director.

Tree trimmings would be chipped and transported to the Santa Rosa Service Center or disposed of properly in accordance with federal, state, and local regulations.

**Figure 1-8: Typical Joint Trench Configuration**

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## **1.6.7 Cleanup**

Cleanup operations involve final grading to design contours and cleaning up all disturbed areas, including temporary workspace. PG&E will conduct a final survey to ensure that cleanup activities have been successfully completed as required.

## **1.6.8 Construction Workforce**

The size and composition of the workforce will vary depending on the activities in progress and the particular phase of construction. During substation grading, a maximum workforce of approximately 15 workers will be needed over an approximate three to four week period. The security wall and fencing, buswork structure, new TSP, and substation foundation work will require approximately eight workers. During installation of the switchgear enclosure and overhead work, approximately eight workers will be required. As phases of the work are completed, the workforce at the substation site will gradually decline. A small workforce will remain at the substation site to complete required project cleanup and landscape activities.

Distribution line installation will require a maximum workforce of approximately 16 workers over approximately six weeks. Pole replacement and reconductoring will require approximately eight workers for approximately six weeks, and undergrounding will require approximately eight workers for approximately five weeks.

## **1.7 CONSTRUCTION SCHEDULE**

Construction is scheduled to begin in May 2011 to meet an in-service date of June 2012. Substation and power line interconnection construction will require approximately 12 months.<sup>2</sup> Distribution line installation construction will take approximately six weeks and will occur between January and May 2012.

## **1.8 OPERATIONS AND MAINTENANCE**

### **1.8.1 System Monitoring and Control**

Distribution equipment in the substation and the associated distribution lines will be controlled from the PG&E Control Center in Vacaville, California. Transmission equipment in the substation and the associated power lines will be controlled from the PG&E Pittsburg Control Center in Pittsburg, California. Station and line alarms for the substation will be connected by phone lines and sent to the control center. If an alarm is triggered, personnel will be dispatched from existing PG&E facilities in Santa Rosa.

### **1.8.2 Facility Inspection**

Regular inspection of electric lines, support systems, and instrumentation and control is critical for the safe, efficient, and economical operation of facilities. All of the structures will be

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<sup>2</sup> Storm events during the rainy season (December through March) could preclude construction activities from occurring, delaying completion of construction.

inspected from the ground on an annual basis for corrosion, misalignment, and foundation condition. Ground inspection will include inspection of hardware, insulator keys, and conductors. This inspection will also check conductors and fixtures for corrosion, breaks, broken insulators, and bad splices. The electric lines will be inspected for sag. Annual ground inspections will be performed on poles, anchors, and right-of-way conditions. Trimming of landscaping trees will be conducted in accordance with the CPUC's General Order 95.

The unmanned station will be operated remotely, and routine inspections by substation personnel will occur on a monthly basis or as needed under emergency conditions. Permanent parking for facility inspections, operations, and maintenance will be located entirely within the fenced substation site.

### 1.9 RIGHT-OF-WAY ACQUISITION

PG&E owns the proposed substation site. PG&E will acquire a new permit at the west side of the substation site for the power line interconnection across the railroad property.

Land entitlement issues are not part of this regulatory proceeding, in which the CPUC is considering whether to grant or deny PG&E's application for a Permit to Construct. Rather, any land rights issues will be resolved in subsequent negotiations and/or condemnation proceedings in the proper jurisdiction, following the decision by the Commission on PG&E's application (see, for example, Jefferson-Martin 230 kV Transmission Project, A.02-04-043, D.04-08-046, p. 85).

### 1.10 AVOIDANCE AND PROTECTION MEASURES

In order to ensure there are no significant impacts associated with the project, PG&E is proposing the following avoidance and protection measures included in Table 1-3.

**Table 1-3: Avoidance and Protection Measures**

<i>Air Quality</i>
Water all active construction areas at least twice daily during dry conditions.
Cover all trucks hauling dirt, sand, or loose materials, or require all trucks to maintain at least two feet of freeboard.
Pave, apply water as necessary to prevent fugitive dust, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
Encourage construction workers to carpool to the job site to the extent feasible. The ability to

<p>develop an effective carpool program for the project will depend upon the proximity of carpool facilities to the area, the geographical commute departure points of construction workers, and the extent to which carpooling will not adversely affect worker arrival time and the project's construction schedule.</p>
<p>Minimize construction equipment exhaust by using low-emission construction equipment where feasible. Portable diesel fueled construction equipment with engines 50 hp or larger and manufactured in 2000 or later will be registered under the California Air Resources Board (CARB) Statewide Portable Equipment Registration Program, or shall meet at a minimum USEPA/CARB Tier 1 engine standards.</p>
<p>Minimize unnecessary idling time – less than the 5-minute maximum idling required by law – through application of a “common sense” approach to vehicle use. If a vehicle is not required immediately or continuously for construction activities, its engine will be shut off.</p>
<p>Encourage use of natural gas powered vehicles for passenger cars and light duty trucks where feasible and available.</p>
<p>Minimize welding and cutting by using compression of mechanical applications where practical and within standards.</p>
<p>Encourage the recycling of construction waste where feasible.</p>
<p>Comply with California Air Resources Board Early Action Measures as these policies become effective.</p>
<p>Maintain substation breakers in accordance with PG&amp;E's maintenance guidelines.</p>
<p>Require that the proposed substation's breakers have a manufacturer's guaranteed leakage rate of 0.5 percent per year or less for SF6.</p>
<p><b><i>Biological Resources</i></b></p>
<p>An ongoing special-status species/sensitive habitat education program for construction crews will be conducted by a qualified biologist(s) prior to the commencement of the project and during construction activities. Sessions will include discussion of the Federal Endangered Species Act (FESA) and California Endangered Species Act (CESA), the consequences of noncompliance with these acts, identification and values of sensitive species and sensitive habitats including Pool Creek and adjacent wetland habitats, and the importance of keeping all project activities and sediments within the designated work area.</p>
<p>The wetlands, intermittent stream, and Pool Creek will be denoted as environmentally sensitive areas and will be avoided during construction at all times. BMPs will be installed between the poles and Pool Creek and between the poles and the intermittent stream to avoid sedimentation or pollutant runoff resulting from construction activities associated with the distribution line alignment reconductoring.</p>
<p>Soil and vegetation disturbance will be minimized to the greatest extent possible.</p>
<p>An educational brochure will be produced for construction crews working on the project. Color photos of some of the special-status species will be included, as well as a discussion of protective</p>

measures agreed to by PG&E and the resource agencies.
A pre-construction wildlife and plant survey will be conducted prior to the start of construction activities to identify any special-status species in the proposed substation site, Fulton No. 1 60 kV power line and distribution line alignment, nesting birds or mammals, and occupied burrows. Should a sensitive wildlife or plant species be found, CDFG and/or USFWS will be contacted immediately.
A biological monitor will be on-site during grading activities and installation of the silt fence around the proposed substation site perimeter and needed areas along the distribution line alignment. After these activities are completed, the biological monitor will visit the site once a week. The biologist will complete a weekly report summarizing activities and environmental compliance.
Trash dumping, firearms, and pets will be prohibited in project work areas.
PG&E will adhere to the conservation measures listed in the USFWS programmatic biological opinion and the appendage to the programmatic biological opinion for special-status plant species.  If special-status plant species are found during any of the special-status plant surveys, PG&E will modify the project to avoid impacts to special-status plant species. If identified special-status plant species cannot be avoided, PG&E will: <ul style="list-style-type: none"> <li>• acquire suitable habitat for identified species within the project site,</li> <li>• develop a long-term habitat enhancement plan for identified species, and/or</li> <li>• monitor the implementation of and the compliance with mitigation measures outlined in the habitat enhancement plan.</li> </ul>
Precautions will be taken to minimize the introduction of noxious or invasive weeds into the adjacent seasonal wetlands in order to protect the plants that provide habitat for the bee. Construction equipment will be clean before it arrives on the proposed substation site, Fulton No. 1 60 kV power line and distribution line alignment. Any landscaping involving vegetation other than trees and/or shrubs will consist of a native seed mix.
A qualified biologist shall conduct a pre-construction survey in the project area no earlier than two days before the start of ground-disturbing activities for the FYLF and NWPT. If these species are found near any proposed construction areas, impacts on individuals and their habitat shall be avoided to the extent feasible. If the FYLF or NWPT is determined to be present in work areas, the biologist will contact CDFG to obtain approval to capture the frog or turtle prior to construction activities and relocate them to nearby, suitable habitat out of harm's way.
Mobile equipment will not be parked overnight within 100 feet of aquatic habitat. Stationary equipment (e.g., pumps and generators) used or stored within 100 feet of aquatic habitat will be positioned over secondary containment.
Anti-perch devices will be applied to the overhead distribution line improvements to inhibit raptor perching and nesting.

<p>Before the spring breeding season (and prior to the start of construction), a survey for potential raptor and passerine nests will be performed by a qualified biologist at the proposed substation site, along the Fulton No. 1 60 kV power line and distribution line alignment. If active nests or breeding species are located prior to construction, PG&amp;E will consult with the USFWS and/or CDFG to coordinate mitigation if the active nests cannot be avoided.</p>
<p>If construction activities do not start until the onset of the nesting season for raptors (generally March through September), a qualified biologist will conduct a raptor survey at the proposed substation site, along the Fulton No. 1 60 kV power line and distribution line alignment and of the surrounding area within 500 feet.</p>
<p>In the event that an active raptor nest is found within 500 feet of the project area, USFWS and/or CDFG will be consulted to determine appropriate buffer and monitoring requirements.</p>
<p>Before the spring breeding season (and prior to start of construction), a survey for roosting bats or maternity colonies will be performed by a qualified biologist at the proposed substation site, and along the Fulton No. 1 60 kV power line and distribution line alignment. It is expected that if construction occurs near suitable roosting habitat before the onset of breeding season, the construction disturbance will cause the bats to seek alternate sites for breeding and nest construction.</p>
<p>If avoidance of an active roosting bat or maternity colony is not practicable, a sufficient buffer will be established at the discretion of the appropriate agency.</p>
<p>In the event that a roosting bat or maternity colony occurs within or near the project area, a qualified biological monitor will be provided and will remain on-site during construction activities to ensure there is no nest abandonment.</p>
<p>Badger dens will be clearly demarcated with appropriate flagging and signs and avoided if possible.</p>
<p>If a badger den cannot be avoided, CDFG will be consulted to discuss the possible relocation of the badger.</p>
<p>The introduction of noxious weeds carried in with construction equipment will be minimized by ensuring the equipment is clean before it arrives at the proposed substation site, Fulton No. 1 60 kV power line and distribution line alignment. In addition, only weed-free erosion control materials will be used on the project.</p>
<p>Any landscaping involving vegetation other than trees and/or shrubs will consist of a native seed mix.</p>
<p>The valley oaks and oak woodlands will be denoted as environmentally sensitive and will be avoided to the extent practical. If any protected oak trees are removed, they will be replaced during the landscaping consistent with the Town of Windsor's Ordinance for Tree Mitigation.</p>
<p><b><i>Cultural</i></b></p>
<p>Prior to the initiation of construction or ground-disturbing activities, PG&amp;E will train all construction personnel to understand the potential for exposing subsurface cultural resources and to recognize possible buried cultural resources. Training will inform all construction personnel of</p>

<p>the anticipated procedures that will be followed upon the discovery or suspected discovery of archaeological materials, including Native American remains and their treatment.</p>
<p>Upon discovery of possible buried cultural materials (including potential Native American skeletal remains), work in the immediate area of the find will be halted and PG&amp;E's archaeologist notified. Once the find has been identified and evaluated, PG&amp;E's archaeologist will make the necessary plans for treatment of the find(s) and mitigation of impacts if the finds are found to be significant according to CEQA. State law will be followed in the event of the exposure of Native American skeletal remains.</p>
<p>In the event human remains are encountered during the project, work in the immediate area of the find will be halted and the County Coroner will be notified immediately. Work will remain suspended until the Coroner can assess the remains. In the event the remains are determined to be prehistoric in origin, the Coroner will notify the Native American Heritage Commission, who will then identify a Most Likely Descendent. The Most Likely Descendent will consult with PG&amp;E's archaeologist to determine further treatment of the remains.</p>
<p><b><i>Hazards and Hazardous Materials</i></b></p>
<p>A Hazardous Substance Control and Emergency Response Plan will be prepared for the project. It will prescribe hazardous material handling procedures to reduce the potential for a spill during construction or exposure of the workers or public to a hazardous material. The plan will provide a discussion of appropriate response actions in the event that hazardous materials are released or encountered during field activities.</p>
<p>Emergency-spill supplies and equipment will be clearly marked and immediately available at all work areas. Oil-absorbent materials, tarps, and storage drums will be used to contain and control any minor releases. Detailed information for responding to accidental spills, and for handling any resulting hazardous materials, will be provided in the project's Hazardous Substances Control and Emergency Response Plan.</p>
<p>An environmental training program will be established to communicate environmental concerns and appropriate work practices to all construction field personnel. The training program will emphasize site-specific physical conditions to improve hazard prevention, and will include a review of the Hazardous Substances Control and Emergency Response Plan and the Stormwater Pollution Prevention Plan (SWPPP).</p>
<p><b><i>Hydrology</i></b></p>
<p>All APMs will be on-site and ready for installation before the start of construction activities.</p>
<p>PG&amp;E will develop a Stormwater Pollution Prevention Plan (SWPPP), as outlined in General Permit 2009-0009-DWQ, which will describe BMPs to prevent the acceleration of natural erosion and sedimentation rates. The SWPPP will include a written site-specific Construction Site Monitoring Program (CSMP). A monitoring program will be established to ensure that the prescribed BMPs are followed during project construction. BMPs will include:</p> <ul style="list-style-type: none"> <li>• silt fences or other sediment containment methods placed around and/or down slope of</li> </ul>

<p>disturbed areas prior to construction;</p> <ul style="list-style-type: none"> <li>• protection of drain inlets from receiving polluted stormwater through the use of filters, such as fabrics, gravel bags, or straw wattles;</li> <li>• installation of additional silt fencing prior to construction along the northwest and south edges of the proposed substation site to address unforeseen runoff from the property into the nearby existing mitigation bank/preserve and mitigation area;</li> <li>• construction of a stabilized construction entrance/exit to prevent tracking onto roadway;</li> <li>• establishment of a vehicle storage, maintenance, and refueling area, if needed, to minimize the spread of oil, gas, and engine fluids. Use of oil pans under stationary vehicles is strongly recommended; and</li> <li>• no overnight parking of mobile equipment within 100 feet of wetlands, culverts, or creeks. Stationary equipment (e.g., pumps, generators) used or stored within 100 feet of wetlands, culverts, or creeks will be positioned over secondary containment.</li> </ul>
<p>A worker education program will be established for all field personnel prior to initiating fieldwork to provide training in the appropriate application and construction of erosion and sediment control measures. This education program will also discuss appropriate hazardous materials management and spill response.</p>
<p>All BMPs will be inspected on a weekly basis, and at least once every 24-hour period during extended storm events. BMPs will be inspected as described in the SWPPP, maintained on a regular basis, and replaced as necessary through the course of construction. For each inspection required, an inspection checklist will be completed using a form as described in Attachment C of General Permit 2009-0009-DWQ. This checklist will remain onsite with the SWPPP.</p>
<p>A Qualified SWPPP Practitioner will supervise placement of silt fencing at the boundary between the work area and wetland mitigation site to limit the area of disturbance during construction of the substation. The silt fence will be monitored regularly to ensure effectiveness.</p>
<p>Standard Urban Stormwater Mitigation Plan (SUSMP) features, e.g. vegetated bioswales and vegetated buffer strips, will be maintained around the perimeter of the substation pad.</p>
<p>The SPCC plan will include engineered methods for containing and controlling an oil release, including a water-collection system and retention pond equipped with an oil/water separator. Oil-absorbent material, tarps, and storage drums will be present on-site to contain and control any minor releases.</p>
<p><b>Noise</b></p>
<p>All construction equipment will use noise-reduction features (such as mufflers) that are no less effective than those originally installed by the manufacturer.</p>

Construction will be limited to the hours between 7 a.m. and 7 p.m., Monday through Saturday, to the extent feasible. If nighttime work is needed because of clearance restrictions on the power line, PG&E take appropriate measures to minimize disturbance to local residents, including contacting nearby residences to inform them of the work schedule and probable inconveniences.

Construction crews will limit unnecessary engine idling. (See Air Quality measures.)

Construction crews will use equipment that is specifically designed for low noise emissions.

Locate all stationary construction equipment as far as practical from noise sensitive receptors.