II. ENVIRONMENTAL IMPACTS (CONT'D)

Swainson's Hawk, Federal candidate 2, California threatened
Short eared Owl, California Special Concern
Sierra Nevada Red Fox, Federal candidate 2, California threatened
Modoc Bedstraw, Federal candidate 2
Greater Sandhill Crane, California threatened

F. Noise

1. The area which surrounds the transmission line corridor is extremely rural. The portion of the project which would produce the greatest noise level would be during the drilling of the holes for the transmission structures. Some residents of the town of Doyle, located approximately 50-300 feet from the proposed construction line would be affected for a short period during this phase of construction. Applicant has agreed to limit the hour of construction activities to weekdays between the hours of 8:00 a.m. and 5:00 p.m. at this location.

G. Light and Glare

2. The insulators to be placed on the transmission structures will be opaque which will reduce possible glare to an insignificant level.

P. Utilities

1. This new 69kv line tying the Chilcoot and Herlong Substations will replace the existing 69kv electrical line from Beckworth to Milford and provide a highly reliable power source to the County's north service area. The existing 69kv line from Beckworth to Milford will be operated as a loop feed ensuring continuity of service during scheduled maintenance of the Chilcoot/Herlong line.

R. Aesthetics

1. In addition to the discussion mentioned in A. 3 above, the transmission line and pole structures will be visible to the south from Highway 70 east of Chilcoot and then be intermittently visible from Highway 395 to the west from Hallelujiah Junction to just south of Herlong. Approximately 30% of the entire line will be replacing existing pole structures to upgrade the existing Plumas Sierra distribution line from 24.9kV to 69kV. The location of the upgraded area will be just north of Red Rock, Plumas County to the Herlong Substation, Lassen County.

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T. Cultural Resources
1./3.

The California Archaeological Inventory Information Center, California State University at Chico completed a search of the archaeological maps, files, and records in the area of the project. A small historic refuse area located east of Chilcoot in Section 27, T23N, R18E was located in the immediate vicinity of the proposed line.

Consultation was also obtained from the Department of Parks and Recreation, Office of Historic Preservation. They recommended an archaeological monitor be on the construction site during pole siting and excavation. The applicant has included this recommendation as part of the project description.

In addition, the State Department of Parks and Recreation, Office of Historic Preservation, has determined in a letter dated November 28, 1989 that the proposed transmission line project will not have an effect on historic properties.

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PROJECT NO.: 1147-01
COPY NO.: _____
ISSUED TO: _____

PLUMAS SIERRA RURAL ELECTRIC COOPERATIVE

CALIFORNIA-16-PLUMAS
P.O. BOX 2000
PORTOLA, CALIFORNIA 96122

ENVIRONMENTAL ASSESSMENT

APRIL 1988

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ENVIRONMENTAL ASSESSMENT
for
PLUMAS-SIERRA RURAL ELECTRIC COOPERATIVE

1.0 Introduction

Plumas-Sierra Rural Electric Cooperative (P-SREC), California-16-Plumas, with main offices located three miles west of Portola on Highway 70, proposes to construct approximately 30.3 miles of 69kV transmission line. The proposed line would extend from the Chilcoot Substation in Plumas County to the Herlong Substation in Lassen County. Ancillary facilities to the proposed transmission line would include removal of existing 12.5/7.2kV distribution line structures and underbuilding the transmission with that circuit from the Chilcoot Substation along Highway 70 to Beckwourth Pass, and from Red Rock along Highway 395 north to Herlong Substation. The change-over of the distribution line would include installation of new conductor, insulators, crossarms, and hardware. This work would represent a significant improvement to this circuit as many of the existing facilities were originally constructed nearly 50 years ago.

The area served by P-SREC is approximately 1,400 square miles encompassing rural areas in Plumas, Sierra, and Lassen Counties in northeastern California and one township in Washoe County located about 30 miles north of Reno, Nevada. There are approximately 4,800 consumers served by the Cooperative. The area generally follows the Middle Fork Feather River in Plumas County, mostly east of Quincy and along the Long Valley/Honey Lake area of Lassen County. In Sierra County, the area served is in the Sierra Valley. In Washoe County, the entire area served is in the Red Rock Valley. The California Public Utilities Commission and the Nevada Public Service Commission have certificated to P-SREC the above-described service area. No loads are served that are nonbeneficiaries of the Rural Electrification Act.

Pacific Gas & Electric Company serves the City of Quincy and borders P-SREC's service area on the west and also part of its southwestern border. CP National serves the

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City of Susanville and borders P-SREC's service area to the north and sections of its northeastern border. Sierra Pacific Power Company serves the City of Loyalton and borders P-SREC's service territory to the east and southeast. Any expansion of service into new areas is limited by the service territories of these utilities and the general topography surrounding the area.

P-SREC's transmission lines are operated at 69kV and are located at some distance up into the mountains and fields away from Highway 70 in Plumas County from East Quincy to Beckwourth. In Sierra County, the transmission line generally follows County Road A-23 to the substation near Sierraville. The line follows the Union Pacific Railroad from Beckwourth to Chilcoot and a circuit is built from Beckwourth over the mountains for 26 miles to Milford in Lassen County.

Transmission facilities in Lassen County generally follow US Highway 395 for about eight miles north from Milford and then another eight miles along the edge of agricultural lands to the substation at Leavitt.

The distribution facilities are located mainly along the roadways in the canyons and in the valleys between the mountain ranges where the residential customers are located.

The area served from Quincy to a location three miles east of Portola is heavily forested and is mostly the property of the United States Forest Service. Generally speaking, the balance of the area served is treeless and is semi-arid to arid. The major highways through the area are state routes 70 and 89, which is designated a State Scenic Highway, and US 395 in Lassen County. State Highway 49 bisects the Sierra Valley.

Area elevations range from 3,423 feet at Quincy to 5,212 feet at Beckwourth Pass. The transmission line between Beckwourth and Milford passes over terrain at about 6,000 feet through forest land.

The electric facilities of P-SREC are constructed in a large area of the Plumas National Forest and in a small portion of the Tahoe National Forest. The lines are set back from the roads so as not to be highly visible, and have been constructed in a manner that mitigates significant environmental and visual impact.

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The annual rainfall in the western portion of the service area is approximately 40 inches per year; most of the precipitation in the western portion falls as snow accumulating to more than 10 feet on the mountain tops. In the eastern portion of the service area, the annual rainfall is only about six inches.

Severe winter storms with accompanying high winds, as well as summer thunderstorms, often inflict considerable damage to electrical facilities causing a high number of consumer outages. A newly constructed 69kV transmission line through the area where the greatest damage previously had occurred has eliminated most of the problem. Outages now occur mainly on distribution facilities and are more isolated, thereby enabling repair crews to find and repair damages more quickly.

The principal area agricultural economy is based upon alfalfa and beef cattle. The alfalfa requires irrigation as a result of the low precipitation. The growing season is short due to the high elevation and cool temperatures; frost free days average about 72 per year.

Wildlife abounds in the area and hunting and fishing are major sources of recreation. Deer, bear, coyotes, cougars and many small game animals may be found. Rivers, streams and lakes are numerous in the area, and the trout fishing is considered to be some of the best in the western United States.

Some of the unincorporated towns included in the service area are Beckwourth, Chilcoot, Doyle, Graeagle, Janesville, Litchfield, Milford, Sattley, Sierraville, Standish, and Vinton.

2.0 Proposed Action and Alternatives

2.1 Project Description

The Chilcoot Substation, on 1.05 acres, is located in the Sierra Valley on Highway 70, approximately 0.9 miles west of Chilcoot in SW¼ Section 35, T 23N, R 15E, MDB&M. The substation has been in existence for twenty years and was modernized just

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recently. The preferred transmission/distribution line route partially follows the existing distribution right of way. The line would exit the Chilcoot Substation and follow the existing distribution line easement on the south side of Highway 70 until Beckwourth Pass, at which point, the line crosses to the north of the highway until it reaches a point in Section 3, T 22N, R17E, which is approximately 4,500 feet west of Hallelujah Junction, the intersection with U.S. Highway 395. At this point, the line would turn north and remain west of Highway 395 until reaching the Herlong Substation, a distance of approximately 25.2 miles. Built in 1982, the Herlong Substation occupies 1.75 acres in the SE¼ Section 21, T26N, R17E, MDB&M.

The line would be designed and constructed using single wood pole structures with horizontal post insulators (See drawing in Appendices). A typical structure would be approximately 65 feet in height, with an average span of 300 to 600 feet between the structures for the transmission line, and a maximum span of 300 feet where the distribution underbuild occurs. The structures would support 4/0 ACSR conductor for distribution and 477 ACSR conductor for transmission, and overhead shieldwire. It is anticipated that the line will utilize the existing 20' distribution right of way easement; however, it will be necessary to acquire an additional 55' easement to facilitate the 69kV transmission line. The line will be constructed using conventional methods. The proposed line will be designed under the guidelines of the joint communiques issued by the United States Department of Agriculture and Department of the Interior, *Environmental Criteria for Electric Transmission Systems*. The structures will be modified according to the guidelines recommended in the Olendorff report entitled, *Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 1981*.

2.2 Need for the Project

Reference 1987 & 1988 Construction Work Plan, dated January 1987, Section III, Planning Criteria.

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2.3 Alternatives to the Project

P-SREC's north system is connected to the south system by a 69kV transmission line, known as the "K" line, which was built in 1960 through environmentally sensitive mountain terrain. Access to the "K" line is by snow cat or all terrain vehicles in all but the summer months. Numerous outages occur on this section of transmission line due to high winds and snow loads.

In recent outages, conductor fatigue has been apparent, indicating an on-going problem can be expected due to severe weather conditions. When the north-south 69kV interconnect is out of service, approximately 1,700 consumers are without power, including the State of California Correctional Facility at Susanville. The proposed new 69kV line would be routed for ease of maintenance and provide transmission voltage in an area that presently is not served with 69kV. The following alternatives exist for replacement or back-up of the "K" line:

- No action
- Reconductor the existing line, replacing and inserting structures where necessary.
- Build a new line adjacent to the existing right of way and remove the old line.
- Build a new 69kV line between Chilcoot Substation and Herlong Substation. This line would have the capability to connect with the old "K" line to create a looped system.

<u>No Action</u>

The No Action alternative would mean that no new transmission line facilities would be constructed. This alternative would preclude P-SREC from accommodating load growth within its eastern service territory. Additionally, the objective of providing increased reliability to P-SREC's consumers would not be met. Therefore, No Action is not considered a viable alternative for meeting the stated need.

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"K" Line Reconductor

Reconductoring the existing 69kV line between Beckwourth Substation and Milford Substation would take this back bone transmission line out of service and require generation in the north system during construction. Approximately 10 MW of generation plus single contingency reserve would be required to maintain the north system consumers. An intertie with PG&E through California Pacific would have to be negotiated. Construction time would be approximately 60 days. The present conductor is #2 ACSR; it would be reconductored with 477 ACSR. This will require numerous structure changes for support of the larger conductor. The rebuilt line would improve service to the north system and reduce system losses. The disadvantage of this alternative is reflected by its location in mountainous terrain. The line will be difficult to service nine months of the year as well as continue to expose this circuit to extreme environmental hazards and outage potential. Outages to the north system will continue to occur during scheduled maintenance and non-scheduled interruptions.

"K" Line Replacement

The advantages and disadvantages of building a new line adjacent to the existing line are similar to reconductoring. As the existing circuit would not be disconnected until construction were complete, the new line would require "hot" construction techniques, a dangerous and expensive process. Generation would not be required during construction but the old line would require removal after completion of the new line. After completion the new line would provide better service to the north system with lower losses. Additional disadvantages would be difficulty in servicing the line and no alternate feed for the north system, resulting in outages during scheduled and non-scheduled interruptions. In addition, due to the placement of the line in an environmentally sensitive area, permitting may not be obtained within the required time frame, if at all. There are five or six poles on State Game Refuge land, and a good portion of the line traverses BLM land in Clover Valley. Currently, there are structures located in wetlands, which are closely monitored by the U.S. Fish & Wildlife Service. On the frequent occasions when Dixie Creek has changed channels, some structures have washed out.

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New Line

A new 69kV line tying together Chilcoot and Herlong Substations would provide a highly reliable power source for the north system. The transformer at Quincy, as well as the entire system, is at 69,000V. The July 1987 *Supplement to the 1980 System Planning Report* confirms there will be no need for a larger voltage line before the year 2015. The line could be constructed adjacent to existing roadways and right of ways, allowing easy access for service twelve months of the year. The existing 69kV line between Beckwourth and Milford could be maintained as an alternate feed to the north system resulting in greater system reliability. The system could be operated as a loop feed ensuring continuity of service during scheduled maintenance. Generation would not be required during construction, and the old "K" line would not require removal. The relatively flat terrain and ease of access would result in less expensive design and construction costs for the Chilcoot to Herlong line versus the Beckwourth to Milford mountainous route.

2.3.1 Alternatives to the Preferred Route

Union Pacific Railroad

Utilization of the Union Pacific Railroad right of way to accommodate the proposed line was examined. However, the UPRR policy is to deny all requests for easements except for cases in which no other alternative exists. In those cases, UP charges an annual rental fee which would render the proposed action economically unfeasible. Therefore, this alternative has not been pursued further.

Highway 395

From a point just south of Doyle, this alternative route would parallel the east side of Highway 395. This route crosses approximately two and one half miles of the Doyle Wildlife Area, and therefore generated considerable concern on the part of the California Department of Fish and Game (F&G).

An on-site meeting with P-SREC representatives and Tom Stone of the F&G was held May 21, 1987.

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The primary issue centered on the F&G's objection to the establishment of new access across the Area. Because this Area is managed to enhance deer migration and winter habitat, the F&G attempts to limit access to the deer. Mitigation of the F&G's concern is limited to confining construction activities to the highway right of way. This constraint would require placing structures immediately adjacent to the California Department of Transportation (CALTRANS) right of way fence. However, CALTRANS is planning, within five years, to widen this portion of Highway 395 from the present two lanes to four lanes. In that event, should the proposed line be constructed adjacent to the highway right of way, it would, in the near future have to be moved.

Additionally, the Red Rock Scenic Area, which is located on the east side of Highway 395 approximately 11 miles south of Doyle, has been designated a Class II Visual Resource, and as such, the BLM does not allow visual modifications to occur within the highway corridor.

Because of the access constraints imposed by the F&G, the visual intrusion in a Class II Visual Resource Area, and the probable highway construction forcing line reconstruction in the near future, this alternative is not considered feasible.

2.4 Affected Environment

Reference Project Area map located in Appendices.

2.5 Environmental Impacts

The proposed construction will not impact the climate of the area. Any impact that the climate might have on the proposed projects will be minimal and virtually limited to damage from wind, lightning, ice, and minor flooding. The probability of these damages occurring are rather minimal since these factors have been considered during design of the facilities. Facilities will not be located within 100 feet of stream banks, on fault lines, below areas designated as being probable landslide, mudflow, or snowslide locations, or within 200 feet of springs or seeps. Area flood plain maps have been investigated, and no structures will be placed within the infrequent areas designated to be prone to such a hazard. These areas will either be spanned or avoided. No facilities will be placed so as to disturb areas

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with historical significance. The line is designed with adequate protection from the lightning storms experienced by the area. Construction will be halted during periods of excessive precipitation so as not to impact the soils or vegetation.

Minor impacts to soil, topography, vegetation, and visual quality will be experienced at the structure locations within the transmission line right of way, which will be 75 feet wide.

After the structure is placed in the excavation, it is backfilled with the excavated material. Any remaining material is spread about the immediate area. Any areas disturbed during construction will be reseeded with natural vegetation at a time of year favorable for establishment of a successful seeding as advised by the Soil Conservation Service in the interest of preventing soil erosion. All litter, waste, and debris will be removed from each construction site upon vacation and disposed of in a proper dumping area.

The line will be routed so as to limit the amount of vegetation clearing to only that necessary for safe line construction and operation. The line will also be routed so as to utilize existing contour features for concealment where feasible. Any impact to airspace will be insignificant, and air quality will not be affected at all.

Impacts to wildlife will be very minimal. The line will not significantly interfere with any migratory, rearing, or wintering activity of area wildlife. Since the Doyle Wildlife Area is predominantly a wintering area for mule deer, the anticipated construction will occur in the summer months, thereby eliminating any possible construction impacts on wintering deer. Some animals resident to the immediate construction sites will be temporarily displaced during the construction process but will most likely return to inhabit the proximity of the facility soon after site vacation. Some animals may even benefit from the increased grazing or browsing opportunities presented by the minimal clearing, pruning, and revegetation that will be performed. It is probable that a small number of rodents, reptiles, and amphibians might be destroyed by construction vehicles and equipment.

A cultural resource survey will be conducted at the area of the proposed new construction on BLM land, a distance of approximately 9.25 miles. Should the survey

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discover significant cultural resources, the proper authorities will be notified and mitigative policies initiated.

2.6 Mitigation and Monitoring

All proposed facilities will be designed under the guidelines of the joint communique issued by the United States Department of Agriculture and Department of the Interior, *Environmental Criteria for Electric Transmission Systems.*

It is possible that some birds may become stunned by colliding with a facility during flight but these occurrences are not expected to be high in number. The following reports have been researched for mitigation guidelines:

Beaulaurier, Diane L., 1981. *Mitigation of Bird Collisions with Transmission Lines,* prepared for the Bonneville Power Administration, Portland, Oregon.

Avery, Michael L., editor, 1978. *Impacts of Transmission Lines on Birds in Flight,* U.S. Department of the Interior, Fish & Wildlife Service.

2.7 Legal Notice

Legal Notice requirements were met through publication of the notice of availability of the Borrower's Environmental Report. See the Appendices for a copy of the legal notices in the following newspapers:

- *Portola Reporter*
- *Lassen Advocate*
- *Feather River Bulletin*
- *Sierra Booster*

3.0 Resource Analysis

3.1 Land Use

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3.1.1 Natural Features and Topography

The service area is composed mainly of mountain ranges, valleys, forests, lakes, and streams. Portions of the Cascade and Sierra Nevada Mountain Ranges are located within this study area, while the extreme northeastern edge is in the Modoc Plateau, a flat to undulating highland capped by recent lava flows and shield volcanoes. Vast areas of forests are found within the boundaries of the Plumas National Forest.

The Sierra Nevada is a high, continuous mountain range that extends for more than 400 miles. The south end of the Sierra Nevada ends in the Tehachapi Mountains in the San Joaquin Valley. The northern section of the Sierra Nevada ends in the Lake Almanor/Honey Lake areas, and its rock types and structures are thought to continue northward under the cover of the volcanic terrain of the Southern Cascade Mountains.

Until the 1960's, geologists assumed for many years that the Sierra Nevada and Klamath Mountains were as distinct geologically as they are geographically. However, studies proved that the two mountain ranges are in fact separate parts of a single dismembered mountain range. Rocks along the southern edge of the Klamaths match those along the northern end of the Sierra Nevada. Each major belt of rock, except one, and each major fault in the southern Klamaths has its counterpart in the northern Sierra Nevada. Research indicates that about 140 million years ago when the rocks in the ranges were still young and the processes that made them were still active, a single mountain range somehow broke into two pieces that moved apart about 60 miles.

Soon afterwards, from the present Sierra Nevada eastward, a large region of the earth's crust began to stretch and break into large blocks. The largest and westernmost of these blocks is the Sierra Nevada. It rose along faults that define the east face of the present range, tilting the old land surface gently westward. Other blocks rose and fell east of Sierra Nevada to form the desert ranges and basins of eastern California and Nevada. The fault that defines the eastern face of the range is still actively moving and occasional earthquakes jolt the crest a few feet higher.

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Evidently, during the next 80 million years, northeastern California was flooded by seawater. The seaway filled with sediment and remained as a level plain similar to the Great Valley for millions of years.

About 15 to 20 million years ago, the long period of relative geologic quiet in California ended. Action in the upper reaches of the northeast section began anew when a series of incandescent floods of molten basalt welled up from long fissures and spread like fluid across the level sediments to form enormous lava flows covering hundreds of square miles to depths of as much as several thousand feet, thereby creating a high tableland - the Modoc Plateau. A plateau formed instead of mountains because the lava spread thinly across the countryside from long fissures, instead of piling up around the vent as do more viscous lavas. Simultaneous eruptions in the Sierra Nevada sent rivers of basalt lava down several major stream valleys sealing the gold-bearing gravels beneath thick lava flows and diverting the streams to other courses through the soft lateritic soils of the countryside.

Northeastern California's most recent volcanic episode has been the development of the Cascade volcanoes, a continuing process that began several million years ago.

A wide variety of lavas, including basalt and rhyolite, are erupted from the Cascade volcanoes but the most common are andesites, which are rocks intermediate in composition between rhyolite and basalt. Andesites vary considerably in appearance but most are some shade of gray or brown; like all volcanic rocks, they are so very fine-grained that it is difficult to see anything very distinctive in them.

The most famous dome cone (a roughly dome-shaped volcano with steep sides, formed by eruption of very viscous lava) in the Cascades is Lassen Peak at the south end of the range. Lassen Peak rises to 10,453 feet, and last erupted in 1914-21.

Major valleys located in P-SREC's service area are the Sierra Valley, Long Valley, and Honey Lake Valley.

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3.1.2 Sierra Valley Area - Sierra Valley and Long Valley

The Sierra Valley Area is composed of Sierra Valley, the larger of the two in the western portion of the Area, and Long Valley in the eastern portion of the Area. Both valleys are encircled by steep uplands and are separated by mountains.

The Area is bordered by the fairly rugged Sierra Nevada on the east, and by the most southerly extension of the Cascades on the north.

The Sierra Valley is an example of a down-faulted basin, which, in ancient times, was a lake comparable in size to Lake Tahoe. Sediment that presently fills the basin ranges up to 2,000 feet in thickness.

Sierra Valley is a hatchet-shaped basin about 19 miles long and 10 miles wide at an elevation of 4,850 feet. It is almost entirely surrounded by a mountainous rim. The Middle Fork of the Feather River and its tributaries originate in the surrounding mountains and flow westward to the Pacific Ocean. The Feather River has been declared a "Wild River", therefore, it is illegal to irrigate with its waters. These streams have steep gradients until they reach the valley. They become meandering waterways on the valley floor, as stream gradients are reduced to less than five feet per mile (the basin floor is almost flat). They form an interlacing network across the valley flood plain, then coalesce into one stream and flow from the valley through a narrow gorge in the northwestern corner of the Area, about three miles east of the town of Portola. The soils are mostly wet, and they are commonly dark colored and high in organic matter content. The soils vary from fine textured to coarse textured. The light colored soils are those affected by salts, alkali, and high lime content.

It is interesting that the Feather River drains this area westward through the high Sierra Nevada. Obviously the river is older than the outlines of the present landscape and managed to maintain its course through all the activity of faulting and volcanism of the last several million years. This could not have occurred unless the river was able to erode its channel downward more rapidly than the uplift of the Sierra Nevada block.

A margin of alluvial fans and lake terraces is around the perimeter of Sierra Valley, and remnants of ashy deposits partly flank the lower slopes of the mountains on the

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west side. Soils in the valley bottoms vary from poorly drained to moderately well drained. The variety of soils include level to gently sloping clays, mucky silty clays, loams, level to moderately sloping coarse sandy loams, sandy loams, and clay loams. The mountainous uplands are composed of volcanic, granitic, and metamorphic rocks.

There are large exposures of volcanic rocks beside the road where it passes through canyons north and south of Sloat and between Blairsden and Beckwourth. They consist mostly of ashfall and mudflow deposits in various pale shades of gray, pink, and lavender. Many are agglomerates of volcanic ash mixed with angular chunks of volcanic rocks.

The slight depressions in basin areas on the valley floor are poorly drained and consist of fine-textured alluvium.

Long Valley is a narrow, trough-shaped valley three to four miles in width and about 18 miles long. The 40th parallel bisects this valley. The valley is drained by Long Valley Creek, a small stream that has its source west of Peavine Mountain near Reno, Nevada. The creek drains northwest through Long Valley and empties into the Honey Lake Basin, which is alkaline and salty because it has no outlet. Evaporation from the lake balances inflow of water from Long Valley Creek and other tributary streams. Long Valley Creek sometimes becomes dry during the summer months. However, during the springtime, the creek has changed channels a dozen times over the past 30 years. The stream approximately bisects the valley in an entrenched and somewhat meandering channel. Along its course are narrow flood plains and low terraces. Eastern Long Valley consists of a series of dissected rolling terraces interspersed with small alluvial fans. West of the creek is a series of high terraces or benches that break along abrupt escarpments into Long Valley Creek and a series of small alluvial fans. These terraces are cobbly alluvium. In general, the soils on terraces bordering Long Valley are of two types: (1) Well-drained, gently sloping to steep sandy loams to extremely stony sandy loams; (2) Well-drained, gently sloping to moderately steep loamy coarse sands, cobbly loamy coarse sands, and sandy loams. The mountainous uplands surrounding Long Valley are made up of volcanic, granitic, and metamorphic rocks.

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