2.8 Hydrology and Water Quality

Issues (and Supporting Information Sources):		*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
8.	**HYDROLOGY AND WATER QUALITY— Would the project:**				
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 the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion of siltation on- or off-site?	☐	☒	☐	☐
d)	Substantially alter the existing drainage pattern of the 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 that 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 authoritative flood hazard delineation map?	☐	☐	☐	☒
h)	Place within a 100-year flood hazard area structures that 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?	☐	☐	☒	☐
j)	Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow?	☐	☐	☒	☐

Setting

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

Hydrologic Setting – Climate and Drainage Features

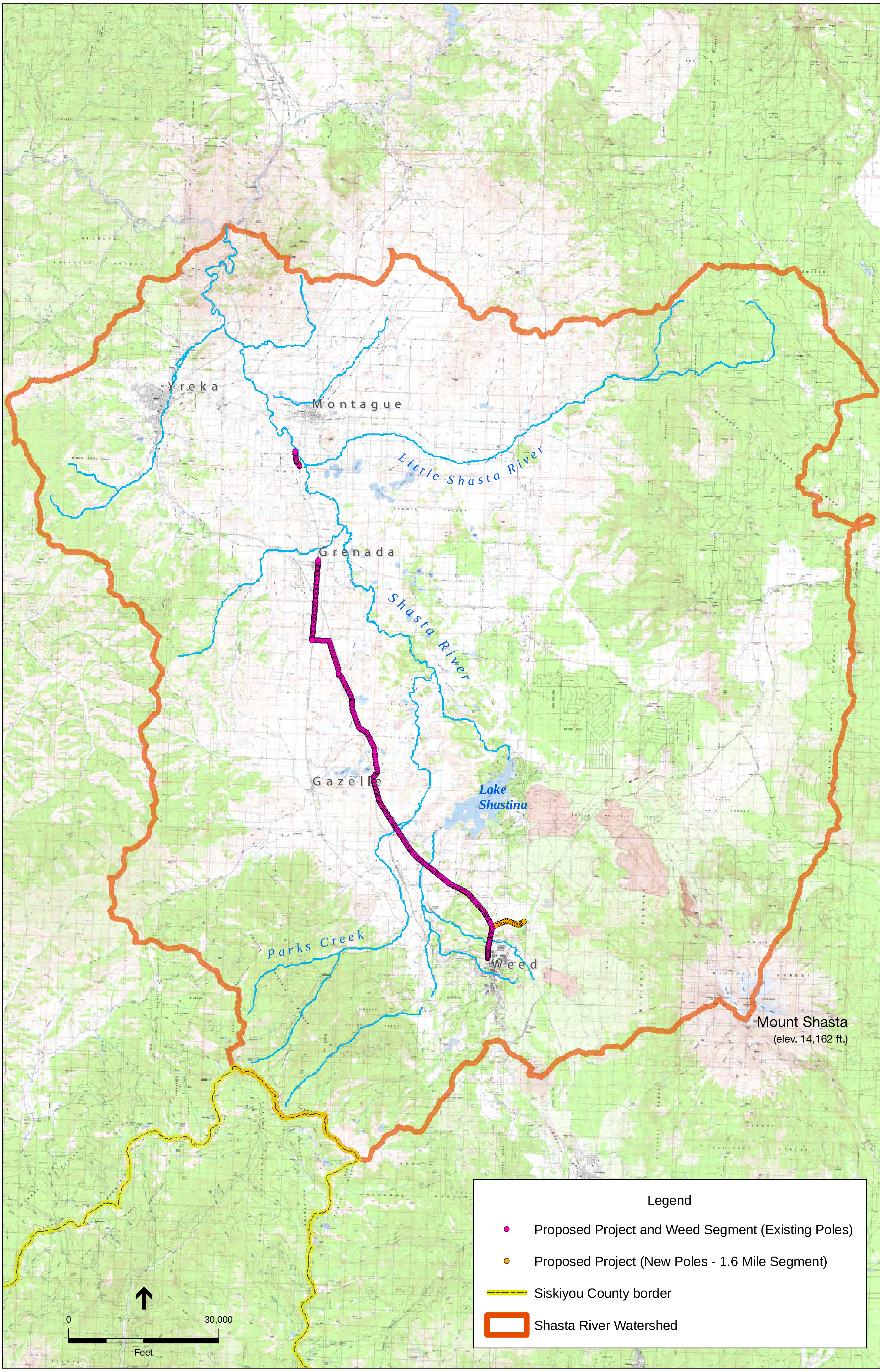
The Proposed Project and the Weed Segment are contained entirely within Upper Shasta Valley, which sits within the 795 square-mile Shasta River watershed (Figure 2.8-1). Shasta Valley is in the central part of Siskiyou County and lies between the Klamath Mountains to west and the Cascade Range (Cascades) 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 average precipitation on the valley floor is much less than the surrounding mountain areas. Annual precipitation ranges from less than 15 inches in parts of the valley to over 60 inches in some of the mountain areas (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 a number of U.S. Geological Survey (USGS) blueline[1] streams, including the Shasta River and Parks Creek. Most of these streams originate in the Klamath Mountains and are draining northeast toward the valley trough and the Shasta River. However, at the southern end of the Proposed Project and the Weed Segment areas, a few of these streams originate in the Cascades (to the south and southeast) and drain to the north and northwest. Shasta Valley is drained principally by the Shasta River and Parks Creek, which rise in the Klamath Mountains, and the Little Shasta River, which rises in the Cascades. However, all streams eventually converge with the Shasta River prior to its confluence with the Klamath River to the north (near Montague).

Many of the largest creeks and rivers within the Shasta River watershed have been altered for irrigation and water supply purposes. In Shasta Valley, domestic and agricultural water supply needs have historically been met through surface water diversions and from springs (PacifiCorp, 2005). About four miles downstream from Edgewood, the Shasta River enters Lake Shastina (formerly called Dwinnell Reservoir); it then flows through the hillocks and knolls of the valley for several miles to its confluence with Parks Creek some two miles southwest of Big Springs. Lake Shastina captures runoff from approximately 15 percent of the Shasta River watershed and lies approximately 1 mile east of the Proposed Project and the Weed Segment areas. Lake Shastina was constructed in the late 1920s as a water supply project for the Montague Water Conservation District (MWCD), the principle water service agency in Shasta Valley. MWCD serves over 14,000 of the 48,000 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

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



SOURCE: USGS, PacifiCorp, ESA

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

Figure 2.8-1

Proposed Project and Weed Segment Area and Shasta River Watershed

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areas, seasonal water use, and appreciable seepage loss from the reservoir (Vignola and Deas, 2005).

Morphology of the Shasta Valley

The morphology of the Shasta Valley floor was shaped primarily by a gigantic debris avalanche [described by Crandell (1989)] that occurred 300,000 to 380,000 years ago. Valley morphology, in turn, exhibits significant control over the development and evolution of drainage networks. 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. In essence, a massive amount of material was entrained in a landslide from the ancestral Mount Shasta and large andesite blocks were scattered down the valley and a finer, more liquid, matrix flowed around them and down the valley. The avalanche deposits cover an area of at least 675 square kilometers and are overlain on the east by basaltic lava flows and on the south by andesitic lava flows, lahars, and alluvium from Mount Shasta. The morphology of the deposits has changed little since their emplacement; the lack of a well-integrated drainage system and absence of deep and widespread dissection of the deposits are due to the gently sloping surface and to the presence of resistant rock at the head of the Shasta River gorge northwest of Montague (this bedrock threshold is the base level for the upstream part of the Shasta River drainage basin). The Shasta River flows northward along the west side of the block facies as far as a point about 3 kilometers north of Edgewood, then turns and follows a northeastward course between parallel ridges formed by the block facies, as does Parks Creek (Crandell, 1989).

Flooding

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), several sections of the Proposed Project and the Weed Segment are located within a 100-year floodplain. The structures located within or very near a 100-year floodplain include the following: existing poles 1/24 to 2A/24; 4/27 to 3/28; 8/33 to 14/33; 1/40 to 4/40; 18/41 to 19/41; and 21/45 of the Weed Segment.

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 and, as a result, many of the water quality issues within the valley are related to this land use practice. Further, Lake Shastina captures runoff from approximately 15 percent of the Shasta River watershed and has altered the downstream hydrologic regime. In more urbanized areas, storm water runoff can entrain urban pollutants generated by residential, commercial, industrial, and transportation land uses. However, the Shasta Valley is not a highly urbanized watershed, though rural residential areas can potentially add pollutants from malfunctioning septic tanks. The North Coast Regional Water Quality Control Board (NCRWQCB, 2003) has identified water quality issues for the Shasta River related to organic enrichment/low dissolved oxygen (i.e., high nutrient loads) and temperature. Potential sources for these water quality issues can be described by a few general categories: agricultural runoff, flow regulation and modification, and habitat modification (i.e., removal of riparian vegetation).

Groundwater Characteristics

The groundwater body in Shasta Valley appears to be hydraulically continuous within all the geologic units in the valley (Mack, 1960). Volcanic rocks (namely basalts) constitute the principal aquifer in the Shasta Valley and typically yield abundant water for irrigation, stock, and domestic wells. Groundwater moves generally northward in the southern part of Shasta Valley and troughward (from the east and west), converging toward the Shasta River, along the valley axis (Mack, 1960). 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. Recharge to groundwater is affected by deep infiltration of precipitation that fall 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 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 area (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.

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 approved by the NCRWQCB in June of 2003 and by the U.S. Environmental Protection Agency (EPA) in March of 2005 (NCRWQCB, 2005).

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, 2005) 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, 2005) for the streams and reservoirs relevant to the Proposed Project and the Weed Segment areas are identified in Table 2.8-1. The applicable beneficial use categories are defined in Table 2.8-2. The Basin Plan (NCRWQCB, 2005) also includes water quality objectives for each of the identified beneficial uses.

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 2.8-3 provides a list of impaired waters, as designated by the NCRWQCB (2003), 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 2.8-1
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, 2005

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.[2] 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 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

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

TABLE 2.8-2
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 (2005)

TABLE 2.8-3
2002 CWA SECTION 303(D) LIST[a] 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	NA
		Agriculture – storm runoff		
		Agriculture – irrigation tailwater		
		Dairies		
		Hydromodification		
		Dam Construction		
		Flow Regulation/Modification		
		Habitat Modification		
	Temperature	Agriculture – irrigation tailwater	Medium	NA
		Flow Regulation/Modification		
		Habitat Modification		
		Removal of Riparian Vegetation		
		Drainage/Filling of Wetlands		

[a] USEPA approved listing as of July 2003
NA Not available

SOURCE: NCRWQCB (2003)

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 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.

Hydrology and Water Quality Impacts and Mitigation Measures

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

Impact 2.8.1: Construction activities associated with the Proposed Project and the Weed Segment could impact water quality by exacerbating the processes of soil erosion and entrainment of sediment in stormwater runoff.

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, access road installation sites, 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. New permanent (1.4 acres) and temporary (4.4 acres) roads 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 and for some portion (approximately 1.25 acres) of the existing access roads. Each pole installation (approximately 395 all together) would require equipment access to a work area of approximately 5,000 to 5,400 square feet. Preparation at each work area may require minor grubbing and surface soil disturbance but the major source of soil disturbance would be digging the hole for installation. Boreholes for pole installation would be approximately 10 feet deep.

Excavation of pole holes may encounter groundwater in parts of the Shasta Valley where the water table is particularly shallow. 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.

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). The majority of the Proposed Project and the Weed Segment areas traverse the floor of the Shasta Valley. As described earlier, the valley floor 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 (Mack, 1960). 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. Of the 395 pole installation sites, 123 of these sites occur on soils assigned a moderate-to-severe erosion hazard [3] ranking and a relatively high K-value [4] by NRCS (2006). These sites comprise the following poles: 5/46-12/46, 15/46-18/46, 1/47-2/47, 12/45-13/45, 5/44-7/44, 11/44-20/44, 6/43-12/43, 19/42-20/42, 2/42-8/42, 1/41, 10/41-11/41, 13/40-21/40, 4/40-9/40, 13/39-19/39, 9/39-10/39, 6/39, 1/39, 14/38-21/38, 2/38, 2/37-16-37, 7/36-15/36, 8/35-14/35, 6/34-8/34, 15/33, 14/32, 13/25, 7/24-8/24, and the new 1.6 mile segment location #11. 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, 11 pole sites have been identified on hillside 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, these sites would be more susceptible to erosion and entrainment of sediment in overland flow; this is a potentially significant impact.

New access road installation proposed between poles 8/35 to 15/35, poles 13/38 to 19/38, and poles 2/42 to 8/42 occur on soils assigned a moderate-to-severe erosion hazard ranking a relatively high K-value by NRCS (2006). Road installation in these areas would leave the hillside more susceptible to erosion and entrainment of sediment in overland flow; this is a potentially significant impact. All these proposed sections of road occur on slopes less than 6 percent according to the USGS Mount Shasta (2002) and Yreka (2002) Quadrangle maps.

PacifiCorp would implement specific erosion control and surface water protection methods for each construction activity conducted as part of the Proposed Project and the Weed Segment. The type and number of measures implemented would be based upon location-specific attributes (i.e., slope and soil type). These control and protection measures, or BMPs, are standard in the construction industry and are commonly used to minimize water quality degradation. As discussed in the Regulatory Context section above, the Proposed Project and the Weed Segment would be required to comply with the NPDES Permit and therefore, be required to employ specific BMPs for the protection of surface water. PacifiCorp would be required to provide details as to the design and monitoring of the BMPs in the SWPPP, which they would prepare under the NPDES permit requirements.

However, a typical SWPP may not be adequate to address the potential impacts related to already contaminated water or soils and the increased erosion susceptibility for the 11 hillside sites and the new road installation segments. Mitigation Measure 2.8-1, which shall be incorporated into the SWPP, would ensure that the potential impacts identified above are reduced to less than significant.

3 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.

4 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.

Mitigation Measure 2.8-1: PacifiCorp shall submit a Notice of Intent (NOI) to the NCRWQCB to comply with the NPDES General Construction Activity Storm Water Permit requirements. PacifiCorp, or its contractor(s), shall prepare a SWPPP prior to construction of the Proposed Project and the Weed Segment, and shall implement the SWPPP during Proposed Project and Weed Segment construction.

The SWPPP shall incorporate, but not be limited to, the construction BMPs listed below. Even with a relatively structured list of BMPs (below), there is still considerable flexibility inherent in the design and implementation of such measures. The BMP list is as follows:

Measures applicable to all sites:

- If unreported contaminated soil or groundwater is encountered during excavation, carry out appropriate remediation of soils or groundwater in contained or covered areas or remediate through treatment prior to initiating excavation.
- Dewatering: if 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, implement standard BMPs as outlined in the SWPPP and below, as necessary.
- Retain, protect and supplement native vegetation wherever possible. Exposure of soil areas shall be limited to the immediate area designated for construction operations.
- Silt fencing, straw wattles, and/or hay bales shall be shall be placed, as appropriate (to contain runoff), at all construction site boundaries (work areas, the staging area, pull and tension sites, and substation construction).
- 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 native 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 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 in the vicinity of natural stream channels.

Measures applicable to the 11 hillside sites 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, within 100 feet of a natural stream or waterbody (receiving water), or for access road installation between poles 8/35 to 15/35, poles 13/38 to 19/38, and poles 2/42 to 8/42:
  - 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) and temporary access road installation 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.

  The SWPPP shall be kept onsite during construction activity and made available upon request to a representative of the NCRWQCB. PacifiCorp or its contractor shall conform to the contract specifications addressing stormwater pollution prevention and shall follow all BMPs identified in the project SWPPP at all times during construction. Given the requirement for a SWPPP and the specific measures to be included, as required by Mitigation Measure 2.8-1, the potential impacts associated with violations of water quality standards or waste discharge requirements would be less than significant.

Significance after Mitigation: Less than significant.

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b) Depletion of 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: ***Less than significant.***

The depth to the groundwater varies across the Proposed Project and the Weed Segment areas and most excavations or boreholes would be above the water table. It is possible, however, particularly in the northern part of the Shasta Valley where the water table is typically shallow, that some groundwater seepage may occur in some pole excavations and substation modification/upgrade-related excavations requiring dewatering on a one-time basis immediately prior to pole placement or concrete pouring. The dewatering process would be temporary, yielding only a small volume of groundwater and therefore would be an insignificant impact to the groundwater supply. If dewatering occurs in an area requiring storm sewer discharge, a discharge permit would be obtained from the local POTW. Discharging excavation water to open ground would require standard BMPs as outlined for stormwater runoff control in the SWPPP. Impacts associated with dewatering and its affects to the groundwater resource would be less than significant.

Pole installation sites, work areas, pull and tension sites, staging area and access roads required for the Proposed Project and the Weed Segment would not result in a net increase in impervious surfaces. Substation modifications/upgrades would result in only a minor increase in impervious surface area (small concrete foundations for new and/or upgraded equipment). Thus, the Proposed Project and Weed Segment would not cause a measurable reduction in surface infiltration or a decrease in deep percolation to the underlying aquifers. Potential impacts associated with groundwater recharge would be less than significant.

Pole installation for the new 1.6 mile segment associated with the Proposed Project could impact local groundwater discharge (seeps and springs) by disrupting groundwater flow through the digging of holes (up to 10 feet) for pole placement. This potential impact is considered less than significant and the following discussion summarizes the rationale for this conclusion.

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; as discussed below, the entire volume of the Cascade volcanics (which cover much of the central and eastern portions of the Shasta Valley) can be considered a huge recharge mechanism for the various surface springs and other features maintained by groundwater discharge.

As explained by Mack (1960), the volcanic rocks of the high Cascades that are adjacent to Shasta Valley serve chiefly as a large intake area and storage reservoir for ground water, much of which eventually finds its way into the valley. 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) derive most of their flow from springs and seeps issuing from the volcanic rocks of the high Cascades.

Springs in the vicinity of the new 1.6 mile segment appear to have formed along a contact between the gigantic debris avalanche deposit (described earlier) mapped by Crandell (1989) and younger, overlying lava flows and moraine deposits depicted by Wagner and Saucedo (1987). The permeability of lava flows tends to vary considerably depending on the somewhat random distribution of joints and contacts; this may explain, in part, the seemingly random distribution and varying magnitude of the various spring discharges along a given formation or contact. As Mack (1960) points out, so far as is known, water-table (i.e., an unconfined, free water surface) conditions exist throughout most of the valley. Given the density of springs throughout the valley and field observations made regarding the local topography and geology, the springs in the vicinity of the new 1.6 mile segment are likely to be maintained by a free water surface (as opposed to emanating from a confined aquifer as an artesian spring).

Thus, it is highly unlikely that implementation of the Proposed Project and Weed Segment (specifically, digging 10 feet deep holes for the placement of new poles) could affect the flow of groundwater that is maintaining the springs, as this process operates on a relatively large scale and is likely not confined by an upper layer that could be affected by pole installations. Further, according to maps and well logs (Mack, 1960; Crandell, 1989; Wagner and Saucedo, 1989), the general depth to the volcanic bedrock extends well beyond 10 feet along the new 1.6 mile segment right-of-way.

Most of the poles for the new 1.6 mile segment would be installed on the valley floor, where the issue or potential impact may also concern a lower confining layer (i.e., a perched aquifer) as opposed to the situation discussed above. However, the existence of a confining layer at depth (i.e., maintaining a perched water table and that the boreholes for the pole installation could puncture) is unlikely. Lines of evidence suggesting that a confining layer is not present are the following:

- Commonly, a clay lens serves as the confining layer for a perched aquifer. Clay lenses typically form in sedimentary deposits or alluvium formations. There are no significant sedimentary or alluvium formations in the area of the new 1.6 mile segment; the volcanic rocks are generally too young to have formed major sedimentary deposits due to weathering and erosion.

- Crandell (1989) depicts the area of the new 1.6 mile segment as being within the southern extent of the gigantic debris avalanche deposit (described earlier). The avalanche deposit is deepest in this southern portion of its extent (i.e., the area nearest the origin of the blast or eruption) and, on average, is 75 meters deep in this area. Rock and soil characteristics evidenced in well logs summarized by Mack (1960) and a shallow boring made by ESA staff in June, 2006, within new 1.6 mile segment right-of-way are consistent with the characteristics of the debris avalanche described by Crandell (1989). Thus, the avalanche deposit is not known to contain any notable clay lenses (or other intermediate, impermeable layers) and its average depth in the vicinity of the new 1.6 mile segment extends well beyond the proposed borehole depth for pole installation.

c) Alter existing drainage pattern of the site or area in a manner that would result in substantial erosion or siltation on- or off-site: *Less than significant with mitigation.*

Impact 2.8-2: Construction activities associated with the Proposed Project and the Weed Segment could impact local drainage patterns or the course of a given stream, resulting in erosion or siltation on- or off-site.

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. This potential impact is addressed in a), above.

Mitigation Measure 2.8-2: Implement Mitigation Measure 2.8-1.

Significance after Mitigation: Less than significant.

d) Alter the existing drainage pattern of the site or area or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site: *Less than significant.*

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 tower areas, 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).

As mentioned above, there would be only a minor increase in impervious surface area. The total footprint of each newly installed pole would be the area covered by a two-foot diameter wood pole, and construction activities related to the substations 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 total footprint areas proposed under the project would not occupy an area that would alter drainage areas or divert surface waters in flood prone areas. The substation modifications would require the construction of small concrete foundation pads for equipment within the existing substation property. The area occupied by these foundation pads would not be enough to alter existing drainage patterns or cause offsite flooding. Impacts associated with alteration of drainage area and potential flooding would remain less than significant.

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: *Less than significant.*

The Proposed Project and the Weed Segment are likely to temporarily increase runoff in some areas as a result of construction activities. However, these areas are relatively small and are located, for the most part, in open space and rural areas that do not have managed stormwater drainage systems. Much of the Proposed Project and the Weed Segment area is not serviced by stormwater drainage systems. Even so, the temporary increase in runoff would likely be negligible in terms of the capacity of any existing stormwater drainage systems (as these are typically designed to accommodate fairly large and infrequent flows). No additional, potential sources of polluted runoff, aside those discussed in a), above, are expected as a result of construction activities related to the Proposed Project and the Weed Segment. Thus, this potential impact is considered less than significant.

f) Otherwise degrade water quality: *No impact.*

The Proposed Project and the Weed Segment would not result in potential surface water pollution beyond the issues discussed in a), above. Therefore, implementation of the Proposed Project and the Weed Segment would not otherwise degrade water quality beyond the issues previously addressed.

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 authoritative flood hazard delineation map: *No impact.*

The Proposed Project and the Weed Segment does not propose to place housing in the project area and, therefore, would not result in any impacts related to the placement of housing within a 100-year flood hazards 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 that would impede or redirect flood flows: *Less than significant.*

No new poles would be placed in a 100-year floodplain as determined by the Flood Insurance Rate Map that identifies 100-year flood zones within the Shasta Valley. Existing poles located within mapped flood zones (as described above) would not impede or redirect flood flows because the area they occupy is not adequate to impede flow (i.e., water flows around the poles with minimal diversion). The Yreka, Weed Junction, Lucerne, and Weed Substations all are located outside of the flood zone boundaries according to digital maps available from FEMA (2004). Impacts associated with pole locations in flood zones would be less than significant.

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: *Less than significant.*

Some construction activities and, therefore, construction workers would be located within known 100-year flood zones. No reservoirs or dams exist within the Proposed Project and the Weed Segment area. However, failure of the Dwinnell Dam (Lake Shastina), located approximately 4.8 miles from the Proposed Project and the Weed Segment boundary, could impact the Shasta River where the transmission line traverses it some 14 linear miles downstream of the dam (at a point just south of Montague). Under existing conditions, a catastrophic failure of Dwinnell Dam could affect portions of the Proposed Project area; yet, the Proposed Project and the Weed Segment would not change that condition. Because of the gentle slope of the valley floor, the extensive floodplain in some of the downstream reaches, and the distance from the dam to the Proposed Project area (along the Shasta River), it is likely that even a catastrophic flood resulting from dam failure would be attenuated to some degree and not cause substantial flooding within the Proposed Project area. The potential risk of injury involving flooding is not a significant one and, thus, the potential impacts associated with catastrophic flooding would be less than significant.

j) Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow: *Less than significant.*

Although within a seismically-active region, the Proposed Project and the Weed Segment are not located in an area that would be impacted by a seiche or tsunami. Local areas within the Proposed Project and the Weed Segment area may experience mudflow hazards (PacifiCorp, 2005) on a relatively small scale. Though mudflows would generally not occur at a level to cause destruction or inundation within the Proposed Project and the Weed Segment area due to distance from steep, upland areas (where mudflows are more likely to occur). However, Mount Shasta, some 9 miles southeast of the Proposed Project and the Weed Segment 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 [5] or mudflow-like event capable of filling the entire Shasta Valley, similar to the gigantic debris-avalanche described by Crandell (1989) and summarized above. In fact, in an analysis of future debris-avalanche hazards emanating from Mount Shasta, Crandell (1989) marks the distal end of a possible future debris avalanche as being near Montague (i.e., filling the Shasta Valley north to Montague). However, such events are extremely rare. The potential risk of injury involving a mudflow (or debris avalanche) is not a significant one and, thus, the potential impacts associated with mudflows or debris avalanches would be less than significant.

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