10.0 HYDROLOGY AND WATER QUALITY

10.1 INTRODUCTION AND METHODOLOGY

This chapter describes the existing surface water and groundwater hydrology, use, and quality, and the potential for erosion and flooding in the project area. It also describes the potential impacts from construction and operation of the project on surface water and groundwater quality and hydrology. With implementation of the recommended mitigation measures, construction and operation of all phases of the project are expected to have less than significant impacts on hydrology and water quality.

Surface water and groundwater in the project area were investigated by reconnaissance level field surveys, by review of studies completed by and for state and local water agencies, and by obtaining information from city, county, regional, and state water agencies. The potential impacts of the project on surface water and groundwater were evaluated by considering the initial construction activities and the long-term operation of the project electric lines and modified substations. PG&E will comply with all applicable federal, state, and local regulatory requirements that protect surface water and groundwater.

Areas of existing soil and water quality degradation were identified by searching federal and state regulatory agency databases that track sites with known, suspected, or potential hazardous substance contamination (e.g., underground storage tanks or landfills). The results of the database search are provided in Chapter 13, Public Health and Safety, and Hazardous Materials.

10.2 REGULATORY FRAMEWORK

The San Francisco Bay Regional Water Quality Control Board (RWQCB) is responsible for protecting the beneficial uses of water resources in the San Francisco Bay Area. The RWQCB adopted a Water Quality Control Plan (Basin Plan) in June 1995, and there were further recommendations by the San Francisco Estuary Institute and Sonoma Ecology Center in December 2000. The Basin Plan sets forth implementation policies, goals, and water management practices in accordance with the Porter-Cologne Water Quality Control Act. The Basin Plan establishes both numerical and narrative standards and objectives for water quality specific to the Bay Area aimed at protecting aquatic resources. Discharges to surface waters in the region are subject to regulatory standards set forth in the plan.

The Sonoma County Water Agency (SCWA Water Policy Statement, December 2002) acts as the local sponsor for federal flood control projects, flood channel maintenance, municipal water supply, and wastewater management projects. They operate under the direction of a Board of Directors comprising the members of the Sonoma County Board of Supervisors.

The North Bay Watershed Association facilitates partnerships across political boundaries that promote stewardship of the North San Pablo Bay watershed resources. They bring together local agencies to work cooperatively on watershed issues of common interest (W. E. Dietrich 2002, US Army Corp of Engineers 2001, SCWA 1985, SSCRCD 1999, Clean Water Action Plan 2000).

10.2.1 Federal and State Permit Requirements

The federal Clean Water Act and state Porter-Cologne Act require compliance with the National Pollutant Discharge Elimination System (NPDES) for projects disturbing one acre or more of soil. Because the total area of soil disturbance for the project will be greater than 1 acre, construction activities must comply with the California Storm Water NPDES General Construction Permit for discharges of storm water runoff associated with construction activities. Compliance with the Construction General Permit requires development and implementation of a Storm Water Pollution Prevention Plan (SWPPP), which must be prepared before construction begins.

10.2.2 Local Permit Requirements

If groundwater is encountered during project construction, it must be managed and disposed of in an appropriate manner in accordance with Sonoma County requirements. If any pole requires a hole deeper than 15 feet, Sonoma County requires a geotechnical boring well permit. Best management practices are to be used for dewatering holes, but no permit is required (pers. comm. with Nathan Quarells, Sonoma County EFS Department, July 27, 2004). The discharge of turbid or contaminated water is not allowed.

10.3 EXISTING CONDITIONS

10.3.1 Surface Water Hydrology

10.3.1.1 Sonoma Creek Watershed

The Sonoma Creek watershed covers an area of approximately 170 square miles. As shown in Figure 10-1, portions or all of each segment of the project are located within this watershed. The watershed is roughly rectangular in shape, stretching about 25 miles from north to south and about 10 miles east to west at its widest point.

Sonoma Creek flows south from its headwaters in the Sugarloaf Ridge State Park, at an elevation of about 2700 feet, to San Pablo Bay. Mountainous ridges bound the creek drainage to the east and west. Sonoma Creek has an extensive valley floor, which expands onto a low-lying tidal floodplain downstream of Schellville. Sonoma Creek flows into San Pablo Bay via a number of “circular” sloughs that have, over the last 150 years, been highly modified by dredging, levees, and re-alignment.

Source: CA Dept of Forestry GIS -- Watersheds 1999 / USGS DRG / PG&E GIS / EDAW, Inc. 2004

Lakeville-Sonoma 115 kV Transmission Line Project

2000 0 2000 4000 6000 Feet

1 0 1 Miles

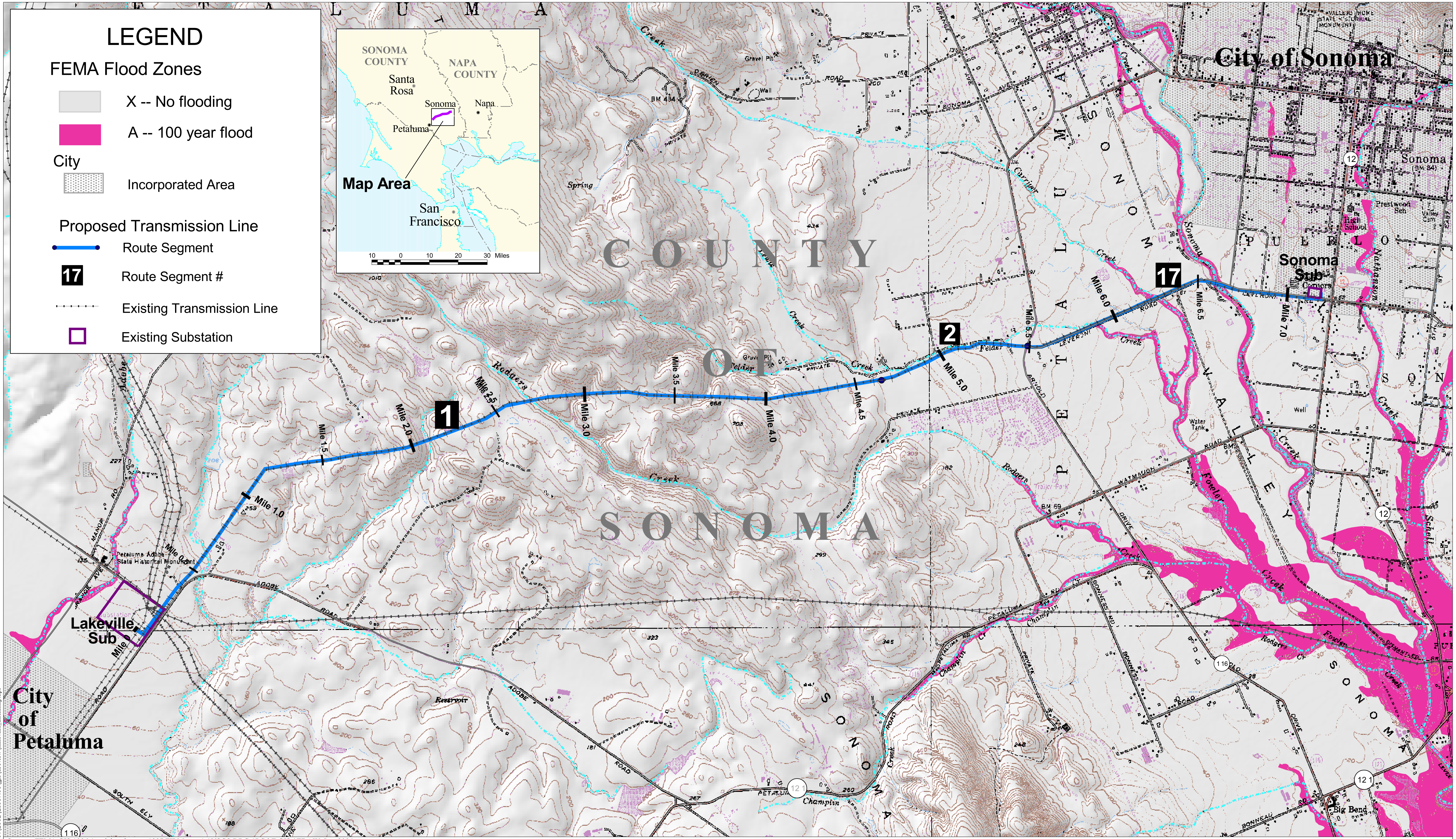
Scale 1 : 31,680
1" = 1/2 mile

FIGURE 10-1

Watersheds

EDAW
8/31/04

Pacific Gas and Electric Company



Source: FEMA GIS 1996 (partial updates to 1997 FIRM maps) / USGS DRG / PG&E GIS / EDAW, Inc. 2004

FIGURE 10-2

2000 0 2000 4000 6000 Feet

1 0 1 Miles

Scale 1 : 31,680
1" = 1/2 mile

Lakeville-Sonoma 115 kV Transmission Line Project

FEMA Flood Zones

EDAW 8/31/04

Pacific Gas and Electric Company

P:\2002\2s067.01\gis\arcview\lakeville_datamap.apr

The true boundary of the lower Sonoma Creek watershed is somewhat obscured by complex water circulation patterns associated with the sloughs and marshlands south of Schellville, adjacent San Pablo Bay.

Tributaries to Sonoma Creek that are located in the project vicinity include Rodgers Creek (spanned in Segment 1between poles 42-43), Felder Creek (paralleled for approximately 0.75 mile and then spanned in Segment 2 between poles 96-97), Carriger Creek (spanned in Segment 2 between poles 101-102), and Sonoma Creek (spanned in Segment 17 between poles 107-108). Key creeks and streams are shown in Figures 2-4(a) through (d) in Chapter 2. Fryer Creek, a small concrete-lined tributary to Nathanson Creek, will also be spanned in Segment 17 at pole 115. Many of these creeks are either dry or reduced to a series of disconnected pools in the summer.

10.3.1.2 Petaluma River Watershed

The Petaluma River watershed covers an area of about 146 square miles and flows into the northwestern portion of San Pablo Bay. The watershed comprises a hilly and mountainous headwater section, a central valley section, and a flat tidelands section near the bay (SSCRCD 1999). The Lakeville substation and a portion of Segment 1 are located just above the tidelands section of the watershed.

The Petaluma River, from its source at the confluence of Liberty Creek and Willow Brook in the northwest portion of the basin, flows in a southeasterly direction through the middle of the basin for about 18 miles, passing through Petaluma and emptying into San Pablo Bay. Tributaries to Petaluma River include two branches of an unnamed ephemeral creek crossed at poles 14-15 and 35-36 located near the Lakeville substation. These tributaries are dry or reduced to disconnected pools in the summer.

10.3.1.3 Ponds, Reservoirs, and Wetlands

There are several ponds and reservoirs located in the Sonoma Creek and Petaluma River watersheds; however, only two ponds (both stock ponds located in segment 1) are crossed by the project. These ponds, located in the Petaluma River watershed northeast of the Lakeville substation, will be spanned at poles 25-26 and 36-37. The poles will be constructed with an appropriate setback from the stock ponds. There is no code for minimum setback, but the County recommends review by a licensed professional to avoid placing a pole so close to the retaining berm that the structure is weakened and the berm is destroyed (pers. comm. with Nathan Quarells, Sonoma County EFS Department, July 27, 2004).

No reservoirs or dams exist in the project vicinity, so there is no threat of inundation to the project from dam failure.

Natural depressions in the two watersheds accumulate runoff and hillslope seepage during wet periods, forming intermittent streams and seasonal ponds. Wetlands are located in the project area adjacent to some of the surface water bodies and near isolated springs. Chapter 6.0, Biological Resources, describes these wetland areas in more detail.

10.3.2 Precipitation and Infiltration

The average annual precipitation in the project vicinity ranges from 25 to 40 inches (increasing with elevation), virtually all of which occurs in winter as rain. Most precipitation falls between the months of November and April, while summers are typically hot and dry. Fog is a common occurrence in summer and winter. Localized climatic conditions are strongly influenced by the topography, and it is not unusual to have a wide variation in climate at locations separated by only a few miles.

Long-term rainfall records for the Sonoma Creek watershed indicate short-term climatic shifts of generally drier weather, the most recent of which lasted for an eight-year period from the mid-1980s to the early 1990s. Rainfall records also indicate that the Sonoma Creek watershed undergoes wetter periods that usually last for up to three years at a time. In spite of the trend of shorter persistence, these strings of wetter years are associated with seven out of ten of the largest floods observed during the gauging record at Agua Caliente (see Figure 10-1). In years when there are many rainstorms, the chance of flooding increases with each storm. In years of very low rainfall, the annual runoff coefficient decreases to almost zero. This is because any rainfall that intercepts the watershed is either evaporated or transpired, or recharges soil moisture and groundwater. Only very small amounts of precipitation are transmitted via the groundwater system or minor surface flow to the stream network.

10.3.3 Storm Water Management System and Flooding Potential

Urbanized portions of the project area in the city of Sonoma have piped storm drain systems to contain and direct storm water runoff associated with impervious surface areas, such as roads and buildings. Most of these pipes and channels feed runoff to the natural creeks, some of which have been partially improved to accommodate flood flows. Storm drain systems in the more urban parts of Sonoma are typically maintained by the city.

The Federal Emergency Management Agency (FEMA) has mapped areas subject to flooding in the project area. The project is included in the FEMA 100-year floodplain only in section 17 at Felder Creek, Carriger Creek and Sonoma Creek (see Figure 10-2).

Flooding in Sonoma Valley results from intense short-period rainfall that occurs within a storm of longer duration. The duration of intense rainfall is relatively short (usually less than 6 hours), and flooding above Schellville is usually of relatively short duration.

The Petaluma River frequently floods part of Petaluma, where approximately 600 residential and commercial buildings are located within FEMA's 100-year floodplain. However, at its nearest point to the project, the Petaluma River is contained by levees and is not within the 100-year floodplain.

Past construction of levees and landfills in the tidal areas downstream of the Lakeville substation have aggravated the effects of sedimentation. Confinement of the natural waterway by levees has accelerated sediment buildup in the remaining unimproved areas. As a result, the flood-carrying capacity of the remaining waterway area is gradually being diminished by sedimentation.

10.3.4 Surface Water Quality

At the end of the 1960s, the Sonoma County Water Agency (SCWA) was faced with meeting water demands that the existing water supply system could not accommodate. The "Agreement for Water Supply and Construction of the Russian River-Cotati Intertie Project" between the Sonoma County Water Agency and eight major cities and special districts in Sonoma and Marin counties was executed in 1974 and has been amended eleven times, most recently January 2000. The 1974 agreement was instrumental in creating the infrastructure that supports the current water transmission system to Santa Rosa, Petaluma, Rohnert Park, Sonoma, Cotati, the North Marin Water District, Valley of the Moon Water District, and Forestville Water District (SCWA 2002).

The principal source of water for the SCWA's water transmission system and other municipal diverters is runoff from the Russian River watershed, augmented by diversions from the Eel River. During dry months, the Russian River flow is regulated by the SCWA with releases of stored water from Lake Mendocino (north of Ukiah) and Lake Sonoma (west of Healdsburg). The SCWA expects to be able to provide a reliable municipal water supply through 2022.

Most stream flow in creeks along the project route originates as storm water runoff. In the more urbanized sections, storm water runoff carries urban pollutants generated by residential, commercial, industrial, and transportation land uses. These pollutants typically include oil and grease, heavy metals, pesticides, treatment plant discharges, and debris. Although some of these contaminants percolate into the streambed, most are discharged directly into San Pablo Bay, adding to the overall pollutant load. In the less urbanized and open space areas along the project route, water quality in creeks is unknown. Sediment is transported from steep erosive areas, and agricultural operations may contribute contaminants from organic sources such as livestock manure and inorganic sources such as chemical fertilizers. Rural residential areas can add effluent from malfunctioning septic tanks. Additionally, sediments from erosion in the upper tributaries of the watershed decrease the capacity of downstream and tidal waterways.

The Petaluma River is influenced by tidal action and saltwater intrusion from San Pablo Bay to Petaluma, and receives little fresh water inflow from May to November when there is little or no rainfall. The river was designated "water quality limited" in the 1982 amended Water Quality Control Plan.

During periods of low freshwater inflow, there is also saltwater intrusion in the lower reaches of Sonoma Creek due to the influence of San Pablo Bay. Suspended sediment concentrations remain high during the dry season, a product of tidal re-suspension. There are also pulses of suspended sediment associated with storm discharge from the watershed.

San Pablo Bay is considered impaired (US Army Corp of Engineers 1999) pursuant to the Clean Water Act Section 303(d).

10.3.5 Groundwater Quality and Use

Although groundwater makes up only a small part of the water supply currently provided by the SCWA (none in the project vicinity), it is the primary source of water supply in many parts of Sonoma County not serviced by the agency's water transmission system. In addition, many of the agency's water contractors (including the cities of Petaluma and Sonoma) operate groundwater wells to supplement deliveries made by the agency. The extent to which groundwater can provide a reliable future regional water supply is not known. Groundwater supply studies are presently under way in the Sonoma, Alexander, and Russian River valleys in cooperation with the U. S. Geological Survey, and should be completed by about 2006.

10.3.5.1 Petaluma Valley Groundwater Basin

The Merced formation, northwest of the city of Petaluma, is essentially one continuous aquifer averaging 450 feet in thickness. Because few creeks cross the recharge areas, the major source of natural recharge to the Merced formation appears to be from rain falling on permeable soils. The Petaluma River flows across some of these recharge areas. However, because there is little storage available in aquifers beneath these recharge areas, the loss of surface water to the groundwater body is probably small.

Because the Petaluma River is tidal and brackish at the city of Petaluma, an increase in river recharge to the groundwater basin in this area would not be desirable. Other recharge areas dot the western uplands and are scattered on the western flank of the Sonoma Mountains. In these areas too, most recharge is from rainfall because few streams flow across the recharge areas.

10.3.5.2 Sonoma Valley Groundwater Basin

The Sonoma Creek watershed is underlain by an assortment of geological materials, most of which yield groundwater of reasonable to excellent quality when tapped. Yields of groundwater to wells drilled into the Sonoma Volcanics are typically slight or nil in dense non-fractured rocks, to moderate in fractured areas that are more permeable. The yields from the Petaluma formation tend to be moderate. However, water quality tends to be poor due to dissolved sodium, chloride and sulfate ions. Yields from the Glen Ellen formation may be locally high enough for irrigation use, although permeability in the Sonoma Valley area tends to be poorer than in other areas in Sonoma County. On the valley floors, younger alluvium provides good recharge to the groundwater table. Modern stream channel deposits are highly permeable and may be very important locally for groundwater recharge if underlain by older permeable strata. Bay Mud in the lower Sonoma Baylands is impermeable and of little consequence to groundwater movement, recharge or extraction.

10.4 POTENTIAL IMPACTS AND MITIGATION MEASURES

10.4.1 Significance Criteria

The following criteria (based on Appendix G of the revised CEQA guidelines) were used to evaluate environmental impacts of the project. It is assumed that the project will have a significant impact if it:

- Violates any water quality standards or waste discharge requirements;
- Substantially depletes groundwater supplies or interferes substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- Substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or sedimentation on- or off-site;
- Substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increases the rate or amount of surface runoff in a manner that would result in flooding on- or off-site;
- Creates or contributes runoff water that would exceed the capacity of existing or planned storm water drainage systems or provides substantial additional sources of polluted runoff;
- Otherwise substantially degrades water quality;
- Places housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map;
- Places within a 100-year flood hazard area structures that would impede or redirect flood flows;

- Exposes people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or
- Causes inundation by seiche, tsunami, or mudflow.

10.4.2 Construction Impacts

Project ground disturbance will be limited to excavation and installation of transmission line poles, construction of concrete pads for new equipment within existing substations, and installation of new electric cable. Tubular steel poles will be installed on a concrete foundation approximately 5 to 7 feet in diameter. Concrete foundation holes will be augured to a depth of approximately 15 to 30 feet. Wood poles will be installed directly into the soil in an augured hole (approximately 7 to 12 feet deep) with compacted backfill around the base. Additional foundations will be required for new breaker and bus structures within the existing switchyards. Since the total surface area of new impervious material is so small (~ 16,887 square feet or 0.39 acre), there will be no significant impact to surface runoff rates or existing surface water drainage patterns.

Most of the project is accessible by existing roads; however, a few new roads and road extensions will be required to access poles. New roads will be bladed and graded as necessary to accommodate occasional maintenance visits, and some areas may be graveled as necessary to minimize rutting and erosion during the wet season. Additionally, unnamed ephemeral tributaries to some creeks (e.g., Felder Creek) will be crossed with heavy equipment and trucks during project construction. Temporary pull sites will be graded as necessary to accommodate the installation of new electric cable.

Impact 10.1 Erosion and Runoff.
Accelerated sedimentation and reduced surface water quality could potentially occur during project construction. Surface runoff from excavation stockpiles could contain turbid water and sediment if the stockpiles are not properly managed, which could impact nearby surface waterways. If construction occurs during the wet season, vehicle traffic on unpaved access roads could increase erosion rates and create turbid runoff. If sediment-laden runoff enters surface waterways, it could increase water turbidity, increase channel siltation rates, and potentially reduce the flood-carrying capacity of the creek downstream. Construction activities conducted when the ground is wet could also result in rutting and scattering of mud upon roadways, which could be washed into storm water drains on the streets in the more urbanized areas.

Mitigation Measure 10.1. Soil stockpiles will be stored away from surface waterways. Silt fences or straw waddles will be installed around stockpile perimeters to prevent sedimentation of surface runoff. Stockpiles will be covered with plastic during inclement weather to prevent erosion. Excess soil will be disposed of at an approved facility. Impacts will be less than significant.

If construction activities occur in the wet season, access roads, pull sites, and material laydown areas will be rocked to prevent rutting and erosion. When project construction is completed, the rock will be removed from temporary pull sites and laydown areas (unless otherwise requested by the landowner). Where access roads cross two ephemeral waterways near Felder Creek, steel bridges will be installed to prevent construction and operation impact. Permits may be needed for bridges. If less than 50 cubic yards of soil are moved, permits for roads are not required.

Impact 10.2 Potential Spills.

Project construction will require the use of motorized heavy equipment including trucks, cranes, backhoes, and air compressors. This equipment requires fuel and liquid replenishment in the form of gasoline, diesel, lubrication oil, hydraulic fluid, antifreeze, transmission fluid, lubricating grease, and other fluids. Surface water and/or groundwater quality could be impacted by an accidental release from a vehicle or motorized piece of equipment, or by a release during concrete preparation or pouring. Such spills could wash into nearby storm drains or infiltrate the soil.

Mitigation Measure 10.2. The project's Stormwater Pollution Prevention Plan will include measures to prevent and clean up potential spills of hazardous substances, as well as stream setback requirements for refueling. Impacts will be less than significant.

Impact 10.3 Dewatering.

The water table is expected to be below the depth of most foundation excavations. However, some seepage may occur in some pole excavations. Dewatering may be required on a one-time basis immediately prior to pole placement. The quantity of water removed will be too small to impact the groundwater supply. However, if improperly managed, turbid water or wet concrete could be released to surface waterway, which could impact surface water quality.

Mitigation Measure 10.3. Evacuated seepage water will be discharged away from any nearby waterways, in a manner that does not cause erosion or sedimentation. Any unused or spilled wet concrete will be contained, allowed to dry, removed from the construction area, and disposed of at an approved facility. A dewatering permit will be obtained from the County of Sonoma if necessary. Impacts will be less than significant.

10.4.3 Operation Impacts

Operation and maintenance of the 115 kV power line will not adversely affect hydrology or water quality in the project area, because there will be no change from the existing operations and maintenance activities that are presently in compliance with all water quality regulations. No new impacts to hydrology or water quality will result from operation or maintenance of the project.

Therefore, no mitigation is proposed. No new hazardous substances will be stored on-site after project construction. Both the Lakeville and Sonoma substations have Spill Prevention Countermeasure and Control Plans in place to prevent the offsite release of hazardous or deleterious materials. These plans, and associated engineering controls, will be modified as necessary to include improvements resulting from the project, including any new oil-filled equipment. As a result, operation of the project will have no impact on hydrology or water quality.

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