4.7 Hydrology and Water Quality

4.7.1 Setting

Setting information in this section was compiled from: field reconnaissance of the Proposed Project and Weed Segment (see Figure 4.7-1); the Proponent's Environmental Assessment (PEA) (PacifiCorp, 2005); peer-reviewed scientific literature; resource agency websites and databases; and California Department of Water Resources (DWR) well completion reports.

Hydrologic Setting

Climate and Drainage Features

The Proposed Project and the Weed Segment are contained entirely within the upper Shasta Valley, which sits within the 795 square-mile Shasta River watershed (Figure 4.7-1). Shasta Valley is in the central part of Siskiyou County and lies between the Klamath Mountains to west and the Cascade Range (Cascades) to the east. Shasta Valley has a Mediterranean climate characterized by warm, dry summers and cold, wet winters. In general, the valley's climate is relatively dry and characteristic of a high desert environment; average precipitation on the valley floor is much less than the surrounding mountain areas. Average annual precipitation ranges from less than 15 inches over much of the valley to over 60 inches at Mount Eddy and between 85 and 125 inches on Mount Shasta (NCRWQCB, 2006a; WRCC, 2006; Mack, 1960). The wet season generally lasts from October to April. In general, the amount of precipitation at any place and the proportion of precipitation that falls as snow are related directly to elevation.

The floor of Shasta Valley occupies about one-third of the Shasta River watershed and, according to Mack (1960), contributes little runoff in years of average or below-average precipitation. Most of the runoff occurs along that part of the west side of the valley adjacent to the Klamath Mountains. By contrast, most of the east-side streams that cross the lava flows of the high Cascades normally do not maintain a flow as far west as Shasta Valley, owing to the porous nature of the lava (Mack, 1960).

The Proposed Project and the Weed Segment cross two U.S. Geological Survey (USGS) blueline[1] streams: Garrick Creek (also locally known as Carrick Creek) and Beaughton Creek. These streams originate near the base of the northwestern flank of Mount Shasta and drain northwest toward the valley trough. The hydrology of both streams is dominated by the influence of spring and seep discharges, the origins of which are found in the porous, volcanic recharge areas higher up on the slopes of Mount Shasta. Garrick Creek is tributary to Lake Shastina (formerly known as Dwinnell Reservoir) and Beaughton Creek is tributary to the upper (e.g., upstream of Lake Shastina) Shasta River. The upper Shasta River flows into Lake Shastina, where its outflow is controlled by the presence and operation of Dwinnell Dam. Lake Shastina was constructed in the late 1920s as a water supply project for the Montague Water Conservation District (MWCD), one of the principle water service agencies in Shasta Valley. MWCD serves over 14,000 of the 48,000

1 Streams shown as blue lines on U.S. Geological Survey 7.5 Minute Quadrangle Maps.

acres irrigated in the valley (PacifiCorp, 2005). Although a relatively small reservoir, with a capacity of approximately 50,000 acre-feet, the reservoir fills only in above-normal runoff years due to the relatively modest yield from upstream watershed areas, seasonal water use, and appreciable seepage loss from the reservoir (Vignola and Deas, 2005). Downstream of Lake Shastina, the Shasta River winds through the valley for some 33 miles before plunging down a short stretch of canyon (7.5 miles) on its way to the Klamath River.

Morphology of the Shasta Valley

It is generally accepted that the present morphology of the Shasta Valley floor was largely shaped by a gigantic debris avalanche [described by Crandell (1989)] that occurred 300,000 to 380,000 years ago. The theory maintains that a massive amount of material was entrained in a huge landslide from the ancestral Mount Shasta. Large andesite blocks were scattered down the valley and a finer, more liquid matrix (similar to a lahar, or mudflow) flowed around them and filled in the valley. The avalanche deposit covers an area of approximately 675 square kilometers and is overlain on the east by more recent basaltic lava flows and on the south by andesitic lava flows, lahars, and alluvium from Mount Shasta. Two texturally distinct parts characterize the avalanche deposit: the block facies and the matrix facies. The matrix facies consist of an unsorted and unstratified mixture of pebbles, cobbles, and boulders in compact silty sand; texturally it resembles the deposit of a mudflow (Crandell, 1989). The block facies are responsible for the many small hillocks throughout the valley and include individual andesite blocks (many of which are pervasively shattered) ranging in size from tens to hundreds of meters in maximum dimension.

The valley morphology, in turn, controls the development and evolution of drainage networks and stream channels. The morphology of the deposit has changed little since its emplacement; the lack of a well-integrated drainage system, as well as the absence of deep and widespread dissection of the deposit, is due to its gently sloping surface and to the presence of resistant rock at the head of the lower Shasta River canyon northwest of Montague (this bedrock threshold serves as a base-level control for the Shasta River and the Shasta Valley). Consequently, the Shasta River within the valley has since persisted as a low gradient, low energy system; this is particularly evident in the highly sinuous, meandering portion of the river between Big Springs and the Little Shasta River.

Flooding

The construction of Dwinnell Dam (forming Lake Shastina) on the Shasta River (in 1928) reduced flooding within the Shasta Valley; still, the Shasta River’s flow regime is influenced more by spring flow and seepage than direct surface runoff. Annual peak flows of 21,500 cubic feet per second (cfs) and 10,900 cfs were recorded at the U.S. Geological Survey (USGS) gaging station (no. 11517500, Shasta River near Yreka) on December 22, 1964 and on January 1, 1997, respectively (USGS, 2007a). Otherwise, annual flood peaks have rarely exceeded 4,000 cfs since this gage began operating in 1934.

SOURCES: USGS (1998), PacifiCorp (2007), ESA (2007)

Figure 4.7-1
Proposed Project and Weed Segment Area and Shasta River Watershed

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The Federal Emergency Management Agency (FEMA) is responsible for mapping areas subject to flooding during a 100-year flood event (i.e., 1 percent chance of occurring in a given year). According to FEMA (2004), existing pole 21/45 of the Weed Segment is located within a 100-year floodplain (Beaughton Creek).

Surface Water Quality

Most of the surface runoff is generated in the uplands on the west side of Shasta Valley, whereas the streams draining the younger volcanic uplands on the east side of the valley are maintained primarily by deep percolation and groundwater recharge through seeps and springs. Surface water and groundwater are generally low in dissolved mineral content and with few exceptions meet minimum standards for irrigation and domestic use (Mack, 1960). The composition of the various rock types has a strong local influence on the mineralization of surface water and groundwater in proximal areas.

The dominant land-use in the Shasta Valley is agriculture (ranching, farming, and crop production) and, as a result, many of the water quality issues within the valley stem from this general land use practice. Further, Lake Shastina captures runoff from approximately 15 percent of the Shasta River watershed and has altered the downstream hydrologic regime and water quality. The North Coast Regional Water Quality Control Board (NCRWQCB) has identified water quality issues for the Shasta River related to low dissolved oxygen levels and high ambient surface water temperatures (NCRWQCB, 2006a, 2006b). Potential sources for these water quality issues can be described by a few general categories: agricultural runoff (e.g., tailwater return), flow regulation and modification, and habitat modification (i.e., removal of riparian vegetation for land conversion and/or as a result of cattle grazing). Regulatory frameworks, standards, and management actions regarding study area water quality are discussed in further detail below.

Groundwater Hydrology

Owing to the unique geology of the Shasta River watershed, groundwater movement and storage is complex and does not easily lend itself to simplification into a single, homogeneous groundwater basin. The primary water-bearing formations within the Shasta Valley are Quaternary alluvium (along the extreme western margin of the valley and in the area north of Montague), Holocene basalt formations (southeastern part of the valley), and the Pleistocene debris avalanche deposit (throughout the middle of the valley) (DWR, 2004a). Though these formations are distinct, the groundwater body of the entire Shasta Valley appears to be hydraulically continuous within all the geologic units (DWR, 2004a; Mack, 1960). All of these geologic units serve as significant groundwater storage and recharge areas within the Shasta Valley. However, the volcanic rocks (basalts) constitute the principal aquifer and typically yield abundant water for irrigation, stockwater, and domestic wells. Due to the complexity of the region with respect to the extensive network of volcanic recharge and storage areas, the amount of groundwater in storage has not been estimated (DWR, 2004a).

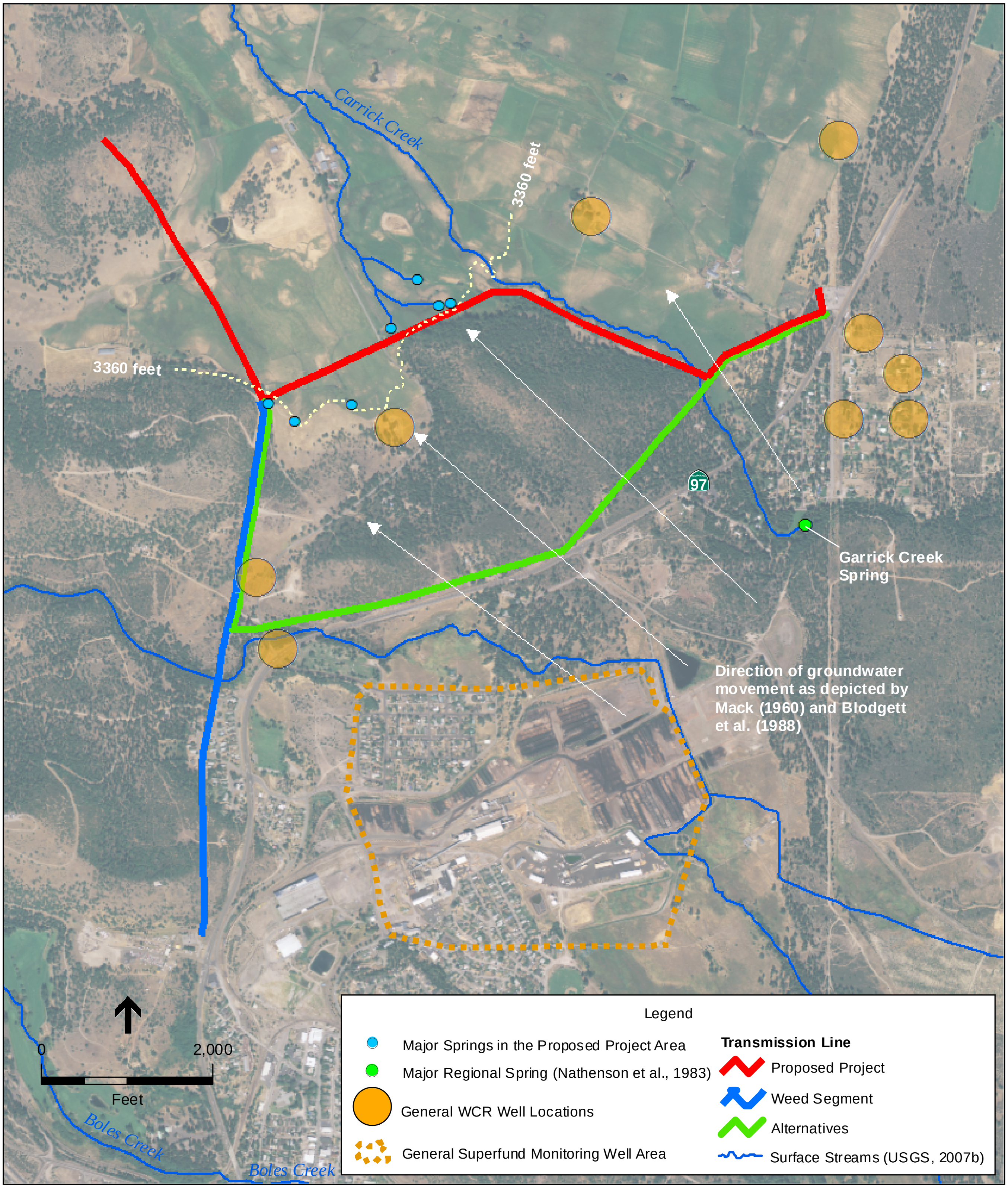
Strata (e.g., layers of different geology and/or time periods) within the upper few hundred feet of the subsurface can be rather heterogeneous and variable with respect to their water-bearing properties; this is due, in part, to the prevalence and frequency of relatively recent (geologically) and distinct volcanic events. These layers could comprise hard volcanic rock, highly fractured volcanic rock, tuff, cinder or ash, lahars or mudflows, pyroclastic flows, sands and gravels (some cemented), and other types of volcanic or alluvial deposits. Groundwater could be contained in and separated by such layers to varying degrees. However, once at the depth of the debris avalanche deposit, the strata within the valleys are relatively homogenous as this deposit has changed little since its emplacement (Crandell, 1989).

Groundwater dynamics exert a strong influence on the volume and quality of surface flow in the Shasta River and its tributaries. Abundant groundwater, generally found on all sides of Mount Shasta, usually flows away from topographic high points toward the Shasta River (Blodgett et al., 1985). Blodgett et al. (1985) and Mack (1960) depict groundwater movement in the study area as flowing in a northwesterly direction (Figure 4.7-2); the direction of groundwater movement is in a down-gradient direction from areas of recharge near Black Butte and Mount Shasta to areas of discharge near Weed and Mount Shasta (city) (Blodgett et al., 1985). Recharge to groundwater is affected by deep infiltration of precipitation that falls on the tributary drainage area, principally the western slopes of Mount Shasta, and by seepage from streams (Mack, 1960). Precipitation on the valley floor is generally not sufficient to contribute much to recharge of the groundwater. Groundwater discharge in Shasta Valley occurs principally by seepage into streams (Mack, 1960). Springs and seeps occur in some exposures of all the geologic formations in the Shasta Valley (particularly near the borders of the valley and along the courses of major streams). However, the young basalt formations on the eastern side are the most prolific in terms of spring and seep development and production.

Throughout Shasta Valley the depth to the water table varies greatly, though depths tend to be greatest at the south end of the valley along the eastern and western margins. Many groundwater wells in the vicinity of the Proposed Project and Weed Segment show only slight fluctuations from season to season and reflect steady-state conditions (Mack, 1960; Blodgett et al., 1985; DWR, 2004b; DWR, 2007); this is reflective of the large and constant source of recharge represented by rainfall and snowmelt on the slopes of Mount Shasta.

Springs

In the Oregon and California Cascades, high recharge rates combined with a poorly dissected landscape result in the formation of many large springs (Manga and Kirchner, 2004). Natural springs and seeps are a prolific feature of the entire Shasta Valley due to the high density of porous, volcanic rocks (particularly on the eastern side). The processes that maintain the function of these springs operate on a relatively large scale; the entire volume of the Cascade volcanics (which cover much of the central and eastern portions of the Shasta Valley) can essentially be considered a huge recharge mechanism for the various surface springs and other similar groundwater features. Most of the steeper areas of the high Cascades are mantled with thin rocky soils overlying highly fractured volcanic rocks, and can thus readily absorb large quantities of water derived from rain and snow. Many of the streams along the east side of the Shasta Valley (i.e., Garrick Creek and Beaughton Creek) derive most of their flow from springs and seeps issuing from volcanic rocks of the High Cascades.



SOURCES: ESA (2007), USGS (2007b), Natheson et al (1983), DWR (2007), NAIP for Siskiyou County, California (2006)

PacifiCorp's Yreka-Weed Transmission Line Upgrade Project - Southern Portion . 205439

Figure 4.7-2

Groundwater Movement, Springs, and Wells in the Study Area

Nathenson et al. (2003) studied and mapped the major springs (Beaughton Creek Spring, Garrick Creek Spring, Boles Creek Spring, and the Black Butte Spring) occurring in the vicinity of Weed; these springs discharge at elevations ranging from 3520 to 3950 feet above mean sea level (amsl) and occur to the east and southeast of the Proposed Project and Weed Segment area. The major springs in the immediate study area (Figure 4.8-2) are slightly less prolific and discharge, for the most part, along the 3360 foot contour interval, just down-gradient from the springs depicted by Nathenson et al. (2003). The elevation of two major springs in the vicinity of the new 1.6 mile segment of the Proposed Project were verified by a survey on June 8, 2007.

The topographic gradient in the southeastern Shasta Valley makes it unlikely that all springs are directly connected via underground flow (Nathenson et al., 2003). Rather, it is more probable that multiple flows from Mount Shasta feed distinct areas of discharge via springs. For example, the flow which feeds the springs depicted by Nathenson et al. (2003) and in the project vicinity is, at the least, distinct from the flow which feeds the springs further north in the valley (e.g., Big Springs east of Grenada). The discharge of large amounts of groundwater requires some combination of a large recharge area, a high recharge rate, and a high permeability for large volumes of water to be concentrated at a single point; the presence of a large discrete spring, rather than diffuse seepage, is further evidence of heterogeneity of permeability in the subsurface (Manga, 2001).

Within the Proposed Project and Weed Segment area, the proximity of the spring sites to one another at similar altitudes (e.g., 3360 feet amsl) indicates the possible seepage and movement of groundwater in one strata that has come into contact with another, less permeable strata (e.g., permeable volcanic flows that rest upon the less permeable debris avalanche deposits; or alluvium and soils that rest upon unfractured and impermeable lava flows). The similarity in the elevation of the springs also suggests that the same groundwater body supports all the springs in the vicinity of the new 1.6 mile segment.

Groundwater Quality

Groundwater in the Shasta Valley is characterized as magnesium bicarbonate and calcium bicarbonate type water (DWR, 2004a). Total dissolved solids (TDS) range from 131 to 1,240 milligrams per liter (mg/L) and average 406 mg/L (DWR, 2004a). Sampling of a number of public supply wells between 1994 and 2000, for a number of constituent groups (inorganics, radiological, nitrates, pesticides, and VOCs), indicated that nitrates were above the primary maximum contaminant level (MCL) for two wells.[2]

Other than information related to the J.H. Baxter Superfund site, there is little water quality information for locations near the study area. The J.H. Baxter Superfund site, a wood-treatment facility and adjacent lumber mill, is located just south of the study area (e.g., in northern Weed on the south side of Highway 97). Sampling, monitoring, and/or remediation activities have taken place at this site since the early 1980s; constituents of concern at this site have included arsenic,

2 This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer (DWR, 2004a).

polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), chromium, copper, zinc, and benzene (USEPA, 2005). Contamination occurred in groundwater, soils, and Beaughton Creek, which traverses the site. However, remediation efforts have been successful and the remedy at the J.H. Baxter Superfund site currently protects human health and the environment because exposure pathways that could result in unacceptable risks are being controlled (USEPA, 2005).

There are two aquifers (an upper and lower) and one aquitard (e.g., strata which generally separates the aquifers) in the soil within 50 feet below ground surface (bgs) at the J.H. Baxter Superfund site (USEPA, 2005). Monitoring efforts at this site included the installation of groundwater wells in the upper and lower aquifer; screen depths for monitoring wells in the upper aquifer extended up to approximately 30 feet bgs. The applicability of the stratigraphy characteristics at the J.H. Baxter Superfund site to areas outside of this location is uncertain, as artificial fill material ranges in thickness from 0 to 35 feet at the site.

Regulatory Context

Federal and State Water Quality Policies

The legislation governing the water quality aspects of the Proposed Project and the Weed Segment are the Federal Clean Water Act (CWA) and, within California, the Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code); these acts provide the basis for water quality regulation. The objective of this legislation is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The California legislature has assigned the primary responsibility to administer regulations for the protection and enhancement of water quality to the California State Water Resources Control Board (SWRQB) and the Regional Water Quality Control Boards (RWQCB). The SWRCB provides state-level coordination of the water quality control program by establishing statewide policies and plans for the implementation of state and federal regulations. Nine RWQCBs throughout California adopt and implement water quality control plans (basin plans) that recognize the unique characteristics of each region with regard to natural water quality, actual and potential beneficial uses, and water quality problems.

Beneficial Use and Section 303(d)

The NCRWQCB is responsible for the protection of the beneficial uses of waters within Siskiyou County. The NCRWQCB uses planning, permitting, and enforcement authorities to meet this responsibility and has adopted the Water Quality Control Plan for the North Coast Region (Basin Plan) to implement plans, policies, and provisions for water quality management. The most recent revision to the Basin Plan was published in September of 2006 (NCRWQCB, 2006c).

In accordance with state policy for water quality control, the NCRWQCB employs a range of beneficial use definitions for surface waters, groundwater basins, marshes, and mudflats that serve as the basis for establishing water quality objectives and discharge conditions and prohibitions. The Basin Plan (NCRWQCB, 2006c) has identified existing and potential beneficial uses supported by the key surface water drainages throughout its jurisdiction. The beneficial uses designated in the Basin Plan (NCRWQCB, 2006c) for the streams and reservoirs relevant to the Proposed Project and the Weed Segment areas are identified in Table 4.7-1. The applicable beneficial use categories are defined in Table 4.7-2. The Basin Plan (NCRWQCB, 2006c) also includes water quality objectives for each of the identified beneficial uses.

TABLE 4.7-1
SHASTA VALLEY HYDROLOGIC AREA

Waterbody	MUN[a]	AGR	IND	PRO	GWR	FRSH	NAV	POW	REC 1	REC 2	COMM	WARM	COLD	WILD	RARE	MIGR	SPWN	AQUA
Shasta River & Tributaries	E	E	E	P	E	E	E	P	E	E	E	E	E	E	E	E	E	E
Lake Shastina	P	E	P	P	E	E	E		E	E		E	E	E		P		P
Lake Shastina & Tributaries	E	E	E	P	E	E	P	P	E	E	E	E	E	E		E	E	P

E = existing beneficial use
P = potential beneficial use

[a] Refer to Table 2.8-2, below, for definition of abbreviations

SOURCE: NCRWQCB, 2006c

Furthermore, under Section 303(d) of the 1972 Clean Water Act, the State of California is required to develop a list of quality impaired water bodies that do not meet water quality standards and objectives. A statewide list of impaired water bodies first was established in 1998 and subsequently has been updated to include more recent information and new pollutants. Table 4.7-3 provides a list of impaired waters, as designated by the NCRWQCB (2006b), relevant to the Proposed Project and the Weed Segment areas along with the corresponding pollutant(s) and issue(s) of concern.

NPDES Program

The CWA was amended in 1972 to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with the National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES Program. In November 1990, the EPA published final regulations that establish storm water permit application requirements for discharges of storm water to waters of the United States from construction projects that encompass five or more acres of soil disturbance. Regulations (Phase II Rule) that became final on December 8, 1999 expanded the existing NPDES Program to address storm water discharges from construction sites that disturb land equal to or greater than one acre and less than five acres (small construction activity).

TABLE 4.7-2
DEFINITIONS OF BENEFICIAL USES OF SURFACE WATERS

Beneficial Use	Description
Municipal and Domestic Supply (MUN)	Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
Agricultural Supply (AGR)	Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Industrial Service Supply (IND)	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
Industrial Process Supply (PRO)	Uses of water for industrial activities that depend primarily on water quality.
Groundwater Recharge (GWR)	Uses of water for natural or artificial recharge or groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
Freshwater Replenishment (FRSH)	Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
Navigation (NAV)	Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
Hydropower Generation (POW)	Uses of water for hydropower generation.
Water Contact Recreation (REC 1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white-water activities, fishing, or use of natural hot springs.
Non-Contact Water Recreation (REC 2)	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Commercial and Sport Fishing (COMM)	Uses of water for commercial, recreational (sport) collection of fish, shellfish, or other aquatic organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Cold Freshwater Habitat (COLD)	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Rare, Threatened, or Endangered Species (RARE)	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal laws as rare, threatened, or endangered.
Migration of Aquatic Organisms (MIGR)	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.
Spawning, Reproduction, and/or Early Development (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Aquaculture (AQUA)	Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

SOURCE: NCRWQCB (2006c)

TABLE 4.7-3
PROPOSED 2006 CWA SECTION 303(D) LIST OF WATER QUALITY LIMITED SEGMENTS IN THE PROPOSED PROJECT AREA

Name	Pollutant/Stressor	Source	TMDL Priority	TMDL Completion Date
Shasta River	Organic Enrichment/Low Dissolved Oxygen	Minor Municipal Point Source	Medium	Staff Report for the Action Plan published on June 28, 2006
		Agriculture – storm runoff		
		Agriculture – irrigation tailwater		
		Dairies		
		Hydromodification		
		Dam Construction		
		Flow Regulation/Modification		
		Habitat Modification		
	Temperature	Agriculture – irrigation tailwater	Medium	Staff Report for the Action Plan published on June 28, 2006
		Flow Regulation/Modification		
		Habitat Modification		
		Removal of Riparian Vegetation		
		Drainage/Filling of Wetlands		

SOURCE: NCRWQCB (2006b)

While federal regulations allow two permitting options for storm water discharges (individual permits and General Permits), the SWRCB has elected to adopt only one statewide General Permit at this time that would apply to all storm water discharges associated with construction activity.[3] This General Permit requires all dischargers where construction activity disturbs one acre or more, to:

- Develop and implement a Storm Water Pollution Prevention Plan (SWPPP) which specifies Best Management Practices (BMPs) that would prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters.
- Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the nation.
- Perform inspections of all BMPs.

This General Permit is implemented and enforced by the nine RWQCBs. The NCRWQCB administers the stormwater permitting program in the section of Siskiyou County that includes the Proposed Project and the Weed Segment areas. Dischargers are required to submit a Notice of

[3] State Water Resources Control Board (SWRCB) Order No. 99-08-DWQ National Pollutant Discharge Elimination System General Permit No. CAS000002.

Intent (NOI) to obtain coverage under this General Permit and annual reports identifying deficiencies of the BMPs and how the deficiencies were corrected. Dischargers are responsible for notifying the relevant RWQCB of violations or incidents of non-compliance.

On August 19, 1999, the SWRCB reissued the General Construction Storm Water Permit (Water Quality Order 99-08-DWQ referred to as “General Permit”). In September 2000, a court decision directed the SWRCB to modify the provisions of the General Permit to require permittees to implement specific sampling and analytical procedures to determine whether BMPs implemented on a construction site are: (1) preventing further impairment by sediment in storm waters discharged directly into waters listed as impaired for sediment or silt, and (2) preventing other pollutants, that are known or should be known by permittees to occur on construction sites and that are not visually detectable in storm water discharges, from causing or contributing to exceedances of water quality objectives. The monitoring provisions in the General Permit have been modified pursuant to the court order.

Local

Siskiyou County General Plan

The Conservation Element of the Siskiyou County General Plan (Siskiyou County Planning Department, 1973) includes some general objectives relating to hydrology, water resources, and water quality. These objectives include:

- To preserve and maintain streams, lakes and forest open space as a means of providing natural habitat for species of wildlife;
- To preserve the quality of existing water supply in Siskiyou County and adequately plan for the expansion and retention of valuable water supplies for future generations and to provide for a comprehensive program for sustained multiple use of watershed lands through reduction of fire hazards, erosion control and type-conversion of vegetation where desirable and feasible.

The Proposed Project and the Weed Segment would comply with these general objectives by: 1) utilizing the existing right-of-way for a majority of the Proposed Project and the Weed Segment, 2) completely avoiding construction on forest lands and near lakes, 3) spanning sensitive areas such as wetlands, riparian zones, and streams, and 4) implementing erosion and runoff control measures into proposed construction activities. Therefore, no conflict with the listed county policies or ordinances would result from implementation of the Proposed Project and the Weed Segment.

City of Weed General Plan

The Open Space and Conservation Elements section of the City of Weed General Plan (City of Weed, 2004) includes a general goal to, “protect, preserve, and enhance the natural and historical resources of the City of Weed.” Specific objectives and measures from this planning document (City of Weed, 2004) related to water resources include the following: protect the existing water source(s) and water quality; cooperate with local, state, and federal agencies responsible for protection of water quality; assure an adequate domestic water supply; limit possible flood damage; prevent sewage system surcharges and overflows; and review sewage treatment facilities and operation for maximum long-term efficiency.

The Proposed Project and the Weed Segment would comply and remain consistent with these objectives and measures related to water resources in the City of Weed. Therefore, no conflict with local policies would result from the Proposed Project and the Weed Segment.

4.7.2 Significance Criteria

Significance criteria, or thresholds, listed in Appendix G of the CEQA Guidelines are used to determine the significance of potential impacts due to the Proposed Project, Weed Segment, and Alternatives. Based on criteria in Appendix G of the CEQA Guidelines, a project would be considered to have a significant hydrology- or water quality-related effect on the environment if it would:

a) Violate any water quality standards or waste discharge requirements;

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);

c) Substantially alter the existing drainage pattern of a 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;

d) Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;

f) Otherwise substantially degrade water quality;

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows;

i) Expose 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; or

j) Inundation by seiche, tsunami, or mudflow.

Regarding criterion e), there is no potential for the Proposed Project, Weed Segment, or the alternatives to impact stormwater drainage systems or provided additional sources of polluted runoff not addressed in the context of the other criteria. All potential impacts concerning runoff and erosion, which relate only to the short-term construction activities proposed as part of the Proposed Project, Weed Segment, and the alternatives, are addressed under criteria a), c), and d). Further, the vast majority of the Proposed Project, Weed Segment, and the alternatives comprise open space and rural locations that do not have managed stormwater drainage systems. As such, impacts related to stormwater drainage systems and additional sources of polluted runoff (criterion e)) are not addressed further in this EIR.

Potential impacts of the Proposed Project, Weed Segment, and the alternatives upon water quality are addressed within the context of criterion a). Criterion a) includes all applicable local, state, and federal water quality standards or waste discharge requirements. Further, NCRWQCB water quality standards and objectives (NCRWQCB, 2006c) are protective of a wide range of beneficial uses within all areas of the Shasta River watershed (e.g., including *Agricultural Supply* and *Cold Freshwater Habitat*). Resultantly, potential water quality impacts outside of those addressed by criterion a) are not applicable to the Proposed Project, Weed Segment, or the alternatives and, consequently, impacts related to otherwise degrading water quality (criterion f))are not addressed further in this EIR.

Neither the Proposed Project, Weed Segment, nor the alternatives would place housing within a 100-year flood hazard area, nor would they expose people or structures to a significant risk of loss, injury, or death involving flooding (e.g., any existing risk concerning flooding would not be exacerbated by the Proposed Project, Weed Segment, or the alternatives). One existing pole of the Weed Segment (Pole 21/45) is located within a 100-year flood hazard area, as delineated by FEMA (2004). Replacement of this pole would not change the existing condition with respect to impeding flood flows. No new poles would be placed within a 100-year floodplain for the Proposed Project, Weed Segment or the alternatives. Therefore, potential impacts related to 100-year flood hazard areas and increasing risks of exposure to flooding (criteria g), h), and i)) are not addressed further in this EIR.

The Proposed Project, Weed Segment, and the alternatives are not within areas subject to inundation by seiche or tsunami. Locales within the Proposed Project, Weed Segment, and the alternatives areas may experience mudflow hazards (PacifiCorp, 2005) on a relatively small scale. However, mudflows would generally not occur at a level to cause significant destruction or inundation. Mount Shasta, some 9 miles southeast of the study area, is an active volcano whose latest flows are probably not more than a few centuries old according to Mack (1960). An eruption or other catastrophic seismic event could trigger a lahar[4] or mudflow-like event capable of filling the entire Shasta Valley. However, such events are extremely rare and the Proposed Project, Weed Segment, and the alternatives would have no impact on increasing one’s risk of exposure to such an event. As a consequence, potential impacts related to inundation by seiche, tsunami, or mudflow (criterion j)) are not addressed further in this EIR.

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4 A very rapid type of downslope mass movement, usually involving mudflows derived from volcanic ash.

4.7.3 Hydrology and Water Quality Impacts and Mitigation Measures

Approach to Analysis

This impact analysis considers the potential hydrologic and water quality effects of activities associated with the construction (installation), operation, and maintenance of transmission line poles, conductors, and modification of the Weed Substation. For the purposes of the discussion, operational impacts concern the operation of the line, while maintenance impacts concern the long-term maintenance of the line and right of way.

a) Violate any water quality standards or waste discharge requirements: *Less than significant with mitigation* (Class II).

Impact HYD-PPWS-1: Construction activities could exacerbate the processes of soil erosion and entrainment of sediment in stormwater runoff, increasing the turbidity levels within local streams, and/or release fuel-based pollutants to local streams. *Less than significant with mitigation* (Class II).

Potential water pollutants may be generated during the construction phase of the Proposed Project and the Weed Segment and could include sediment and petroleum-based fuels and lubricants. Construction activities have the potential to temporarily increase the sediment load of stormwater runoff from construction areas (i.e., disturbing soil at work areas, the staging area, access roads, pull and tension sites, etc.). Excess sediment in surface drainage pathways can alter and degrade the aquatic habitat in creeks and rivers. In addition, if construction equipment or workers inadvertently release pollutants such as hydraulic fluid or petroleum to the surface water, these materials could be entrained by stormwater and discharged into surface water features causing water quality degradation. Potential pollutant sources would be present only during the construction phase of the Proposed Project and the Weed Segment and would not be an issue following installation.

The transmission line component of the Proposed Project and the Weed Segment would require a relatively minor amount of soil disturbance and mechanized equipment use. Soil disturbance and equipment use for the Proposed Project and the Weed Segment would take place in several localized areas including temporary work areas, permanent access road installation sites, where brush clearing is necessary for existing access roads, pull and tension sites, and a staging area. Establishing these areas would require some grubbing (i.e., removal of vegetation by mechanized equipment) and soil grading to level the near-surface soils.

Construction crews would primarily use existing roads and trails along the upgrade portion of the Proposed Project and Weed Segment to access pole sites. Overland access in the right-of-way would be utilized where feasible to minimize the construction of new roads. New permanent roads (0.06 acres for the Weed Segment) for access would require standard grubbing and grading of the surface soil to achieve grade and slope where necessary. In addition, blading (i.e., clearing of surface rocks/boulders and other obstacles to vehicular access by means of scraping with a bulldozer or other, similar type of equipment) would be required for the permanent roads.

Each pole installation would require equipment access to a work area of approximately 5,000 to 5,400 square feet. Site preparation at only about 13 work areas is expected to require minor grubbing and surface soil disturbance; otherwise, the major source of soil disturbance at each work area would be digging the hole for installation. Boreholes for wood pole installation would be approximately 9 to 12 feet deep, while boreholes for steel pole installation would range from 20 to 30 feet deep.

Soil erosion risk is determined by two principal factors: 1) the amount of surface runoff generated and 2) the physical characteristics of the soil (i.e., susceptibility to erosion). The majority of the Proposed Project and the Weed Segment route traverses the floor of the Shasta Valley. As described earlier, the valley floor contributes little runoff in years of average or below-average precipitation. Thus, significant runoff (or, more specifically, overland flow) generation is not as much of a concern on the valley floor, which includes the majority of the Proposed Project and the Weed Segment areas. The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS, 2006) has summarized descriptive and spatial information regarding soils in the central part of Siskiyou County which includes the Proposed Project and the Weed Segment area. Most of this information was derived from the Soil Survey for Siskiyou County, Central Part, published by the NRCS in 1983. The NRCS ranks and qualifies erosion risk and characteristics for each soil type. Some of the pole installation sites occur on soils assigned a moderate-to-severe erosion hazard [5] ranking and a relatively high K-value [6] by NRCS (2006). These sites comprise the following poles: 15/44-20/44, 12/45-13/45, and 5/46-12/46 (16 total; 8 within the Proposed Project and 8 within the Weed Segment). Yet, most of the slopes on these sites are relatively flat and, even though the soil type may be classified as being susceptible to erosion based on physical properties, preclude significant erosion risk.

Construction practices and regulatory requirements, intended to control erosion and protect surface water, have been previously identified or set forth for the Proposed Project and the Weed Segment in Section 2, *Project Description*. As part of their standard construction practices, PacifiCorp would implement specific erosion control and surface water protection methods, or Best Management Practices (BMPs), for each construction activity conducted as part of the Proposed Project and the Weed Segment. The type and number of measures implemented would be dependant upon site-specific attributes (i.e.,

5 The NRCS (2006) ranks erosion hazard in two general categories: 1) hazard of off-road or off-trail erosion and 2) hazard of erosion on roads and trails. Thus, as stated here, the erosion hazard represents both categories (i.e., “moderate-to-severe” means moderate for category 1 and severe for category 2.

6 The NRCS (2006) assigns a K-value, or erosivity value, to each soil type based upon soil properties such as cohesiveness and soil particle size distribution (i.e., mostly sand, mostly clay, silty-sand, etc.). The higher the K-value the more erosive the given soil type.

slope and soil type). Further, as discussed above, the applicant would be required to obtain and comply with the NPDES General Permit, which requires development and implementation of a SWPPP for the Proposed Project and the Weed Segment. The General Permit also includes provisions for inspecting BMPs and monitoring their performance.

These existing construction practices and regulatory requirements would mitigate most of the potential water quality impacts associated with typical construction activities; the measures below would make existing construction practices intended to protect water quality more explicit with regards to typical construction activities. However, 5 pole sites (between Poles 4/46 to 11/46) for the Weed Segment have been located on side hill areas (i.e., slopes are generally steeper than the valley floor) and would require blading of an access trail and a leveled area to allow for equipment set-up. Because of the steeper slopes and erosive soils, these sites would be particularly susceptible to erosion and entrainment of sediment in overland flow; this is a potentially significant impact because slope erosion could contribute to increased turbidity within local streams and water bodies. The existing practices and regulatory requirements would not be adequate to address the potential impacts related to increased erosion susceptibility for the 5 side hill sites and the installation of new road segments.

Mitigation Measure HYD-PPWS-1: The applicant, in preparing the SWPPP for the project shall include the following measures:

Measures applicable to all sites:

- Silt fencing, straw wattles, and/or hay bales shall be shall be placed at all construction site boundaries (work areas, the staging area, pull and tension sites, and areas for the substation modification work).
- Permanent access roads shall be sloped to provide effective overland flow pathways (i.e., convex in cross section) and avoid formation of erosive gullies caused by concentrated runoff. Where necessary, all-weather roads shall be covered with gravel base material.
- Grading activities:
  - Grading areas shall be clearly marked and no equipment or vehicles shall disturb slopes or drainages outside of the grading area.
  - For grading related to the staging area and pull and tension sites: surfaces of these areas shall be graveled during the wet season (October through April). Upon completion of construction activities, these areas shall be returned to pre-project conditions and re-vegetated (i.e., re-seeded using a County-approved seed mix).
- General stockpiling:
  - Soil excavated from boreholes or for substation modifications/upgrades shall not be left at work areas where slopes exceed 10 percent or where the work area is within 100 feet of a natural stream or waterbody (receiving water). In these situations: Loose soil shall be loaded and

used elsewhere or stockpiled at the staging area. Soil stockpiled at the staging area shall be managed as required in other sections of the SWPPP and be appropriately covered, vegetated, or protected by berms during the wet season (October through April) and, as appropriate, during spring and summer thunderstorms.

  – No stockpiling or spreading of excavated soil or other materials shall occur within stream channels.

- Waste management:
  – The NPDES requires that the SWPPP show BMPs for control of discharges from waste handling and disposal areas and methods of on-site storage and disposal of construction materials and waste. The SWPPP also must describe the BMPs designed to minimize or eliminate the exposure of stormwater to construction materials, equipment, vehicles, waste storage or service areas. The SWPPP would require PacifiCorp to identify equipment storage, cleaning and maintenance areas.
  – Changing of oil or other fluids for equipment and heavy machinery shall not be performed within, or on the banks of, natural stream channels.

Measures applicable to the 5 side hill sites (between Poles 4/46 to 11/46) and the new road installation on the erosive soil type(s) (as identified above):

- For all instances where runoff is altered by a BMP design (i.e., concentrated, re-directed, etc.): filter runoff on-site using silt fences, desiltation ponds, baker tanks, and/or other appropriate control measures prior to off-site discharge.
- Upon completion of slope-grading activities, erosion protection shall be provided and must include slope revegetation, if appropriate (i.e., where vegetation was cleared or removed). Revegetation shall be facilitated by mulching, hydroseeding, or other methods, and shall be initiated as soon as possible after completion of grading and prior to October 15th. Selection of plant materials shall consider native plantings and shall encourage shrubs and trees as a long-term erosion control feature.
- For construction activities (i.e., work areas and pull and tension sites) and access road installation on slopes between 10 and 30 percent, or within 100 feet of a natural stream or waterbody (receiving water):
  – Waterbars shall be installed on all temporary and permanent access roads.
  – Diversion swales and/or roadside ditches shall be constructed to convey and filter runoff (i.e., cross-slope diversions steep hillsides) away from a natural stream or waterbody (receiving water). Swales shall be vegetated (i.e., grass) or lined with rock; roadside ditches shall be lined with rock.
- For construction activities (i.e., work areas and pull and tension sites) on slopes exceeding 30 percent:

- – Same as above (for 10 to 30 percent slopes); and
- – Implement terracing or other, similar slope-roughening techniques.

- No permanent road installation shall occur on slopes exceeding 30 percent.

Significance after Mitigation: Less than significant.

Impact HYD-PPWS-2: Dewatering during construction activities could release previously contaminated groundwater to surface water channels or features. *Less than significant with mitigation* (Class II).

Excavation and boring of pole holes may encounter groundwater in parts of the Shasta Valley where the water table is particularly shallow. Where the groundwater table is shallow, some groundwater seepage may occur into pole excavation or auger holes and substation modification/upgrade-related excavations requiring dewatering on a one-time basis immediately prior to pole placement or concrete pouring. Though the dewatering process would be temporary, yielding only a small volume of groundwater, the potential exists for such water or saturated soils to be already contaminated. Discharge (i.e., through dewatering) or displacement of contaminated water or soil, as a result of excavation related to the Proposed Project and the Weed Segment, is a potentially significant impact.

Mitigation Measure HYD-PPWS-2: The applicant, in preparing the SWPPP for the project shall include the following measures:

- If degraded soil or groundwater is encountered during excavation (e.g., there is an obvious sheen, odor, or unnatural color to the soil or groundwater), the applicant's contractor shall excavate, segregate, test, and dispose of degraded soil or groundwater in accordance with state hazardous waste disposal requirements.

- If dewatering is necessary in an area requiring storm sewer discharge, obtain a discharge permit from the local Publicly Owned Treatment Works (POTW); otherwise, if discharging to a stream or open ground, acquire any necessary permits from the NCRWQCB.

Significance after Mitigation: Less than significant.

Impact HYD-PPWS-3: Pole installation could affect the flow of nearby springs or the flow of shallow groundwater, both of which supply cold water to streams: *Less than significant with mitigation* (Class II).

This impact is synonymous with the potential impact concerning domestic and irrigation groundwater supply, and it is addressed in Impact HYD-PPWS-4, below.

Mitigation Measure HYD-PPWS-3: Implement Mitigation Measures HYD-PPWS-4a and HYD-PPWS-4b, described below.

Significance after Mitigation: Less than significant.

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b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). ***Less than significant with mitigation*** **(Class II).**

Impact HYD-PPWS-4: Pole installation could affect the production of nearby domestic or irrigation water sources and/or the flow of nearby springs and shallow groundwater, both of which supply cold water to streams: ***Less than significant with mitigation*** **(Class II).**

Installation of wood poles in areas where none currently exist, and installation of steel poles to depth deeper than existing wood poles, could penetrate an impermeable layer and/or form a conduit between two water-bearing layers such that the level of the overlying groundwater body would be lowered; this would be a potential impact in that it could 1) affect the production of nearby domestic or irrigation wells and/or 2) affect the production of nearby springs which supply water for irrigation or domestic uses or which supply water to streams or wetland areas. Existing beneficial uses of the Shasta River and its tributaries include *Agricultural Supply* and *Cold Freshwater Habitat* (NCRWQCB, 2006c; see Table 2.8-2). Springs are an important supply of cold water to the Shasta River and its tributaries, and the Shasta River has been listed as impaired due to elevated stream temperatures (NCRWQCB, 200b). Given the proliferation of springs in the study area and the known importance of spring flow to local streams and rivers, a long-term reduction in the shallow groundwater level would be a significant impact to water quality and/or to irrigation and domestic water supply (where such existing uses occur).

As part of this analysis, 9 Well Completion Reports (WCRs)[7] (or water well driller's report) for groundwater wells installed in the study area were reviewed; these reports span the time period from 1966 to 2006. Groundwater wells draw water from the segment of the well which is screened (e.g., perforated), and this segment is typically near the bottom of the well. For domestic and irrigation supply wells within the study area, the range of screen depths is from 62 to 242 feet bgs according to the WCRs reviewed. Thus, all of the WCRs reviewed indicate that domestic and irrigation supply wells in the study area are obtaining water from depths greater than 30 feet bgs (i.e., the greatest auger depth proposed for the Proposed Project and the Weed Segment). As such, the potential

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7 The Water Code (Section 13751) requires all water well contractors and drillers to file a Well Completion Report form with the California Department of Water Resources.

impact of pole installation on nearby domestic and irrigation supply wells would be less than significant (Class III).

Springs in the study area could be supported by water-bearing units (or strata) that are separate from and higher in elevation (e.g., closer to the ground surface) than the units being exploited for groundwater well supplies. A number of springs exist in the vicinity of the new 1.6 mile segment of the Proposed Project. Surveyed and observed spring elevations (approximately following the 3360 foot amsl contour), as well as a WCR, indicate a shallow water table is likely in the vicinity of the western portion of the new 1.6 mile segment (generally from Pole 8 west to Pole 15). New wood pole installation for the Proposed Project and the Weed Segment would require auger depths of up to 12 feet. However, WCRs in the vicinity of the new 1.6 mile segment and the Weed Junction Substation show no evidence of confining strata within the upper 12 feet of the subsurface. Thus, a minor amount of dewatering would likely be necessary for the installation of some of the new wood poles, yet they would not be expected to penetrate an impermeable layer and/or form a conduit between two water-bearing layers such that the level of the overlying groundwater body would be lowered. As such, the potential impact of new wood pole installation on the production of nearby springs would be less than significant (Class III).

Steel pole installation for the Proposed Project and the Weed Segment would require auger depths of up to 25 feet and 30 feet, respectively. As discussed above, monitoring at the J.H. Baxter Superfund site included the installation of groundwater wells in an upper aquifer that extended up to approximately 30 feet bgs. Thus, for areas of the Proposed Project contiguous with the valley section containing this monitoring site, there is potential for an upper aquifer, or water-bearing unit, confined to the upper 30 feet of the subsurface. As such, the installation of steel poles has the potential to penetrate strata with different water-bearing properties and could lower the local water table, as discussed below.

Steel Poles 13/46 and 13X1/46. There are no sizeable springs, streams, or wetland communities (see Section 4.4, *Biological Resources*) in the vicinity of proposed steel poles 13/46 and 13X1/46 at the Weed Substation), or 1/49 at the Weed Junction Substation; therefore, there would be no impact upon springs, streams, or wetland communities from steel pole installation at these locations.

Steel Poles 1 and 15/48. The locations of proposed steel poles 1 and 15/48 are near the east bank of Garrick Creek; baseflow in Garrick Creek is heavily influenced by discharge of groundwater and springs. A number of WCRs were completed for groundwater wells in the vicinity of proposed poles 1 and 15/48. These WCRs indicate that groundwater was first encountered at depths ranging from 72 to 80 feet bgs; the time of year during which these wells were installed ranged from January to August, and this indicates that the seasonal fluctuation in water level is minimal. Thus, steel pole installation would not extend to the groundwater table in this area, and the potential impact upon springs of steel pole installation at proposed poles 1 and 15/48 would be less than significant (Class III).

Steel Pole 19/45. The location of proposed steel pole 19/45 is near the east bank of Beaughton Creek; Beaughton Creek is tributary to the upper Shasta River and baseflow in Beaughton Creek is heavily influenced by discharge of groundwater and springs. According to a WCR filed for a groundwater well near (within 575 feet) and at approximately the same contour as the location of proposed pole 19/45, the depth to groundwater at this location is approximately 35 feet bgs. However, the well was installed in January and the groundwater level could be slightly higher during the spring months (groundwater levels in the area typically peak in the late spring due to the influence of snowmelt), and it was reported that some water was encountered in the upper portion of the boring. Steel pole installation at 19/45 could alter the permeability of the subsurface and impact the local water table (Class II). Mitigation Measure HYD-PPWS-4a is required for steel pole installation at pole 19/45.

Steel Pole 8/45. The groundwater table is shallow in the vicinity of proposed steel pole 8/45, and this location is very near (less than 75 feet from) a spring that supports irrigation and domestic water supply needs. The elevation of the proposed steel pole location in relation to the elevation of the spring and the local water table was surveyed on June 8, 2007. The excavation depth for Pole 8/45 would extend below the elevation of the spring and the local water table. The proposed location for Pole 8/45 is down-gradient of the nearby spring, which limits the potential for any impact to the spring. Nonetheless, installation of the steel pole at 8/45 could alter the permeability of the subsurface and impact the local water table (Class II). Mitigation Measure HYD-PPWS-4b is required for steel pole installation at pole 8/45.

Mitigation Measure HYD-PPWS-4a: Steel pole installation at Pole 19/45 shall adhere to the following measures:

- If groundwater is encountered during the auger or excavation process, then 1) the depth to first water shall be recorded and 2) completion of the hole to final depth shall proceed by means of auger only (or other such means that results in a cylindrical hole). The depth to water shall be then be recorded at the end of a 24 hour period.

- If the water level drops by less than five feet over the 24-hour period, then pole installation can proceed as described in Section 2, *Project Description*.

- If the water level has fallen by more than five feet before or at the end of the 24 hour period, or is continuing to drop after the 24 hour period, then upon pole installation the auger hole shall be backfilled with an appropriate sealant material (e.g., a bentonite/cement mixture) to a depth of six inches below ground surface, or completely to ground surface if the boring was started by means of excavation. This would seal any potential conduit created by installation of the pole; this method is similar to the long-standing and continuing practice of creating a sanitary seal upon installation of groundwater wells. The bentonite/cement mixture shall be formulated and placed by a water well driller with a California license (C57 License); the bentonite/cement mixture shall be formulated to avoid shrinkage and cracking. The process of backfilling and sealing the auger hole shall be supervised by a Professional Geologist who is also a Certified Hydrogeologist, or other similarly qualified individual.

Mitigation Measure HYD-PPWS-4b: Steel pole installation at Pole 8/45 shall adhere to the following measures:

- If excavation is required, then the depth of excavation shall be no deeper than two feet above the head elevation of the spring; completion of the hole to final depth shall proceed by means of auger only (or other such means that results in a cylindrical hole).
- If no groundwater is encountered during hole completion, then pole installation can proceed as described in Section 2, *Project Description*.
- If groundwater is encountered during hole completion, then upon pole installation the auger hole shall be backfilled completely with an appropriate sealant material (e.g., a bentonite/cement mixture). This would seal any potential conduit created by installation of the pole; this method is similar to the long-standing and continuing practice of creating a sanitary seal upon installation of groundwater wells. The bentonite/cement mixture shall be formulated and placed by a water well driller with a California license (C57 License); the bentonite/cement mixture shall be formulated to avoid shrinkage and cracking. The process of backfilling and sealing the auger hole shall be supervised by a Professional Geologist who is also a Certified Hydrogeologist, or other similarly qualified individual.

Significance after Mitigation: Less than significant.

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c) Substantially alter the existing drainage pattern of a 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. *Less than significant with mitigation* (Class II).

Impact HYD-PPWS-5: Construction activities could impact local drainage patterns, or the course of a given stream, resulting in substantial on- or off-site erosion or sedimentation: *Less than significant with mitigation* (Class II).

The Proposed Project and the Weed Segment, in disturbing the ground and hillsides during construction activities, may alter existing drainage pathways so as to make surface soils more susceptible to erosive forces (i.e., overland flow) and/or generate enough increased runoff through removal/clearing of existing vegetation to increase surface erosion.

Mitigation Measure HYD-PPWS-5: Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

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d) Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. *Less than significant* (Class III).

Construction or operation of the Proposed Project and the Weed Segment would not alter drainage patterns such that they would cause flooding on- or off-site. Some vegetation removal and soil disturbance would occur during clearing of staging and work areas and access roads, resulting in the potential for increased stormwater runoff. However, implementation of the BMPs associated with the SWPP would minimize the potential for surface runoff and reduce the potential for on- or off-site flooding (PacifiCorp, 2005). Consequently, impacts related to an increase in surface runoff as a result of vegetation removal and soil disturbance would be less than significant (Class III).

As a result of the Proposed Project and the Weed Segment, there would be only a minor increase in impervious surface area. Each replacement wood pole (which would be up to 24 inches in diameter) would occupy only about 1.4 square feet greater area than each existing wood pole (which are approximately 18 inches in diameter); each of the approximately 15 new poles in the new 1.6-mile segment would occupy an area of approximately 3.1 square feet. The footprint of each newly installed steel pole (8 total) would be approximately 12.6 square feet. Construction activities related to the substation modification would be performed within the existing PacifiCorp property boundaries and involve only minor additions of impervious surface (i.e., small concrete foundations for new and/or upgraded equipment). The substation modifications would require the construction of small concrete foundation pads for equipment within the existing substation property. The area occupied by these new and larger poles and the foundation pads would not be enough to substantially alter existing drainage patterns or cause offsite flooding. Impacts to surface runoff as a result of an increase in impervious surface area would also be less than significant (Class III).

4.7.4 Cumulative Impacts

Implementation of the Proposed Project and Weed Segment in conjunction with past, present, and reasonably foreseeable future projects would result in a cumulative increase in the local amount of impervious surfaces and stormwater generation. Within 200 feet of the Weed Segment, a housing subdivision is planned on 120.5 acres. The majority of the projects are associated with existing infrastructure (i.e., repairs and/or upgrades of local roads and bridges). The total increase in the permanent footprint from the project, resulting from pole installation would be approximately 128 square feet; however, this total is comprised of the incremental increase of many individual pole footprints spread out over the length of the PacifiCorp Option 4 alternative. Furthermore, the mitigation measures described above would ensure that the Proposed Project and Weed Segment's impacts to hydrologic resources and water quality would be less than cumulatively considerable. Therefore, the impact of the Proposed Project and Weed Segment, in combination with other reasonably foreseeable projects, would be less than significant (Class II).

4.7.5 Alternatives

PacifiCorp Option 4 Alternative

a) Violate any water quality standards or waste discharge requirements. *Less than significant with mitigation* (Class II).

Impact HYD-OPT4-1: Construction activities could exacerbate the processes of soil erosion and entrainment of sediment in stormwater runoff, increasing the turbidity levels within local streams, and/or release fuel-based pollutants to local streams: *Less than significant with mitigation* (Class II).

Potential water pollutants may be generated during the construction phase of the PacifiCorp Option 4 alternative and could include sediment as well as petroleum-based fuels and lubricants. Construction activities have the potential to temporarily increase the sediment load of stormwater runoff from construction areas (i.e., disturbing soil at work areas, the staging area, access roads, pull and tension sites, etc.). Excess sediment in surface drainage pathways can alter and degrade the aquatic habitat in creeks and rivers. In addition, if construction equipment or workers inadvertently release pollutants such as hydraulic fluid or petroleum to the surface water, these materials could be entrained by stormwater and discharged into surface water features causing water quality degradation. Potential pollutant sources would be present only during the construction phase of the PacifiCorp Option 4 and would not be an issue following installation.

The transmission line component of the PacifiCorp Option 4 would require a relatively minor amount of soil disturbance and mechanized equipment use. Soil disturbance and equipment use for the PacifiCorp Option 4 would take place in several localized areas including temporary work areas, permanent access road installation sites, where brush clearing is necessary for existing access roads, pull and tension sites and a staging area. Establishing these areas would require some grubbing (i.e., removal of vegetation by mechanized equipment) and soil grading to level the near-surface soils.

Construction crews would primarily use existing roads and trails along the upgrade portion of the project to access pole sites. Overland access in the right-of-way would be utilized where feasible to minimize the construction of new roads. New permanent roads

(0.09 acres) for access would require standard grubbing and grading of the surface soil to achieve grade and slope where necessary. In addition, blading (i.e., clearing of surface rocks/boulders and other obstacles to vehicular access by means of scraping with a bulldozer or other, similar type of equipment) would be required for the permanent roads.

Each pole installation would require equipment access to a work area of approximately 5,000 to 5,400 square feet. Site preparation at about 18 work areas may require minor grubbing and surface soil disturbance; otherwise, the major source of soil disturbance at each work area would be digging the hole for installation. Boreholes for wood pole installation would be approximately 9 to 12 feet deep, while boreholes for steel pole installation would range from 20 to 25 feet deep.

Soil erosion risk is determined by two principle factors: 1) the amount of surface runoff generated and 2) the physical characteristics of the soil (i.e., susceptibility to erosion). Some of the pole installation sites for the PacifiCorp Option 4 occur on soils assigned a moderate-to-severe erosion hazard ranking and a relatively high K-value by NRCS (2006). In addition to those previously described for the common portion (i.e., common to all of the alternatives) of the Proposed Project (15/44-20/44), these sites comprise the following poles for PacifiCorp Option 4: 12/45-13/45, 15/47-5/48, and 11/48-13/48 (23 total). Yet, most of the slopes on these sites are relatively flat and, even though the soil type may be classified as being susceptible to erosion based on physical properties, preclude significant erosion risk. However, some pole sites for the PacifiCorp Option 4 have been located on side hill areas (i.e., slopes are generally steeper than the valley floor), including the segment which parallels Highway 97. Some vegetation clearance would be necessary for approximately 1.4 miles of this segment as it traverses through mature stands of conifers and other types of vegetation. Because of the steeper slopes and erosive soils, these sites would be particularly susceptible to erosion and entrainment of sediment in overland flow; this is a potentially significant impact.

Construction practices and regulatory requirements, intended to control erosion and protect surface water, previously identified or set forth for the Proposed Project and the Weed Segment would be the same for the PacifiCorp Option 4. As part of their standard construction practices, PacifiCorp would implement specific erosion control and surface water protection methods, or Best Management Practices (BMPs), for each construction activity. The type and number of measures implemented would be dependant upon site-specific attributes (i.e., slope and soil type). Further, as discussed above, the applicant would be required to obtain and comply with the NPDES General Permit, which requires development and implementation of a SWPPP for the Proposed Project and the Weed Segment. The General Permit also includes provisions for inspecting BMPs and monitoring their performance.

These existing construction practices and regulatory requirements would mitigate most of the potential water quality impacts associated with typical construction activities. However, these existing practices and regulatory requirements would not be adequate to address the potential impacts related to increased erosion susceptibility for the side hill sites and the installation of new road segments.

> **Mitigation Measure HYD-OPT4-1:** Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

Impact HYD-OPT4-2: Dewatering during construction activities could release previously contaminated groundwater to surface water channels or features: *Less than significant with mitigation* (Class II).

Excavation and boring of pole holes may encounter groundwater in parts of the Shasta Valley where the water table is particularly shallow. Where the groundwater table is shallow, some groundwater seepage may occur into pole excavation or auger holes and substation modification/upgrade-related excavations requiring dewatering on a one-time basis immediately prior to pole placement or concrete pouring. Though the dewatering process would be temporary, yielding only a small volume of groundwater, the potential exists for such water or saturated soils to be already contaminated. Discharge (i.e., through dewatering) or displacement of contaminated water or soil, as a result of excavation related to the PacifiCorp Option 4 alternative, is a potentially significant impact.

> **Mitigation Measure HYD-OPT4-2:** Implement Mitigation Measure HYD-PPWS-2.

Significance after Mitigation: Less than significant.

Impact HYD-OPT4-3: Pole installation could affect the flow of nearby springs or the flow of shallow groundwater, both of which supply cold water to streams: *Less than significant with mitigation* (Class II).

This impact is synonymous with the potential impact concerning domestic and irrigation groundwater supply, and it is addressed in Impact HYD-OPT4-4, below.

> **Mitigation Measure HYD-OPT4-3:** Implement Mitigation Measure HYD-PPWS-4a.

Significance after Mitigation: Less than significant.

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b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). ***Less than significant with mitigation*** **(Class II).**

Impact HYD-OPT4-4: Pole installation could affect the production of nearby domestic or irrigation water sources and/or the flow of nearby springs and shallow groundwater, both of which supply cold water to streams. ***Less than significant with mitigation*** **(Class II).**

As part of the PacifiCorp Option 4 alternative, 4 new wood poles would be installed where no poles previously existed, and 2 new steel poles would be installed where wood poles previously existed. The auger depth for the 4 new wood poles would be between 9 and 12 feet; the steel-pole auger depths would be up to 25 feet.

Installation of wood poles in areas where none currently exist, and installation of steel poles to depths deeper than existing wood poles, could penetrate an impermeable layer and/or form a conduit between two water-bearing layers such that the level of the overlying groundwater body would be lowered; this would be a potential impact in that it could 1) affect the production of nearby domestic or irrigation wells and/or 2) affect the production of nearby springs which supply water for irrigation or domestic uses or which supply water to streams or wetland areas. Existing beneficial uses of the Shasta River and its tributaries include *Agricultural Supply* and *Cold Freshwater Habitat* (NCRWQCB, 2006c; see Table 2.8-2). Springs are an important supply of cold water to the Shasta River and its tributaries, and the Shasta River has been listed as impaired due to elevated stream temperatures (NCRWQCB, 200b). Given the proliferation of springs in the study area and the known importance of spring flow to local streams and rivers, a long-term reduction in the shallow groundwater level would be a significant impact to water quality and/or to irrigation and domestic water supply (where applicable).

As previously discussed, all of the WCRs reviewed indicate that domestic and irrigation supply wells in the study area are obtaining water from depths greater than 30 feet bgs. As such, the potential impact of pole installation on nearby domestic and irrigation supply wells would be less than significant (Class III).

Springs in the study area could be supported by water-bearing units (or strata) that are separate from and higher in elevation (e.g., closer to the land surface) than the units being exploited for groundwater well supplies. Steel pole installation for the PacifiCorp Option 4 would require auger depths of up to 25 feet. As discussed above, monitoring at the J.H. Baxter Superfund site included the installation of groundwater wells in an upper aquifer that extended up to approximately 30 feet bgs. Thus, for areas of this alternative contiguous with the valley section containing this monitoring site, there is potential for an upper aquifer, or water-bearing unit, confined to the upper 30 feet of the subsurface. As such, the installation of steel poles has the potential to penetrate strata with different water-bearing properties and could lower the local water table as discussed below.

Steel Pole 1/49. There are no sizeable springs, streams, or wetland communities (see Section 4.4, *Biological Resources*) in the vicinity of proposed steel pole 1/49 at the Weed Junction Substation; therefore there would be no impact upon springs from steel pole installation at this locations.

Steel Pole 19/45. The location of pole 19/45 is near the east bank of Beaughton Creek; Beaughton Creek is tributary to the upper Shasta River and baseflow in Beaughton Creek is heavily influenced by discharge of groundwater and springs. According to a WCR filed for a groundwater well near (within 575 feet) and at approximately the same contour as the location of pole 19/45, the depth to groundwater at this location is approximately 35 feet bgs. However, the well was installed in January and the groundwater level could be slightly higher during the spring months (groundwater levels in the area typically peak in the late spring due to the influence of snowmelt), and it was reported that some water was encountered in the upper portion of the boring. Steel pole installation at 19/45 could alter the permeability of the subsurface and impact the local water table (Class II). Mitigation Measure HYD-OPT4-4 is required for steel pole installation at Pole 19/45.

> **Mitigation Measure HYD-OPT4-4:** Implement Mitigation Measure HYD-PPWS-4a.

Significance after Mitigation: Less than significant.

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c) Substantially alter the existing drainage pattern of a 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.

Impact HYD-OPT4-5: Construction activities could impact local drainage patterns, or the course of a given stream, resulting in substantial on- or off-site erosion or sedimentation: ***Less than significant with Mitigation.***

The PacifiCorp Option 4, in disturbing the ground and hillsides during construction activities, may alter existing drainage pathways so as to make surface soils more susceptible to erosive forces (i.e., overland flow) and/or generate enough increased runoff through removal/clearing of existing vegetation to increase surface erosion.

> **Mitigation Measure HYD-OPT4-5:** Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

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d) Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

Construction or operation of the PacifiCorp Option 4 alternative would not alter drainage patterns such that they would cause flooding on- or off-site. Some vegetation removal and soil disturbance would occur during clearing of staging and work areas and access roads, resulting in the potential for increased stormwater runoff. However, implementation of the BMPs associated with the SWPP would minimize the potential for surface runoff and reduce the potential for on- or off-site flooding (PacifiCorp, 2005). Consequently, impacts related to an increase in surface runoff as a result of vegetation removal and soil disturbance would be less than significant (Class III).

As a result of the PacifiCorp Option 4 alternative, there would be only a minor increase in impervious surface area. Each replacement wood pole (which would be up to 24 inches in diameter) would occupy only about 1.4 square feet greater area than each existing wood pole (which are approximately 18 inches in diameter). The footprint of each newly installed steel pole (5 total including the Weed Segment) would be approximately 12.6 square feet. The total area occupied by these new and larger poles would not be enough to substantially alter existing drainage patterns or cause offsite flooding. Impacts to surface runoff as a result of an increase in impervious surface area would also be less than significant (Class III).

Mackintosh/ALJ Variation A Alternative

a) Violate any water quality standards or waste discharge requirements. *Less than significant with mitigation* (Class II).

Impact HYD-VAR/A-1: Construction activities could exacerbate the processes of soil erosion and entrainment of sediment in stormwater runoff, increasing the turbidity levels within local streams, and/or release fuel-based pollutants to local streams: *Less than significant with mitigation* (Class II).

Potential water pollutants may be generated during the construction phase of the Mackintosh/ALJ Variation A alternative and could include sediment as well as petroleum-based fuels and lubricants. Construction activities have the potential to temporarily increase the sediment load of stormwater runoff from construction areas (i.e., disturbing soil at work areas, the staging area, access roads, pull and tension sites, etc.). Excess sediment in surface drainage pathways can alter and degrade the aquatic habitat in creeks and rivers. In addition, if construction equipment or workers inadvertently release pollutants such as hydraulic fluid or petroleum to the surface water, these materials could be entrained by stormwater and discharged into surface water features causing water quality degradation. Potential pollutant sources would be present only during the construction phase of the Mackintosh/ALJ Variation A alternative and would not be an issue following installation.

The transmission line component of the Mackintosh/ALJ Variation A alternative would require a relatively minor amount of soil disturbance and mechanized equipment use. Soil disturbance and equipment use for the Mackintosh/ALJ Variation A alternative would take place in several localized areas including temporary work areas, permanent access road installation sites, where brush clearing is necessary for existing access roads, pull and tension sites and a staging area. Establishing these areas would require some grubbing (i.e., removal of vegetation by mechanized equipment) and soil grading to level the near-surface soils.

Construction crews would primarily use existing roads and trails along the upgrade portion of the project to access pole sites. Overland access in the right-of-way would be utilized where feasible to minimize the construction of new roads. New permanent roads (0.09 acres) for access would require standard grubbing and grading of the surface soil to achieve grade and slope where necessary. In addition, blading (i.e., clearing of surface rocks/boulders and other obstacles to vehicular access by means of scraping with a bulldozer or other, similar type of equipment) would be required for the permanent roads.

Each pole installation would require equipment access to a work area of approximately 5,000 to 5,400 square feet. Site preparation at about 18 work areas may require minor grubbing and surface soil disturbance; otherwise, the major source of soil disturbance at each work area would be digging the hole for installation. Boreholes for wood pole installation would be approximately 9 to 12 feet deep, while boreholes for steel pole installation would range from 20 to 25 feet deep.

Soil erosion risk is determined by two principle factors: 1) the amount of surface runoff generated and 2) the physical characteristics of the soil (i.e., susceptibility to erosion). Some of the pole installation sites for the Mackintosh/ALJ Variation A alternative would occur on soils assigned a moderate-to-severe erosion hazard ranking and a relatively high K-value by NRCS (2006). In addition to those previously described for the common portion (i.e., common to all of the alternatives) of the Proposed Project (15/44-20/44), these sites comprise the following poles for the Mackintosh/ALJ Variation A alternative: 12/45-13/45, 15/47-5/48, and 11/48-13/48 (23 total). Yet, most of the slopes on these sites are relatively flat and, even though the soil type may be classified as being susceptible to erosion based on physical properties, preclude significant erosion risk. However, some pole sites for the Mackintosh/ALJ Variation A alternative have been located on side hill areas (i.e., slopes are generally steeper than the valley floor), including the segment which parallels Highway 97. Some vegetation clearance would be necessary for approximately 1.4 miles of this segment as it traverses through mature stands of conifers and other types of vegetation. Because of the steeper slopes and erosive soils, these sites would be particularly susceptible to erosion and entrainment of sediment in overland flow; this is a potentially significant impact.

Construction practices and regulatory requirements, intended to control erosion and protect surface water, previously identified or set forth for the Proposed Project and the Weed Segment would be the same for the Mackintosh/ALJ Variation A Alternative. As part of their standard construction practices, PacifiCorp would implement specific erosion control and surface water protection methods, or Best Management Practices (BMP), for each construction activity. The type and number of measures implemented would be dependant upon site-specific attributes (i.e., slope and soil type). Further, as discussed above, the applicant would be required to obtain and comply with the NPDES General Permit, which requires development and implementation of a SWPPP for the Proposed Project and the Weed Segment. The General Permit also includes provisions for inspecting BMPs and monitoring their performance.

These existing construction practices and regulatory requirements would mitigate most of the potential water quality impacts associated with typical construction activities. However, these existing practices and regulatory requirements would not be adequate to address the potential impacts related to increased erosion susceptibility for the side hill sites and the installation of new road segments.

> **Mitigation Measure HYD-VAR/A-1**: Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

Impact HYD-VAR/A-2: Dewatering during construction activities could release previously contaminated groundwater to surface water channels or features: *Less than significant with mitigation* (Class II).

Excavation and boring of pole holes may encounter groundwater in parts of the Shasta Valley where the water table is particularly shallow. Where the groundwater table is shallow, some groundwater seepage may occur into pole excavation or auger holes and substation modification/upgrade-related excavations requiring dewatering on a one-time basis immediately prior to pole placement or concrete pouring. Though the dewatering process would be temporary, yielding only a small volume of groundwater, the potential exists for such water or saturated soils to be already contaminated. Discharge (i.e., through dewatering) or displacement of contaminated water or soil, as a result of excavation related to the Mackintosh/ALJ Variation A alternative, is a potentially significant impact.

> **Mitigation Measure HYD-VAR/A-2:** Implement Mitigation Measure HYD-PPWS-2.

Significance after Mitigation: Less than significant.

Impact HYD-VAR/A-3: Pole installation could affect the flow of nearby springs or the flow of shallow groundwater, both of which supply cold water to streams: *Less than significant with mitigation* (Class II).

This impact is synonymous with the potential impact concerning domestic and irrigation groundwater supply, and it is addressed in Impact HYD-VAR/A-4, below.

> **Mitigation Measure HYD-VAR/A-3:** Implement Mitigation Measure HYD-PPWS-4a.

Significance after Mitigation: Less than significant.

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b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). *Less than significant with mitigation* (Class II).

Impact HYD-VAR/A-4: Pole installation could affect the production of nearby domestic or irrigation water sources and/or the flow of nearby springs and shallow groundwater, both of which supply cold water to streams. *Less than significant with mitigation* (Class II).

As part of the Mackintosh/ALJ Variation A alternative, 4 new wood poles would be installed where no poles previously existed, and 2 new steel poles would be installed where wood poles previously existed. The auger depth for the 4 new wood poles would be between 9 and 12 feet; the steel-pole auger depths would be up to 25 feet.

Installation of wood poles in areas where none currently exist, and installation of steel poles to depths deeper than existing wood poles, could penetrate an impermeable layer and/or form a conduit between two water-bearing layers such that the level of the overlying groundwater body would be lowered; this would be a potential impact in that it could 1) affect the production of nearby domestic or irrigation wells and/or 2) affect the production of nearby springs which supply water for irrigation or domestic uses or which supply water to streams or wetland areas. Existing beneficial uses of the Shasta River and its tributaries include *Agricultural Supply* and *Cold Freshwater Habitat* (NCRWQCB, 2006c; see Table 2.8-2). Springs are an important supply of cold water to the Shasta River and its tributaries, and the Shasta River has been listed as impaired due to elevated stream temperatures (NCRWQCB, 200b). Given the proliferation of springs in the study area and the known importance of spring flow to local streams and rivers, a long-term reduction in the shallow groundwater level would be a significant impact to water quality and/or to irrigation and domestic water supply (where applicable).

As previously discussed, all of the WCRs reviewed indicate that domestic and irrigation supply wells in the study area are obtaining water from depths greater than 30 feet bgs. As such, the potential impact of pole installation on nearby domestic and irrigation supply wells would be less than significant (Class III).

Springs in the study area could be supported by water-bearing units (or strata) that are separate from and higher in elevation (e.g., closer to the ground surface) than the units being exploited for groundwater well supplies. Steel pole installation for the Mackintosh/ALJ Variation A alternative would require auger depths of up to 25 feet. As discussed above, monitoring at the J.H. Baxter Superfund site included the installation of groundwater wells in an upper aquifer that extended up to approximately 30 feet bgs. Thus, for areas of this alternative contiguous with the valley section containing this monitoring site, there is potential for an upper aquifer, or water-bearing unit, confined to the upper 30 feet of the subsurface. As such, the installation of steel poles has the potential to penetrate strata with different water-bearing properties and could lower the local water table as discussed below.

Steel Pole 1/49. There are no sizeable springs, streams, or wetland communities (see Section 4.4, *Biological Resources*) in the vicinity of proposed steel pole 1/49 at the Weed Junction Substation; therefore there would be no impact upon springs from steel pole installation at this location.

Steel Pole 19/45. The location of proposed pole 19/45 is near the east bank of Beaughton Creek; Beaughton Creek is tributary to the upper Shasta River and baseflow in Beaughton Creek is heavily influenced by discharge of groundwater and springs. According to a WCR filed for a groundwater well near (within 575 feet) and at approximately the same contour as the location of pole 19/45, the depth to groundwater at this location is approximately 35 feet bgs. However, the well was installed in January and the groundwater level could be slightly higher during the spring months (groundwater levels in the area typically peak in the late spring due to the influence of snowmelt), and it was reported that some water was encountered in the upper portion of the boring. Steel pole installation at 19/45 could alter the permeability of the subsurface and impact the local water table (Class II). Mitigation Measure HYD-VAR/A-4 is required for steel pole installation at pole 19/45.

> **Mitigation Measure HYD-VAR/A-4:** Implement Mitigation Measure HYD-PPWS-4a.

Significance after Mitigation: Less than significant.

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c) Substantially alter the existing drainage pattern of a 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. ***Less than significant with mitigation*** **(Class II).**

Impact HYD-VAR/A-5: Construction activities could impact local drainage patterns, or the course of a given stream, resulting in substantial on- or off-site erosion or sedimentation. ***Less than significant with mitigation*** **(Class II).**

The Mackintosh/ALJ Variation A alternative, in disturbing the ground and hillsides during construction activities, may alter existing drainage pathways so as to make surface soils more susceptible to erosive forces (i.e., overland flow) and/or generate enough increased runoff through removal/clearing of existing vegetation to increase surface erosion.

> **Mitigation Measure HYD-VAR/A-5**: Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

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d) Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. ***Less than significant*** **(Class III).**

Construction or operation of the Mackintosh/ALJ Variation A alternative would not alter drainage patterns such that they would cause flooding on- or off-site. Some vegetation removal and soil disturbance would occur during clearing of staging and work areas and access roads, resulting in the potential for increased stormwater runoff. However, implementation of the BMPs associated with the SWPP would minimize the potential for surface runoff and reduce the potential for on- or off-site flooding (PacifiCorp, 2005). Consequently, impacts related to an increase in surface runoff as a result of vegetation removal and soil disturbance would be less than significant (Class III).

As a result of the Mackintosh/ALJ Variation A alternative, there would be only a minor increase in impervious surface area. Each replacement wood pole (which would be up to 24 inches in diameter) would occupy only about 1.4 square feet greater area than each existing wood pole (which are approximately 18 inches in diameter). The footprint of each newly installed steel pole (5 total including the Weed Segment) would be approximately 12.6 square feet. Also, under the Mackintosh/ALJ Variation A alternative, the upgrade of the Weed Substation would require an additional temporary pad area of approximately 2,500 square feet. The total area occupied by these new and larger poles and the additional pad area would not be enough to substantially alter existing drainage patterns or cause offsite flooding. Impacts to surface runoff as a result of an increase in impervious surface area would also be less than significant (Class III).

Mackintosh/ALJ Variation B Alternative

a) Violate any water quality standards or waste discharge requirements. ***Less than significant with mitigation*** **(Class II).**

Impact HYD-VAR/B-1: Construction activities could exacerbate the processes of soil erosion and entrainment of sediment in stormwater runoff, increasing the turbidity levels within local streams, and/or release fuel-based pollutants to local streams: ***Less than significant with mitigation*** **(Class II).**

Potential water pollutants may be generated during the construction phase of the Mackintosh/ALJ Variation B alternative and could include sediment as well as petroleum-based fuels and lubricants. Construction activities have the potential to temporarily increase the sediment load of stormwater runoff from construction areas (i.e., disturbing soil at work areas, the staging area, access roads, pull and tension sites, etc.). Excess sediment in surface drainage pathways can alter and degrade the aquatic habitat in creeks and rivers. In addition, if construction equipment or workers inadvertently release pollutants such as hydraulic fluid or petroleum to the surface water, these materials could be entrained by stormwater and discharged into surface water features causing water quality degradation. Potential pollutant sources would be present only during the construction phase of the Mackintosh/ALJ Variation B alternative and would not be an issue following installation.

The transmission line component of the Mackintosh/ALJ Variation B alternative would require a relatively minor amount of soil disturbance and mechanized equipment use. Soil disturbance and equipment use for the Mackintosh/ALJ Variation B alternative would take place in several localized areas including temporary work areas, permanent access road installation sites, where brush clearing is necessary for existing access roads, pull and tension sites and a staging area. Establishing these areas would require some grubbing (i.e., removal of vegetation by mechanized equipment) and soil grading to level the near-surface soils.

Construction crews would primarily use existing roads and trails along the upgrade portion of the project to access pole sites. Overland access in the right-of-way would be utilized where feasible to minimize the construction of new roads. New permanent roads (0.09 acres) for access would require standard grubbing and grading of the surface soil to achieve grade and slope where necessary. In addition, blading (i.e., clearing of surface rocks/boulders and other obstacles to vehicular access by means of scraping with a bulldozer or other, similar type of equipment) would be required for the permanent roads.

Each pole installation would require equipment access to a work area of approximately 5,000 to 5,400 square feet. Site preparation at about 18 work areas may require minor grubbing and surface soil disturbance; otherwise, the major source of soil disturbance would be digging the hole for installation. Boreholes for wood pole installation would be approximately 9 to 12 feet deep, while boreholes for steel pole installation would range from 20 to 25 feet deep.

Soil erosion risk is determined by two principle factors: 1) the amount of surface runoff generated and 2) the physical characteristics of the soil (i.e., susceptibility to erosion). Some of the pole installation sites for the Mackintosh/ALJ Variation B alternative would occur on soils assigned a moderate-to-severe erosion hazard ranking and a relatively high K-value by NRCS (2006). In addition to those previously described for the common portion (i.e., common to all of the alternatives) of the Proposed Project (15/44-20/44), these sites comprise the following poles for the Mackintosh/ALJ Variation B alternative: 12/45-13/45, 15/47-5/48, and 11/48-13/48 (23 total). Yet, most of the slopes on these sites are relatively flat and, even though the soil type may be classified as being susceptible to erosion based on physical properties, preclude significant erosion risk. However, some pole sites for the Mackintosh/ALJ Variation B alternative have been located on side hill areas (i.e., slopes are generally steeper than the valley floor), including the segment which parallels Highway 97. Some vegetation clearance would be necessary for approximately 1.4 miles of this segment as it traverses through mature stands of conifers and other types of vegetation. Because of the steeper slopes and erosive soils, these sites would be particularly susceptible to erosion and entrainment of sediment in overland flow; this is a potentially significant impact.

Construction practices and regulatory requirements, intended to control erosion and protect surface water, previously identified or set forth for the Proposed Project and the Weed Segment would be the same for the Mackintosh/ALJ Variation A alternative. As part of their standard construction practices, PacifiCorp would implement specific erosion control and surface water protection methods, or Best Management Practices (BMP), for each construction activity. The type and number of measures implemented would be dependant upon site-specific attributes (i.e., slope and soil type). Further, as discussed above, the applicant would be required to obtain and comply with the NPDES General Permit, which requires development and implementation of a SWPPP for the Proposed Project and the Weed Segment. The General Permit also includes provisions for inspecting BMPs and monitoring their performance.

These existing construction practices and regulatory requirements would mitigate most of the potential water quality impacts associated with typical construction activities. However, these existing practices and regulatory requirements would not be adequate to address the potential impacts related to increased erosion susceptibility for the side hill sites and the installation of new road segments.

> **Mitigation Measure HYD-VAR/B-1**: Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

Impact HYD-VAR/B-2: Dewatering during construction activities could release previously contaminated groundwater to surface water channels or features: *Less than significant with mitigation* (Class II).

Excavation and boring of pole holes may encounter groundwater in parts of the Shasta Valley where the water table is particularly shallow. Where the groundwater table is shallow, some groundwater seepage may occur into pole excavation or auger holes and substation modification/upgrade-related excavations requiring dewatering on a one-time basis immediately prior to pole placement or concrete pouring. Though the dewatering process would be temporary, yielding only a small volume of groundwater, the potential exists for such water or saturated soils to be already contaminated. Discharge (i.e., through dewatering) or displacement of contaminated water or soil, as a result of excavation related to the Mackintosh/ALJ Variation B alternative, is a potentially significant impact.

> **Mitigation Measure HYD-VAR/B-2:** Implement Mitigation Measure HYD-PPWS-2.

Significance after Mitigation: Less than significant.

Impact HYD-VAR/B-3: Pole installation could affect the flow of nearby springs or the flow of shallow groundwater, both of which supply cold water to streams: *Less than significant with mitigation* (Class II).

This impact is synonymous with the potential impact concerning domestic and irrigation groundwater supply, and it is addressed in Impact HYD-VAR/B-4, below.

> **Mitigation Measure HYD-VAR/B-3:** Implement Mitigation Measure HYD-PPWS-4a.

Significance after Mitigation: Less than significant.

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b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). *Less than significant with mitigation* (Class II).

Impact HYD-VAR/B-4: Pole installation could affect the production of nearby domestic or irrigation water sources and/or the flow of nearby springs and shallow groundwater, both of which supply cold water to streams. *Less than significant with mitigation* (Class II).

As part of the Mackintosh/ALJ Variation B alternative, 4 new wood poles would be installed where no poles previously existed, and 2 new steel poles would be installed where wood poles previously existed. This alternative would also include approximately 33 temporary wood poles installed within approximately 15 feet of existing wood poles. The auger depth for the 4 new wood poles would be between 9 and 12 feet; the steel-pole auger depths would be up to 25 feet.

Installation of wood poles in areas where none currently exist, and installation of steel poles to depths deeper than existing wood poles, could penetrate an impermeable layer and/or form a conduit between two water-bearing layers such that the level of the overlying groundwater body would be lowered; this would be a potential impact in that it could 1) affect the production of nearby domestic or irrigation wells and/or 2) affect the production of nearby springs which supply water for irrigation or domestic uses or which supply water to streams or wetland areas. Existing beneficial uses of the Shasta River and its tributaries include *Agricultural Supply* and *Cold Freshwater Habitat* (NCRWQCB, 2006c; see Table 2.8-2). Springs are an important supply of cold water to the Shasta River and its tributaries, and the Shasta River has been listed as impaired due to elevated stream temperatures (NCRWQCB, 200b). Given the proliferation of springs in the study area and the known importance of spring flow to local streams and rivers, a long-term reduction in the shallow groundwater level would be a significant impact to water quality and/or to irrigation and domestic water supply (where applicable).

As previously discussed, all of the WCRs reviewed indicate that domestic and irrigation supply wells in the study area are obtaining water from depths greater than 30 feet bgs. As such, the potential impact of pole installation on nearby domestic and irrigation supply wells would be less than significant (Class III).

Springs in the study area could be supported by water-bearing units (or strata) that are separate from and higher in elevation (e.g., closer to the ground surface) than the units being exploited for groundwater well supplies. Steel pole installation for the Mackintosh/ALJ Variation B alternative would require auger depths of up to 25 feet. As discussed above, monitoring at the J.H. Baxter Superfund site included the installation of groundwater wells in an upper aquifer that extended up to approximately 30 feet bgs. Thus, for areas of this alternative contiguous with the valley section containing this monitoring site, there is potential for an upper aquifer, or water-bearing unit, confined to the upper 30 feet of the subsurface. As such, the installation of steel poles has the potential to penetrate strata with different water-bearing properties and could lower the local water table as discussed below.

Steel Pole 1/49. There are no sizeable springs, streams, or wetland communities (see Section 4.4, *Biological Resources*) in the vicinity of proposed steel pole 1/49 at the Weed Junction Substation; therefore there would be no impact upon springs from steel pole installation at this location.

Steel Pole 19/45. The location of proposed steel pole 19/45 is near the east bank of Beaughton Creek; Beaughton Creek is tributary to the upper Shasta River and baseflow in Beaughton Creek is heavily influenced by discharge of groundwater and springs. According to a WCR filed for a groundwater well near (within 575 feet) and at approximately the same contour as the location of proposed pole 19/45, the depth to groundwater at this location is approximately 35 feet bgs. However, the well was installed in January and the groundwater level could be slightly higher during the spring months (groundwater levels in the area typically peak in the late spring due to the influence of snowmelt), and it was reported that some water was encountered in the upper portion of the boring. Steel pole installation at 19/45 could alter the permeability of the subsurface and impact the local water table (Class II). Mitigation Measure HYD-VAR/B-4 is required for steel pole installation at Pole 19/45.

> **Mitigation Measure HYD-VAR/B-4:** Implement Mitigation Measure HYD-PPWS-4a.

Significance after Mitigation: Less than significant.

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c) **Substantially alter the existing drainage pattern of a 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. *Less than significant with mitigation* (Class II).**

Impact HYD-VAR/B-5: Construction activities could impact local drainage patterns, or the course of a given stream, resulting in substantial on- or off-site erosion or sedimentation. *Less than significant with mitigation* (Class II).

The Mackintosh/ALJ Variation B alternative, in disturbing the ground and hillsides during construction activities, may alter existing drainage pathways so as to make surface soils more susceptible to erosive forces (i.e., overland flow) and/or generate enough increased runoff through removal/clearing of existing vegetation to increase surface erosion.

> **Mitigation Measure HYD-VAR/B-5**: Implement Mitigation Measure HYD-PPWS-1.

Significance after Mitigation: Less than significant.

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d) Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. *Less than significant* (Class III).

Construction or operation of the Mackintosh/ALJ Variation B alternative would not alter drainage patterns such that they would cause flooding on- or off-site. Some vegetation removal and soil disturbance would occur during clearing of staging and work areas and access roads, resulting in the potential for increased stormwater runoff. However, implementation of the BMPs associated with the SWPP would minimize the potential for surface runoff and reduce the potential for on- or off-site flooding (PacifiCorp, 2005). Consequently, impacts related to an increase in surface runoff as a result of vegetation removal and soil disturbance would be less than significant (Class III).

As a result of the Mackintosh/ALJ Variation B alternative, there would be only a minor increase in impervious surface area. Each replacement wood pole (which would be up to 24 inches in diameter) would occupy only about 1.4 square feet greater area than each existing wood pole (which are approximately 18 inches in diameter). The footprint of each newly installed steel pole (5 total including the Weed Segment) would be approximately 12.6 square feet. The total area occupied by these new and larger poles would not be enough to substantially alter existing drainage patterns or cause offsite flooding. Impacts to surface runoff as a result of an increase in impervious surface area would also be less than significant (Class III).

No Project

For the purposes of this analysis, the No Project Alternative includes the following two assumptions: 1) the project would not be implemented and the existing conditions in the study area would not be changed; and 2) a new transmission line and/or additional power generation would be constructed in or near the study area to supply power to the Weed area. Given the highly speculative nature of the No Project Alternative assumptions, this analysis is qualitative.

a) Violate any water quality standards or waste discharge requirements;

Construction of a new transmission line and/or power generation facility would likely result in potential water quality impacts similar to those identified for the Proposed Project and Weed Segment. Namely, water quality impacts would primarily be short-term and associated with ground disturbing activities during construction. Such potential impacts would be addressed by a SWPPP, BMPs, and/or mitigation measures similar to those defined for the Proposed Project and Weed Segment, and the potential water quality impacts of new transmission line and/or power generation facility construction would likely be less than significant.

Installation of a power generation facility would result in an increase in the amount of impervious surface area. However, the increase in impervious surface area, and the subsequent increase in stormwater runoff, would likely be small when compared to the watershed areas and runoff generation of the major tributaries in the study area. Discharge of stormwater would likely require a SWRCB-issued 401 permit and/or a permit from the local POTW. The increase in impervious surface area as a result of installation of a power generation facility would likely be a less than significant impact.

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b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);

Operation of a power generation facility would require a supply of process water (e.g., for cooling). Depending on the quantity of process water required and the source of the process water (e.g., on-site groundwater vs. municipal supply), there could be a potential impact on existing groundwater supply wells. However, such an impact could likely be mitigated by restrictions placed upon the amount of water extracted and where a new groundwater well could be located, though the feasibility of such mitigation measures is at this point speculative. The need to discharge process water used for cooling is unlikely, as most of this water would evaporate and that which doesn't would likely be recycled through the process water system.

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c) Substantially alter the existing drainage pattern of a 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;

Construction of a new transmission line and/or power generation facility, in disturbing the ground and/or hillsides during construction activities, may alter existing drainage pathways so as to make surface soils more susceptible to erosive forces (i.e., overland flow) and/or generate enough increased runoff through removal/clearing of existing vegetation to increase surface erosion. Such potential impacts could be addressed by mitigation measures similar to those defined for the Proposed Project and Weed Segment, and this potential impact would likely be less than significant.

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d) Substantially alter the existing drainage pattern of a site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

As discussed with respect to the Proposed Project and Weed Segment, construction of a new transmission line would not likely alter drainage patterns such that they would cause flooding on- or off-site.

As discussed above under a), installation of a power generation facility would result in an increase in the amount of impervious surface area. However, the increase in impervious surface area, and the subsequent increase in stormwater runoff, would likely be small when compared to the watershed areas and runoff generation of the major tributaries in the study area. Discharge of stormwater would likely require a SWRCB-issued 401 permit and/or a permit from the local POTW. The increase in impervious surface area as a result of installation of a power generation facility would likely be a less than significant impact.

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