CHAPTER 3

Affected Environment and Environmental Consequences

3.1 Introduction

This chapter provides an assessment of the effects of the proposed Energy Facility on various environmental elements, including geology, soil, and seismicity, hydrology and water quality, vegetation and wildlife, fish, traffic and circulation, air quality, visual quality and aesthetics, cultural resources, land use plans and policies, socioeconomics, public services and utilities, and health and safety (including noise). The information presented in this chapter is based on the detailed analyses of the SCA submitted to EFSC on September 5, 2002, and Amendments No. 1 and No. 2 to the SCA submitted to EFSC on July 25, 2003, and October 15, 2003, respectively, by the project proponent. Table 3.1-1 provides a summary of the affected environment and anticipated impacts of the Energy Facility and the No Action Alternative.

3.1.1 Mitigation Measures

The sections of this chapter that address each element of the environment include a discussion of mitigation measures. In this EIS, mitigation measures are broadly defined to include measures taken to avoid, minimize, or offset environmental impacts. Two classes of mitigation measures are described in this chapter: measures already incorporated in the proposed project, and additional measures recommended in this EIS. The mitigation measures included in the proposed project are those mitigation measures that the project proponent has proposed in its application to EFSC for a site certificate. The environmental analyses contained in this chapter were made assuming that these mitigation measures would be implemented as part of the proposed project.

Recommended mitigation measures are measures that would further reduce the environmental impacts of the Energy Facility. If the Energy Facility is approved, these mitigation measures would be considered in the Record of Decision.

3.1.2 Environmental Impacts of the No Action Alternative

If the No Action Alternative were selected, the COB Energy Facility would not be built. Accordingly, none of the potential impacts to water, land, and air discussed in this chapter would be realized. However, the No Action Alternative would have three adverse impacts of its own. First, the proposed project's contribution to the regional need for more electrical power would be foregone, potentially resulting in power shortages, limits on economic development, and increased power costs. Second, to the extent the regional need for power could be met through existing generation resources, a negative environmental impact would result because those older sources are, on average, less efficient and more polluting than the proposed COB Energy Facility. Third, the proposed project would not contribute to the regional economy.

3.1.3 Unavoidable Adverse Impacts

This EIS identifies measures to mitigate the potential adverse impacts of the proposed project through avoiding, minimizing, rectifying, reducing, or compensating for the adverse impact. However, even with mitigation, some adverse impacts would still occur if the proposed project is implemented, and these impacts thus would be considered unavoidable. The following unavoidable adverse impacts would occur during the 30-year lifetime of the Energy Facility:

3.1.3.1 Geology, Soil, and Seismicity

- 56.7 acres of Exclusive Farm Use (EFU) land would be converted to energy production
- Soil erosion would occur at the project site and along the pipeline and electric transmission line easement as a result of the land disturbance.
- The project would impact 13.9 acres of designated high-value agricultural soil

3.1.3.2 Hydrology and Water

- 162 gallons per day (gpd) of water, under average conditions would be used for power generation and irrigation requirements.

3.1.3.3 Vegetation and Wildlife

- Less than 0.5 acre of wetland would be filled.
- 108.7 acres of designated Oregon Department of Fish and Wildlife habitat would be removed from potential use by wildlife, including 50.7 acres of designated Significant Resource Overlay by Klamath County for high- and medium-density deer winter range.[9]

3.1.3.4 Traffic and Circulation

- Energy Facility construction traffic (835 daily trips) would decrease the Level of Service (LOS) of roads in the vicinity of the project.

3.1.3.5 Air Quality

- During construction, fugitive dust and combustion exhaust would be emitted from equipment and vehicles.
- During operation, the Energy Facility would emit up to 354 tons of NO_2 annually, 246 tons of PM_{10} annually, and 465 tons of CO annually.

3.1.3.6 Scenic and Aesthetic Values

- The Energy Facility would be visible in an area where industrial facilities previously did not exist.

[9] This acreage also includes lands designated as high-value soil and exclusive farm use.

3.1.3.7 Socioeconomic

- During construction, there would be a short-term impact on housing in the vicinity of the project.

3.1.3.8 Health and Safety

- Electric and magnetic fields would increase as a result of the construction of the switchyard and the electric transmission line.
- There would be an increase in noise levels in the vicinity of Energy Facility

3.1.4 Short-Term Uses and Long-Term Productivity

NEPA requires an analysis of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity for all alternatives. The following describes the local short-term use of the land as a power facility weighed against the long-term productivity of the rangeland, dryland agricultural fields, fallow fields, and woodlands. This analysis primarily focuses on permanent impacts during the 30-year life of the proposed project.

3.1.4.1 Proposed Action

The short-term uses of the land would result in increased short-term construction jobs and long-term operational jobs in Klamath County. In addition, there would be increased tax revenues for both the state of Oregon and Klamath County. The revenues would be used to enhance local and state public services and infrastructure and contribute to social programs. Mitigation proposed by the project proponent would also increase the productivity of 31 acres of agricultural land by beneficial use of process wastewater for pasture irrigation. The proposed project would restore 91 acres of fallow land to high-quality deer habitat and another 145 acres of habitat would be improved in the wildlife mitigation area. The proposed project would generate electricity that would meet present and future demand for power for homes and business throughout the western states.

Although water would be withdrawn from a deep aquifer, there are no other known users of this water in the vicinity of the proposed project. By using an air-cooled system, the Energy Facility would minimize the use of the water resource and wastewater would be used beneficially for irrigating 31 acres of pasture land. No wastewater or stormwater would be discharged to surface or ground waters.

Short-term construction impacts would result in the loss of existing vegetation and increased traffic, noise, and soil erosion. The implementation of best management practices (BMP's) through the proposed project's erosion and sediment control plan, regulated under NPDES General Construction Permit 1200-C, would be employed to minimize soil loss. Construction activities would disturb vegetation in some areas. However, following construction , revegetation of disturbed areas would be in conformance with a revegetation plan.

Long-term productivity impacts would result from the permanent loss for 30 years of approximately 108.7[10] acres of undeveloped land used for cattle grazing and fallow dryland

[10] Does not Include the corridor for the buried natural gas pipeline.

farming fields. The electric transmission line would impact fallow agricultural fields used for cattle grazing, woodlands, and open rangeland. The natural gas pipeline would follow an existing road right-of-way (Harpold County Road and West Langell Valley Road) and have minor long-term productivity impacts. The water well system and pipeline would be constructed through or adjacent to irrigated pasture and other agricultural operations, including open range land and woodlands on land under option by the project proponent. Approximately 56.7 acres of EFU land would be permanently impacted, including approximately 13.9 acres of high-value soil land[11]. Operation of the project would result in a long-term loss of the existing productivity of approximately 108.7 acres of agricultural, woodland, and rangeland. However, after the Facility is retired the land would be restored, as described in the site restoration plan required by EFSC, to the former uses.

Other impacts on long-term productivity of natural resources include the use of natural gas, impacts on air quality, and use of water resources. The proposed Energy Facility would consume natural gas resulting in a loss of this natural resource. As a result of using natural gas in a combustion turbine, the proposed Energy Facility could also have a potential long-term impact on global warming through the release of greenhouse gases. However, this would be offset by the proposed CO_2 mitigation as required by EFSC.

The short-term use (30 years) of natural resources would have a minor adverse impact on the long-term viability of the environmental resources in the vicinity of the project.

3.1.4.2 No Action Alternative

Under the No Action Alternative, the land would essentially remain in the same use over the long-term, but there would be no short-term positive or negative impacts.

3.1.5 Irreversible and Irretrievable Commitments of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (for example, energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action.

3.1.5.1 Proposed Action

The proposed action would result in both irreversible and irretrievable commitments of resources for the construction and operation of the Energy Facility. Construction of the Energy Facility would result in the consumption of hydrocarbons (such as gas, oil, and propane), gravel, sand, and wood and other materials that go into the production of steel, glass, aluminum, other metal alloys, asphalt, concrete, and bricks. The depletion of these natural resources is not expected to have a significant adverse effect on their availability over the lifetime of the project. At the retirement of the project, all salvageable material would be removed prior to demolition of the Facility. During and after demolition, scrap material such as metal would be sorted from nonuseable material and recycled. These actions would reduce the overall irreversible impacts of constructing the Energy Facility.

[11] Does not include the corridor for the buried natural gas pipeline.

During construction there would be temporary impacts on approximately 256.7 acres of land, but these impacts would be reversible following construction and restoration of the land, including buried pipelines, construction laydown areas, and other temporary construction features.

During its operational lifetime, the Energy Facility would consume approximately 9,000 MMBtu of per hour of natural gas annually. This is an irretrievable commitment of a nonrenewable resource.

Although the project has a projected life of 30 years, it is anticipated that the land would be restored back to the former uses at the end of the project as required by EFSC. Productivity of the land would be lost during the life of the project, but it would not be irretrievably lost.

3.1.5.2 No Action Alternative

If the proposed action is not constructed, the land and natural resources estimated to construct and operate the Energy Facility would not be irreversibly nor irretrievably committed.

3.2 Geology, Soil, and Seismicity

The proposed Energy Facility would be located in a subbasin of the Klamath Basin. The Energy Facility site, the natural gas pipeline, and the water supply pipeline would not have substantial changes in elevations where they are sited but the electric transmission line would. Two landslide areas have been observed in the vicinity of the electric transmission lines, and the transmission towers have been sited away from them.

Earthquakes are likely within the basin. However, the risk to human safety and the destruction of improvements would be minimized through the design and construction of the Facility, so impacts would be low.

The Energy Facility would cause the permanent disturbance during the 30-year operating life of the Energy Facility to approximately 13.1 acres of nonirrigated, high-value farmland soil. However, this soil is not considered prime farmland by the Natural Resources Conservation Service (NRCS) because it is not irrigated. Construction and operation of the Energy Facility could cause wind and water erosion. However, the implementation of BMPs and the National Pollutant Discharge Elimination System (NPDES) permits during construction and operation would minimize those impacts.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.2.1 Affected Environment

The Energy Facility site is located in a subbasin of the larger Klamath Basin in south-central Oregon. The Klamath Basin is a composite graben that forms the westernmost structural trough of the Basin and Range physiographic province. The Klamath graben is bounded by predominantly north- to northwest-striking normal faults. The geology and topography of the Facility site are summarized below and shown in Figure 3.2-1.

3.2.1.1 Topography

Energy Facility Site. Most of the Energy Facility site is proposed in relatively flat agricultural fields. The site slopes gently upward towards the northeast to a low ridge. The total elevation difference is about 135 feet from the low point at elevation 4,205 feet in a field on the southeast end of the site to the top of the low ridge at elevation 4,340 feet at the northern end of the site.

Electric Transmission Line Easement. The electric transmission line easement would have substantial topographic relief. From the Energy Facility site, the alignment would extend southwestward up the steep slope of the Bryant Mountain ridge. From the top of the ridge, the alignment would trend generally south-southwestward, crossing a number of gently sloping upland ridges. The alignment would then turn south-southeastward and run subparallel to an upland ridge. Near its southern terminus, the alignment would cross a 30-foot-high rock cliff. The total elevation change along the alignment would be about 590 feet, with the low point of 4,290 feet elevation at the Energy Facility site and a high point of 4,880 feet elevation near the southern end of the alignment.

Natural Gas Pipeline Easement. The natural gas pipeline easement would follow along West Langell Valley and Harpold Roads. The easement would cross county roads in three places, and an irrigation canal in one place. The slopes would be very gentle, with a total elevation difference along the alignment of about 185 feet. The low point of 4,120 feet elevation would occur within the floodplain of the Lost River along Harpold Road. The high point of 4,305 feet elevation would occur along West Langell Valley Road just southwest of the Energy Facility site.

Water Supply Pipeline Easement. The water supply pipeline easement would cross several low ridges and basins from the raw water supply storage tank to the existing water supply well. In addition, the alignment would cross two paved Klamath County roads and three irrigation ditches. The alignment would also cross under the existing electric transmission lines that extend through the proposed Energy Facility site. The total elevation change would be about 235 feet, with the low point of 4,130 feet elevation at the water supply well and the high point of 4,365 feet elevation along the low ridge just north of the proposed Energy Facility site.

3.2.1.2 Geological Features

The following summarizes the geological features of the Energy Facility.

Energy Facility Site. Information provided on the Energy Facility site is based on the *Preliminary Geotechnical Engineering Report, COB Energy Facility, Bonanza, Oregon* (GeoEngineers, 2002).

The Energy Facility site would be partially underlain by Tertiary-age basalts that erupted from 15 million to 4 million years ago from multiple volcanic vents. The intact basalt is generally highly to closely fractured, hard, moderately weathered, blocky to massive, and moderately strong. Individual flows are typically 10 feet thick. The tops of flows are fractured and weathered. In addition, the top 5 to 10 feet of basalt are highly fractured and locally weathered to a gravelly soil.

Overlying and interbedded with the basalt units is a volcaniclastic rock that is massive, soft to moderately hard, severely to moderately weathered, blocky, and weak to moderately strong. The uppermost portion of this unit is highly weathered and has the properties of a very dense soil.

A very generalized distribution of these units is that basalt directly underlies steep slopes and upland areas and the volcaniclastic rock is the uppermost unit underlying the flatter basins and areas with agricultural fields.

Overlying the volcaniclastic rock in the flat-lying basins is a volcanic ash that is attributed to the eruption of Mount Mazama (Crater Lake). The ash has an age of about 6,000 years. The ash is a fine elastic silt that is slightly cemented giving it a stiff and to hard consistency. It ranges in thickness from 0 feet thick at the fringes of the basins to more than 39 feet thick in the middle of the basins.

Recent surficial soil mantles the other geologic units. In the steeply sloping and upland areas where basalt bedrock is exposed or close to the surface, the soil consists of a mixture of silt, sand, gravel, cobbles and boulders. The thickness ranges from 0 feet to about 5 feet. Within the flatter lying basins, the surficial soil ranges from a silty sand to a silt with sand.

This soil also contains occasional to some gravel. The thickness of the basin surficial soil is 5 to 13 feet in the vicinity of the proposed Energy Facility site. In the agricultural fields, the upper 18 inches of soil has been loosened by tilling activities.

An unmapped normal fault occurs along the base of Bryant Mountain, immediately to the southwest of the Energy Facility site. The inferred trace of the fault is shown in Figure 3.2-1. The fault trends northwest-southeast and is at least 10 miles in length. The bedrock has been uplifted on the southwest side of the fault, giving rise to Bryant Mountain, and down-dropped on the northeast side, resulting in the basin where the Energy Facility site would be located. The fault likely dips to the northeast, extending beneath the proposed Energy Facility site.

Natural Gas Pipeline Easement. Rock and soil units along the natural gas pipeline easement appear to be similar to those at the proposed Energy Facility site. However, no subsurface information currently exists for the easement. Shallow basalt bedrock occurs along only 20 percent of the alignment, mostly near the Energy Facility site. The subsurface soil is presumably similar to the agricultural fields at the proposed Energy Facility site. There may be recent alluvial sands and silts located along Harpold Road, which roughly parallels the Lost River.

The extension of the fault along the base of Bryant Mountain ridge crosses the proposed natural gas pipeline along Harpold Road. The trace of the fault is not apparent as it crosses under the Lost River floodplain north of Harpold Road.

Electric Transmission Line Easement. The rock and soil units along the proposed electric transmission line easement appear to be similar to the proposed Energy Facility site. However, no subsurface information currently exists for the easement. More than 90 percent of the easement has shallow bedrock. The rock is mostly basalt, although some volcaniclastic rock could also be present. Soil is shallow and consists of mixtures of silt, sand, gravel, cobbles, and boulders.

An ancient landslide has been identified where the northern section of the proposed electric transmission line easement would extend up the steep slope that forms the Bryant Mountain Ridge, southwest of the Energy Facility. No signs of recent movement were observed in the field or on air photos. The electric transmission line route was relocated around the ancient landslide.

The alignment would cross a cliff created by resistant basalt. The cliff is about 30 feet high and consists of columnar jointed basalt. The columns are wide and are up to about 8 feet in diameter. In addition, it is common for the columnar joints to be open by as much as several feet. This indicates that the columns are slowly toppling. Transmission towers would be located to span over this cliff area. The landslide and rock cliff are shown in Figure 3.2-1.

The electric transmission line easement would traverse several faults. The fault along the base of Bryant Mountain ridge would cross the easement on the far north end near the Energy Facility. At its southern end the transmission line would cross a mapped fault (Walker and MacLeod, 1991). This is a normal fault that is down-dropped to the northeast, similar to the Bryant Mountain ridge fault. It runs subparallel to the easement for a short distance. These faults are shown in Figure 3.2-1. There are undoubtedly other unmapped normal faults crossing the easement that have less obvious topographic expression.

Water Supply Pipeline Easement. The rock and soil units that would be along the water supply pipeline easement appear to be similar to the Energy Facility site composition. However, no subsurface information currently exists for the easement. Sloping and upland areas are underlain by basalt. Flat-lying basins with agricultural fields are likely underlain by volcaniclastic rock and volcanic ash. Shallow basalt bedrock occurs along about 50 percent of the easement. Shallow and deep soil both occur and are assumed to be similar to soil at the Energy Facility site.

The water supply pipeline easement would cross several unmapped normal faults. These faults trend northwest-southeast and are down-dropped on the northeast side similar to the Bryant Mountain ridge fault. The inferred fault traces are shown in Figure 3.2-1.

3.2.1.3 Soil

The near-surface soil at the Energy Facility site and vicinity was identified using the Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service) Soil Survey of Klamath County, Oregon, Southern Part (NRCS, 1985). The soil survey describes soil conditions in the upper 5 feet and classifies land capability. Figure 3.2-2 shows the NRCS soil map units for the vicinity.

A preliminary soil investigation and shallow groundwater assessment was conducted in December 2002. Soil borings were made at 15 locations to a depth of 48 inches, where borings were not otherwise restricted by shallow bedrock or hardpan. Figure 3.2-3 shows the field sampling locations. Soil properties recorded for each boring included texture, moisture, effervescence (using 10 percent hydrochloric acid), and presence of cementation, hardpan, bedrock, and redoximorphic features. At selected boring locations, composite soil samples were collected to establish background soil chemical characteristics. A summary table of soil properties is presented in Table 3.2-1.

Soil Units. Sixteen soil map units were identified within the Energy Facility site footprint and the natural gas pipeline, water supply pipeline, and electric transmission line easements. A breakdown of soil areas by Facility feature for permanent and temporary disturbance is presented in Tables 3.2-2 and 3.2-3, respectively. General soil descriptions are provided below.

6B Calimus fine sandy loam, 2 to 5 percent slopes. This well-drained soil can be found on terraces and alluvial fans near the edge of warmer basins. It formed in alluvial and lacustrine sediment weathered mainly from diatomite, tuff, and basalt. Permeability is moderate, runoff is slow and erosion hazard is slight. The soil is used for irrigated crops such as Irish potatoes, alfalfa hay, barley, wheat, oats, and pasture crops.

7 Calimus loam, 0 to 2 percent slopes. This well-drained soil can be found on terraces near the edge of warmer basins. It formed in loamy sediment weathered mainly from diatomite, tuff, and basalt. Permeability is moderate, runoff is very slow, and erosion hazard is slight. The soil is used for irrigated crops such as Irish potatoes, alfalfa hay, barley, wheat, oats, and pasture crops.

7B Calimus loam, 2 to 5 percent slopes. This well-drained soil can be found on terraces and alluvial fans near the edge of warmer basins. It formed in alluvial and lacustrine sediment weathered mainly from diatomite, tuff, and basalt. Permeability is moderate, runoff is slow, and erosion hazard is slight. The soil is used for irrigated crops such as Irish potatoes, alfalfa hay, barley, wheat, oats, and pasture crops.

7C Calimus loam, 5 to 15 percent slopes. This well-drained soil can be found on terraces and alluvial fans near the edge of warmer basins. It formed in alluvial and lacustrine sediment weathered mainly from diatomite, tuff, and basalt. Permeability is moderate, runoff is medium, and erosion hazard is moderate. The soil is used for irrigated crops such as alfalfa hay, barley, wheat, oats, and pasture crops.

9B Capona loam, 2 to 5 percent slopes. This well-drained soil can be found on terraces and rock benches near the edge of warmer basins. It formed in material weathered mainly from tuff, diatomite, and basalt. Permeability is moderate, runoff is medium, and erosion hazard is moderate. The soil is used for irrigated and dryland crops such as Irish potatoes, alfalfa hay, barley, wheat, oats, pasture crops, and dryland wheat. Bedrock is at a depth of 20 to 40 inches.

23B Harriman loam, 2 to 5 percent slopes. This well-drained soil can be found on terraces near the edge of warmer basins. It formed in lacustrine sediment weathered mainly from tuff, diatomite, and basalt. Permeability is moderately slow, runoff is slow, and erosion hazard is slight. The soil is mainly used for irrigated crops such as Irish potatoes, alfalfa hay, barley, wheat, oats, pasture, and cereal hay. Lacustrine bedrock is at a depth of 40 to 60 inches.

23C Harriman loam, 5 to 15 percent slopes. This well-drained soil can be found on terraces near the edge of warmer basins and below escarpments. It formed in lacustrine sediment weathered mainly from tuff, diatomite, and basalt. Permeability is moderately slow, runoff is medium, and erosion hazard is moderate. The soil is mainly used for irrigated and dryland crops such as alfalfa hay, barley, wheat, oats, pasture, and cereal hay. Lacustrine bedrock is at a depth of 40 to 60 inches.

26 Henley loam. This somewhat poorly drained soil can be found on low terraces. It formed in alluvial and lacustrine sediment. Zero to 2 percent slopes are most common. Permeability is moderate, runoff is very slow, and erosion hazard is slight. The soil is most commonly used for irrigated pasture. Where the soil has been drained and alkali has been removed, alfalfa hay, barley, wheat, oats, and cereal hay are grown. Hardpan is at a depth of 20 to 40 inches.

28 Henley-Laki loam. This somewhat poorly drained (Henley) to moderately well-drained (Laki) soil can be found on low terraces. It formed in mixed alluvial and lacustrine sediment. Zero to 2 percent slopes are common. Permeability is moderate, runoff is very slow, and erosion hazard is slight. The soil is used for irrigated crops such as pasture, alfalfa hay, barley, wheat, oats, and cereal hay. Hardpan is at a depth of 20 to 40 inches underneath the Henley soil.

38 Laki loam. This moderately well-drained soil can be found on low terraces. It formed in very deep alluvial and lacustrine sediment weathered from basalt, diatomite, tuff, and ash. Zero to 2 percent slopes are common. Permeability is moderate, runoff is very slow, and erosion hazard is slight. The soil is used for irrigated crops such as Irish potatoes, barley, wheat, oats, cereal hay, and pasture.

40 Laki-Henley loam. This moderately well-drained (Laki) to somewhat poorly drained (Henley) soil can be found on low terraces. It formed in alluvial and lacustrine sediment weathered from diatomite, tuff, basalt, and ash. Zero to 2 percent slopes are common. Permeability is moderate, runoff is very slow, and erosion hazard is slight. The soil is used for irrigated crops such as pasture, alfalfa hay, barley, wheat, oats, cereal hay, and Irish potatoes. Hardpan is at a depth of 20 to 40 inches.

50E Lorella very stony loam, 2 to 35 percent south slopes. This well-drained soil can be found on escarpments at the edge of warmer basins that mostly face south. It formed in very cobbly and gravelly material weathered from tuff and basalt. Permeability is slow, runoff is rapid, and erosion hazard is high. The soil is used for range and wildlife habitat. Tuffaceous bedrock is at a depth of 19 inches.

51E Lorella-Calimus association, steep north slopes. This well-drained soil can be found on escarpments at the edge of warmer basins that dominantly face north. It formed in very cobbly and gravelly material weathered from tuff and basalt. Permeability is slow (Lorella) to moderate (Calimus), runoff is rapid (Lorella) to medium (Calimus), and erosion hazard is high (Lorella) to moderate (Calimus). The soil is used for range and wildlife habitat. Tuffaceous bedrock is at a depth of 19 inches.

58B Modoc fine sandy loam, 2 to 5 percent slopes. This well-drained soil can be found on terraces near the edge of basins. It formed in lacustrine sediment weathered mainly from tuff, diatomite, basalt, and a small amount of ash. Permeability is moderately slow, runoff is slow, and erosion hazard is slight. The soil is mainly used for irrigated crops such as alfalfa hay, barley, wheat, oats, pasture, cereal hay, and Irish potatoes. An indurated hardpan is at a depth of 20 to 40 inches.

74B Stukel-Capona loam, 2 to 15 percent slopes. This well-drained soil can be found on rock benches around the edges of warmer basins. It formed in material weathered mainly from tuff and diatomite. Permeability is moderate, runoff is rapid (Stukel) to medium (Capona), and erosion hazard is high. The soil is mainly used for range and irrigated crops such as pasture, barley, wheat, oats, and cereal hay. Tuffaceous bedrock is at a depth of 17 inches (Stukel) and 25 inches (Capona).

74D Stukel-Capona loam, 15 to 25 percent slopes. This well-drained soil can be found on rock benches around the edges of warmer basins. It formed in material weathered mainly from tuff and diatomite. Permeability is moderate, runoff is rapid (Stukel) to medium (Capona), and erosion hazard is high. The soil is mainly used for range and wildlife habitat. Tuffaceous bedrock is at a depth of 17 inches (Stukel) and 25 inches (Capona).

Identification of Farmland Soil. Prime and unique farmlands are protected under the Federal Farmland Protection Act (FFPA) of 1984 (7 CFR Part 658.2). The FFPA recognizes that lands within the urban growth boundary (UGB) are committed to urban development, regardless of soil type. However, proposed projects outside the UGB are subject to evaluation by the Natural Resource Conservation Service (NRCS), formerly the Soil Conservation Service (SCS).

The following soil types encountered at the Energy Facility site are classified as prime farmland by the NRCS under certain conditions:

Class 1 Soil. No soil listed by the state of Oregon as Class 1, nonirrigated, high-value farmland soil for southern Klamath County (OAR 660-033-0020) would be permanently disturbed by construction of the Energy Facility site.

A total of 9.6 acres along the electric transmission line route is listed as prime or Class 1, nonirrigated, high-value soil for southern Klamath County (OAR 660-33-020). The soil type is 23B Harriman loam, 2 to 5 percent slopes.

Class 2 Soil. The following soil types listed by the state of Oregon as Class 2, nonirrigated, high-value farmland soil for southern Klamath County (OAR 660-33-020) can be found at the Energy Facility site and the electric transmission line:

- 6B Calimus fine sandy loam, 2 to 5 percent slopes
- 7A Calimus loam, 0 to 2 percent slopes
- 7B Calimus loam, 2 to 5 percent slopes

The NRCS identifies these soil types as prime farmland only if they are irrigated. A total of approximately 17.7 acres of these soil types fall within the Facility permanent disturbance areas. This number represents about 17 percent of the 108.7 acres of permanent disturbance during the 30-year operating life of the Energy Facility.

3.2.1.4 Seismicity

The following describes the faults present within 50- and 100-mile radii of the Energy Facility. Also described are the seismic forces at work within the project area.

Faults. Figure 3.2-1 shows inferred faults and landslides in the immediate vicinity of the proposed Energy Facility site, including one fault mapped by a CH2M HILL engineering geologist; the fault runs within a few hundred feet of the proposed Energy Facility. These faults have not previously been identified as having seismic activity and are not known to be active. One ancient landslide was observed in the vicinity of the proposed Energy Facility. The landslide shows no apparent signs of recent instability. Areas of shallow bedrock are not shown in Figure 3.2-1 because of the prevalence of shallow bedrock along the alignments. Although the faults could pose hazards, the risk to human safety and the destruction of property would be minimized through the design and construction of the Facility.

In addition to the inferred faults shown in Figure 3.2-1, faults within a 50-mile radius of the Energy Facility are summarized below. Only mapped faults are discussed. The assessment of activity is based on historical seismicity. If there is evidence for possible late Quaternary (less than 780,000 years) fault movement, the fault is considered potentially active and a probability of activity is assigned to it. Quaternary faults for which there is no evidence of displacement are not considered potentially active sources and the probability of activity is considered zero. Therefore, the lowest probability of activity is 0 and the highest probability of activity is 1.

The **West Klamath Lake Fault**, the **South Klamath Graben Zone** and the **East Klamath Graben Fault** are subdivisions of the **Klamath Graben**. The Klamath Graben is at the northwestern end of a set of complex northwest-trending horsts and grabens at the west edge of the Basin and Range structural province.

The **West Klamath Lake Fault** is located approximately 35 miles northwest of the site. It has a probability of activity of 1.0 and a total length of 40 miles.

The **South Klamath Graben Zone** has a probability of activity of 1.0 and a total length of 31 miles. It is approximately 17 miles west of the site.

The **East Klamath Graben Fault** has a probability of activity of 0.5. The total length of the fault is 12 miles. It is located approximately 42 miles north to northwest of the site.

The **Sky Lakes Fault** is a series of several 3- to 8-mile-long north-trending normal faults lying approximately 40 miles from the site. The probability of activity is 0.6. The total length of the feature is about 37 miles.

The **Mahogany Mountain Fault Zone** is a zone of northwest-trending normal faults along the northeast side of Butte Valley in north-central California near the Oregon border. The probability of activity of the Mahogany Mountain Fault Zone is 1.0 and the total length is about 17 miles. This fault zone lies approximately 30 miles southwest of the site.

The **Cedar Mountain Fault Zone** is a complex, 27-mile-long zone of north-trending normal faults in northern California near the Oregon border, approximately 23 miles southwest of the site. The probability of activity is 1.0.

The **Winter Ridge-Ana River-Slide Mountain Fault Zone** is a northwest-trending normal fault zone located about 50 miles northeast of the site. The probability of activity is 1.0. The total length of the fault zone is about 43 miles. Maximum rupture lengths considered are between 10 and 43 miles.

The **Goose Lake Graben** is a north-trending graben located along the Oregon-California border west of Warner Mountain, about 50 miles east of the site. The probability of activity is 0.8. Maximum rupture lengths of the normal fault considered are between 12 and 37 miles.

Faults within a 100-mile radius of the Energy Facility site are summarized below:

The **Southeast Newberry Zone/Crack-in-the-Ground Fault/Viewpoint Fault Zone** is a discontinuous northwest-trending fault zone located about 58 miles northwest of the site and mapped at about 40 miles in total length. Maximum rupture lengths are mapped between 16 and 25 miles. The probability of activity is 1.0.

The **Southwest Newberry Fault Zone** is an east- and west-facing group of normal faults located about 62 miles south of the Energy Facility site. The probability of activity is 0.8. A range of maximum surface rupture lengths of 6 to 16 miles is expected.

The **Chemult Graben (Western Margin)** is a discontinuous north- to northeast-trending normal fault zone located about 93 miles southwest of the site and mapped at about 34 miles in total length. Maximum rupture lengths are mapped between 19 and 34 miles. The probability of activity is 0.8.

The **Walker Rim Fault (Eastern Margin)** is located about 93 miles southwest of the site. Maximum rupture lengths are mapped between 14 and 37 miles. The probability of activity is 0.3.

The **Paulina Marsh Fault** is a northwest-trending strike slip fault located about 70 miles north of the site and mapped at about 7 miles in length. Maximum rupture lengths are expected to be between 6 and 19 miles. The probability of activity is 1.0.

The **Abert Rim Fault** is a north 15° east-trending normal fault located about 65 miles to the northeast of the site and mapped at about 30 miles in length. Maximum rupture lengths are expected to be 19 and 28 miles. The probability of activity is 1.0.

The **Surprise Valley Fault** is a normal fault located in the north-south bounded basin in northeastern California, approximately 67 miles to the southeast of the site. The fault has a mapped length of about 52 miles. Maximum rupture lengths are expected to be 19 and 52 miles. The probability of activity is 1.0.

The **Warner Valley Graben** is a predominantly normal-faulting graben that extends for a distance of more than 62 miles from northern California into southern Oregon. The fault along the eastern margin of the valley is divided into two faults sources, the East Warner Valley north and south. These faults are assigned a probability of activity of 0.5 and maximum rupture lengths between 12 and 37 miles. The fault along the western margin of the valley is characterized separately. It was assigned a probability of activity of 0.2 and maximum rupture lengths between 12 and 28 miles.

Seismic Hazard. The seismic hazard in the project area results from three seismic sources: interplate events, intraslab events, and crustal events (Geomatrix Consultants, 1995). Each of these sources has a different cause and therefore produces earthquakes with different characteristics (that is, peak ground accelerations, response spectra, and duration of strong shaking). Each source is capable of generating a peak ground acceleration (PGA) on rock at the site larger than 0.05g.

Two of the potential seismic sources, interplate and intraslab events, are related to the subduction of the Juan De Fuca plate beneath the North American plate. Interplate events occur as a result of movement at the interface of these two tectonic plates. Intraslab events originate within the subducting tectonic plate, away from its edges, when built-up stresses within the subducting plate are released. These source mechanisms are referred to as the Cascadia Subduction Zone (CSZ) source mechanism. The CSZ originates off the northern coast of California, extends along the coast of Oregon and Washington, and subducts beneath both states. The two source mechanisms associated with the CSZ are currently thought to be capable of producing moment magnitudes of about 9.0 and 7.5, respectively (Geomatrix Consultants, 1995). These moment magnitudes are the largest postulated magnitudes for the two source mechanisms. They are used as limiting values in the probabilistic model for estimating ground motions or as the source magnitude for deterministic estimates of ground motion. Interplate earthquakes are usually thrust events occurring on relatively shallow dipping faults at depths of less than about 30 miles (Geomatrix Consultants, 1995). Intraslab events are typically deeper, 25 to 45 miles, and have normal faulting mechanisms.

Earthquakes caused by movements along crustal faults, generally in the upper 10 to 15 miles, are the third source mechanism. In the vicinity of the Facility, these movements occur on the crust of the North America tectonic plate when built-up stresses near the surface are released. Several crustal faults are in the vicinity of the Energy Facility site. Faults within a 50-mile and 100-mile radius around the Facility are listed under Faults above

(Geomatrix Consultants, 1995). A magnitude 6.5 earthquake at the Klamath Graben fault zone near Klamath Falls and a magnitude 6.0 earthquake, randomly picked, 6 miles away from the Facility are considered appropriate to represent the maximum credible earthquake in the vicinity of the Facility. The selected magnitude of these events is equal to or greater than the magnitude of recorded events in southern Oregon.

Two earthquakes struck the Klamath Falls area in September 1993. Recorded magnitudes were 5.9 and 6.0. The 6.0 quake, located more than 67 miles away, was the most distant event to affect the proposed Energy Facility site.

3.2.2 Environmental Consequences and Mitigation Measures

As described below, the Energy Facility would have no significant unavoidable adverse impacts on geology, soil, or seismicity.

Impact 3.2.1. Landslides present a low risk to the proposed Energy Facility.

Assessment of Impact. One existing ancient mass landslide and one small toppling-type landslide were identified along the route of the electric transmission line during the site reconnaissance. The route has been modified to miss the ancient landslide based on visual observation and review of aerial photographs; the overall stability of the ancient landslide mass would be evaluated during the geotechnical investigation. Stability of the toppling landslide has already been evaluated and the transmission towers would be set back far enough from the top of the slope and the toe of the slope to avoid the unstable area.

Recommended Mitigation Measures. If upon further evaluation, the stability of the ancient landslide mass was found to be lacking, additional mitigation measures would be implemented, including further adjustment of the transmission tower locations and installation of instrumentation on the towers to monitor for movement.

Impact 3.2.2. The Energy Facility would have a low impact on land identified as high-value soil in Klamath County.

Assessment of Impact. The Energy Facility site would be located on a fallow field that was used for dryland grain farming until 1999, but the crop was not economical due to low productivity. The Energy Facility site has been heavily grazed and soil and vegetation productivity are low. Approximately 13.1 acres of high-value farmland soil would be permanently disturbed on the Energy Facility site.

Approximately 10.9 acres of the land within the natural gas pipeline construction easement is classified as high-value soil if irrigated. This soil would be temporarily disturbed during construction, and fully restored after pipeline installation. Because this soil is not irrigated in this location, it is not considered prime, high-value farmland soil.

Along the electric transmission line easement, 0.4 acre of land classified as high-value farmland if irrigated would be permanently disturbed. The soil along the electric transmission line easement would not be irrigated and thus is not considered prime, high-value farmland soil.

Class 1 Soil. No soil listed by the state of Oregon as Class 1, nonirrigated, high-value farmland soil for southern Klamath County (OAR 660-033-0020) would be permanently disturbed by construction of the Energy Facility site.

A total of 9.6 acres along the electric transmission line route is listed as prime or Class 1, nonirrigated, high-value soil for southern Klamath County (OAR 660-33-020). The soil type is 23B Harriman loam, 2 to 5 percent slopes.

Class 2 Soil. The following soil can be found at the Energy Facility site and the electric transmission line and is listed as Class 2, nonirrigated, high-value farmland soil for southern Klamath County (OAR 660-33-020):

- 6B Calimus fine sandy loam, 2 to 5 percent slopes
- 7A Calimus loam, 0 to 2 percent slopes
- 7B Calimus loam, 2 to 5 percent slopes

A total of approximately 23.7 acres of this soil falls within the Facility impact areas. This number represents about 23 percent of the 108.7 acres of permanent disturbance during the 30-year operating life of the Energy Facility.

A facility retirement and site restoration approach would support restoration of the Energy Facility site, to its current agricultural use. This is consistent with the current zoning of Exclusive Farm Use-Cropland (EFU-C). The approach uses topsoil salvaging and replacement, and standard farming practices.

Recommended Mitigation Measures. The following measures would be employed to minimize construction impacts on highly-valued soil and agricultural practices:

- Consult with landowners and farmers to address field access, revegetation, timing, and other sensitive cropping issues.
- Consult with landowners to identify the locations of drainage and irrigation systems.
- Flag tile and irrigation lines prior to construction.
- Maintain the flow of irrigation water during construction or coordinate a temporary shutoff with affected parties.
- Coordinate with farm operators to provide access for farm equipment to fields isolated by construction activities.
- The natural gas pipeline and water supply pipeline would be buried with 4 feet of topcover; the pipelines would be installed under drain tiles unless the drain tiles are located deep enough to allow the pipelines to be installed above the drain tile with at least 4 feet of topcover over the pipelines and, where feasible, a 12-inch clearance between the tile and the pipelines; where feasible and practicable, install the pipelines with greater than 4 feet of topcover where specifically requested by the landowner to allow for certain site-specific conditions or practices; and install plastic warning ribbon approximately 12 inches above the buried pipelines to provide a greater level of safety for potential future excavation activities.

- Follow an erosion and sediment control plan as part of NPDES General Construction Permit 1200-C; control the discharge from trench dewatering to avoid damaging adjacent agricultural land, crops, or drainage systems.
- Control dust emissions generated during construction, as necessary, by the control of vehicle speed, by wetting the construction area or by other means; and coordinate with farm operators to provide adequate dust control in areas where specialty crops are susceptible to damage from dust contamination.
- Identify potential noxious weed and soil-borne pathogen threats before construction and develop appropriate plans.
- Require contractors to thoroughly clean construction equipment prior to the moving into a new construction area or relocating from one construction area to another.
- Consult with the appropriate agencies to determine the location of noxious weeds.
- Make reasonable efforts to obtain straw bales for erosion control and straw for mulch that are free of noxious and nuisance weed contamination.
- Use Oregon-certified seed or equivalent for revegetation.
- Construct linear facilities adjacent to public rights-of-way and along property lines, and avoid bisecting fields.
- Where possible, strip and segregate topsoil from subsoil over the trench, from the trench spoil storage area and from areas subject to grading in agricultural lands; store topsoil immediately adjacent to the stripped area to the extent practical; replace the segregated topsoil after the trench is backfilled and the subsoil is restored to grade.
- Take suitable precautions to minimize the potential for oversize rock to be introduced into the topsoil and to become interspersed with soil that is placed back in the trench and remove excess surface rock from agricultural soil following construction activities.
- Locate temporary access roads used for construction purposes in coordination with the landowner and any tenants; attempting to identify existing farm lanes as preferred temporary access roads for construction; and designing and constructing temporary roads with proper drainage and to minimize soil erosion.
- Restrict the operation of vehicles and heavy equipment, or take other appropriate action, on excessively wet soil on the portion of the construction work area in agricultural land where the topsoil is not stripped and segregated so that deep rutting does not result in the mixing of topsoil and subsoil.

The following measures would be employed to mitigate temporary construction impacts on agricultural practices:

- Restore and return to agricultural use the areas temporarily impacted by construction.
- Deep root, invasive crops that can cause damage to the buried pipelines would be restricted within a 10-foot-wide area (centered over the centerline) directly over the pipelines.

- Restore drainage patterns to prevent ponding of water.
- Implement additional restoration efforts if visual crop deficiencies occur on the construction area.
- Inspect the construction areas for noxious weed infestations following construction and treat new infestations resulting from construction activities.
- Use appropriate tillage on compacted agricultural land to relieve soil compaction and follow tillage with revegetation of affected areas.
- Repair or replace damaged irrigation lines or drainage tiles.

Impact 3.2.3. Limited erosion would occur during construction with the implementation of BMPs.

Assessment of Impact. Generally, construction activities introduce the potential for increased erosion; however, the implementation of BMPs through the proposed project's erosion and sediment control plan, regulated under NPDES General Construction Permit 1200-C, would be employed to minimize soil loss. Construction activities would disturb vegetation in some areas; however, following construction, revegetation of disturbed areas would be completed in conformance with a revegetation plan.

The natural gas pipeline would parallel county roads to minimize traffic disturbance during construction. Lands temporarily affected by the natural gas pipeline construction would include irrigated and nonirrigated cropland and rangeland. Some soil and vegetation disturbance within the 80-foot construction easement would be required for equipment access, excavation, soil stockpiling, and laydown areas. Additional temporary work space of 40 feet (for a total of 120 feet) would be required along the north side of West Langell Valley Road near the Energy Facility site, where the natural gas pipeline route goes through an approximate 2,200-foot section of steep topography. The extra width is needed for soil storage when leveling the easement to create a safe working platform for workers and equipment.

Soil removed from the excavations would be temporarily stockpiled within the construction easement and would be exposed to wind and water erosion during construction. Dust and erosion control mitigation measures would be used. Following pipeline installation, trenches would be backfilled with native soil to the surface and revegetated according to the project's revegetation plan.

The proposed electric transmission line would require the construction of approximately 38 transmission towers and a gravel surfaced access road for travel by wheeled vehicles during construction and to access the new transmission line for maintenance during operation. Grading would occur as needed within the easement to construct the footings and foundations of the transmission towers and to construct the 14- to 16-foot-wide access road. Prior to grading for these features, trees, brush, stumps, and snags would be removed, including root systems. During construction, staging areas would be needed for storage. During construction, dust and erosion control mitigation measures would be employed. Culverts would be installed where the access road crosses an intermittent creek to facilitate flow of stormwater or snow melt runoff and to minimize erosion.

The water supply pipeline would cross irrigated and nonirrigated land used for crop production and rangelands. The total width of temporary construction easement would be 60 feet. Surface vegetation within the temporary construction easement would be temporarily impacted. A portion of the water supply pipeline would follow an existing unimproved road in order to minimize disturbances to agricultural soil. During construction, dust and erosion control mitigation measures would be employed. The water supply pipeline would be placed under the three identified agricultural canals using conventional bore construction techniques. After construction, the temporary disturbed areas would be revegetated in accordance with the Facility revegetation plan.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.2.4. Soil erosion during operation of the Facility would be limited by stormwater control features, implementation of BMPs, and an erosion and sediment control plan.

Assessment of Impact. Operations activities would be limited to those areas directly related to the Facility (i.e., access roads, the Energy Facility site). Some stormwater would be shed from paved and gravel surfaces and structures during periods of precipitation. Drainage collection procedures would be used to capture and route this runoff to a stormwater pond and an infiltration basin. Quarry stone or other similar materials would be used in onsite drainage ditches leading to the stormwater pond to reduce the potential for soil erosion.

During operations, gravel access roads along electric transmission line would be used for maintenance and repairs. Gravel roads and associated stormwater control features would be maintained so road surfaces do not create soil erosion and sediment transport. Heavy equipment used for vegetation control under the electric transmission line would be restricted to the access roads and transmission tower sites where possible.

If the alternative of stormwater disposal into the West Langell Valley Road side ditch is selected, NPDES General Stormwater Permit 1200-Z and an erosion and sediment control plan would specify BMPs to use.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.2.5. The risk to human safety and harm to physical property as a result of seismic hazard would be minimal at the Energy Facility.

Assessment of Impact. The Energy Facility would be located in an area subject to earthquakes. The Energy Facility would be designed to sustain no permanent structural damage under ground-shaking conditions. By limiting structural damage through design and engineering, the risk to human safety would be minimal. Based on the analysis contained in the SCA, and subject to verification of assumptions through further geotechnical work, the Energy Facility and related pipelines and electric transmission line could be designed, engineered, and constructed without danger to human safety arising from seismic events. The *Preliminary Geotechnical Engineering Report* indicates that Uniform Building Code design parameters for seismic design address peak ground acceleration greater than that likely at the Energy Facility (GeoEngineers, 2002). (USGS earthquake hazards data indicate that there is a 10 percent chance of exceeding a PGA of 0.17g in

50 years in the site area.) Furthermore, based on the relative density of the onsite soil and current accepted analyses, there is low potential for liquefaction at the site. Consequently, lateral spread is not considered to be a hazard.

Buried pipelines with welded joints have low vulnerability to ground shaking that does not cause permanent deformations. Such permanent deformations would occur only from actual fault displacement along the pipelines or substantial soil movement resulting from seismically induced liquefaction, lateral spreading, subsidence, or landslides. Based on expected soil and rock responses at the Facility, no movements sufficient to damage the buried pipelines would be likely.

Liquefaction refers to the loss of shear strength that saturated soil deposits can experience during undrained cyclic loading, such as earthquake loading. The susceptibility of a soil deposit to liquefaction is a function of the degree of saturation, soil grain size, relative density, percent fines, age of deposit, plasticity of fines, earthquake ground motion characteristics, and several other factors. Based on the relative density of the onsite soil at the Energy Facility site, the potential for liquefaction at the site would be low.

The probability of fault displacement within the Facility would be low for faults that are mapped and identified as active. The closest known active faults are 15 miles to the southwest, 5 miles to the north, and 10 miles to the east of the Energy Facility site (Geomatrix Consultants, 1995). Fault displacement from the fault adjacent to the Facility may be as great as 4 inches. Pipelines and electric transmission lines that cross the fault could be designed for this level of displacement, if this fault is determined to be active.

The Oregon Structural Specialty Code (OSSC) uses the UBC, 1997 edition, with current amendments by the state of Oregon and local agencies. The Energy Facility would be designed to meet or exceed the minimum standards in UBC chapter 16, divisions IV and V, Earthquake Design and Soil Profile Types, respectively, with slight modifications by the current amendments of the state of Oregon and local agencies. The Facility could be designed to the OSSC so that no damage would occur during the design earthquake.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.2.6. Process wastewater management alternative by beneficial use of the water for irrigated pasture.

Assessment of Impact. Agricultural soil would not be adversely impacted by the land application of process wastewater. The process wastewater would be applied to the pasture at agronomic rates during the irrigation season and at an instantaneous application rate less than the infiltration rate of the soil. Irrigation would not be conducted during periods of frozen or saturated soil to prevent erosion and generation of surface runoff. The process wastewater quality would generally be of equal or better quality than the shallow groundwater and Lost River water used for irrigation to lands around the beneficial use area. Fertilization would be conducted according to Oregon State University fertilization guidelines and typical pasture management activities would be conducted as described in Amendment No. 2 to the SCA, Attachment I-2 (*COB Energy Facility Land Application Plan*).

The high-quality process wastewater would be applied at rates preventing buildup of applied water constituents to harmful levels. With irrigation to full crop water requirements and the natural winter precipitation-driven leaching, a suitable leaching fraction would be provided. At 28.6 inches of irrigation and 6.7 inches of deep percolation, the annual leaching fraction is 23 percent. With this leaching fraction and the estimated process wastewater electrical conductivity (EC) of 0.32 deciSiemens per meter (dS/m), the maximum increase in EC of the soil saturation paste extract (EC_e) at the bottom of the root zone is estimated at 0.7 dS/m. The average root zone EC_e increase would be about 0.33 dS/m. The background EC_e of Calimus soil types from samples collected at the Energy Facility site by CH2M HILL in November 2002 was 0.25 dS/m (0 to 20 inches depth). Even the most salt sensitive of pasture grasses are not negatively affected by soil salinity until the average root zone EC_e is increased to above 1.5 dS/m (Ayars and Westcot, 1989). Under the condition of partial irrigation, where the leaching fraction has been reduced by curtailing late season irrigation, the soil salinity would increase slightly. At 14.3 inches of irrigation and 1.9 inches of deep percolation, the annual leaching fraction would be reduced to about 13 percent and the maximum increase in EC_e at the bottom of the root zone would be 1.2 dS/m. The average root zone EC^e increase would be about 0.59 dS/m. Using a threshold EC_e of 1.5 dS/m and a background EC_e of 0.25 dS/m, the minimum leaching requirement necessary to keep the average root zone EC_e below the threshold EC_e is about 5 percent. All water balance scenarios meet this minimum condition.

The sodium hazard of the irrigation water, which influences soil infiltration, and as indicated by the sodium adsorption ratio (SAR) and EC, is considered slight to moderate. The EC and SAR of the process wastewater are virtually identical to the EC_e and SAR of the Calimus soil types onsite as determined on samples collected at the Energy Facility site by CH2M HILL in November 2002. The Calimus soil EC_e and SAR were 0.25 dS/m and 0.8 respectively, compared to the process wastewater EC and SAR of 0.32 dS/m and 0.8. Given these results, the sodium hazard of the process wastewater is lower than that of the pore water in the Calimus soil and no changes to sodium hazard of the site soil are anticipated.

Restrictions on use of the process wastewater were evaluated against standard irrigation water quality criteria (Table 3.2-4). Process wastewater sodium, chloride, boron, EC, and TDS were all within the range of concentrations under which no restriction is placed on irrigation uses (Ayars and Westcot, 1989). In addition, sulfate concentrations of 6.29 mg/L or 0.13 milliequivalents per liter (m_{eq}/L) are low enough that excess gypsum formation would not be a concern. At the projected irrigation rates, 41 lbs/ac of sulfate would be applied annually. The OSU pasture fertilizer guide recommends application of 20 to 30 lbs/ac of sulfur per year, which equates to 60 to 90 lb/ac of sulfate per year. No additional sulfur fertilizer would be applied to the site and low sulfur analysis fertilizer for addition of nitrogen, phosphorous, and potassium would be used. A specific fertility management program would be outlined in the irrigation management plan submitted to ODEQ prior to irrigation of process wastewater.

<u>Recommended Mitigation Measures</u>. No mitigation measures are recommended.

3.2.3 Cumulative Impacts

The proposed Energy Facility would result in the permanent disturbance of 108.7 acres of land during its 30-year operating life. Of this total, approximately 13.1 acres of high-value soil would be permanently disturbed. Table 3.2-2 shows the permanent impact in acres by soil type.

Cumulative impacts to soil can result from past, present, and reasonably foreseeable actions such as cultivation, livestock grazing, and urban and industrial development. Operation of the proposed Energy Facility would not contribute to cumulative impacts to seismicity or other geologic conditions or hazards. Because of increased impervious surfaces resulting from conversion of the land to industrial use, operation of the proposed Energy Facility would result in a minor loss of soil productivity. There are no other known or proposed industrial facilities in the vicinity of the project so no cumulative impacts are anticipated.

Another potential impact to the soil resource is erosion by wind or water. Stormwater and wastewater would be managed for beneficial use, either as irrigated pasture or groundwater recharge (infiltration basin). Therefore, erosion caused by wind and water from the Energy Facility would have minor or no cumulative impacts. The following mitigation actions would be implemented to minimize potential cumulative impacts:

- Prior to construction, an erosion control plan and measures would be implemented to minimize water and wind erosion.
- During Energy Facility operation, stormwater would be strictly controlled and managed onsite.
- Permeable surfaces or exposed soil at the operational Facility would be landscaped and planted to minimize wind erosion.
- Land application would minimize soil erosion by applying the wastewater through a sprinkler system in agronomic-controlled rates.

TABLE 3.2-1
Summary of Soil Properties by Sampling Location

Sample Location	Soil Map Unit	Depth to Bedrock (inches)	Depth to Hardpan (inches)	Zone of Induration (inches)[a]	ECe (dS/m)[b]	SAR [b]	ESP[b]	Fluoride (mg/kg)[b]
20	50E	9	-	-	0.3	0.5	<0.1	< 0.1
21	50E	13	-	-	-	-	-	-
22	50E	11	-	-	0.2	0.3	<0.1	-
23	50E	11	-	-	0.4	1.2	0.4	-
24	7C	35	-	-	0.3	0.7	<0.1	-
25	40	22	-	-	-	-	-	-
26	40	>48	-	-	0.3	0.6	<0.1	< 0.1
27	40	-	32	29-32	0.8	7.5	8.9	-
28	40	>48	-	37-48	-	-	-	-
29	40	>48	-	38-48	0.4	1.1	0.3	-
30	40	>48	-	-	-	-	-	-
31	40	46	-	-	-	-	-	-
32[c]	7A	-	-	-	0.3	0.8	<0.1	< 0.1
33[c]	7A	-	-	-	0.2	0.8	<0.1	-
34	40	-	16	-	-	-	-	-
35	40	>48	-	33-48	-	-	-	-
36	40	-	25	9-25	-	-	-	-

[a] Induration is the cementation of soil particles by humus, carbonates, or oxides of silica, iron, or aluminum resulting in a hard and brittle soil consistence. Due to the effervescence of indurated materials at this site when applying 10% hydrochloric acid, it was determined that the cementing agent was in fact a carbonate material.

[b] Composite samples were collected from a 0-20” depth except at locations 20, 22, and 23 where sample depth was limited by the depth of bedrock.

[c] Samples were collected for soil analysis but no profile descriptions were made.

Soil map units referred to include:

7A Calimus loam, 0 to 2 percent slopes
7C Calimus loam, 2 to 5 percent slopes
40 Laki-Henley loams
50E Lorella very stony loam, 2 to 35 percent south slopes

TABLE 3.2-2
Soil Area by Facility Feature—Permanent Disturbance During the 30-Year Operating Life of the Energy Facility (in Acres)

Symbol	Map Unit Name	Energy Facility Site	Water Supply Well System	Water Supply Pipeline	Natural Gas Pipeline	Electric Transmission Line	Irrigated Pasture Access Road	Total Facility
6B	CALIMUS FINE SANDY LOAM, 2 TO 5 PERCENT SLOPES					4.1		4.1
7A	CALIMUS LOAM, 0 TO 2 PERCENT SLOPES	17.7					0.4	18.1
7B	CALIMUS LOAM, 2 TO 5 PERCENT SLOPES	4.7				1.9		5.4
7C	CALIMUS LOAM, 5 TO 15 PERCENT SLOPES	2.9				5.3		8.2
9B	CAPONA LOAM, 2 TO 5 PERCENT SLOPES							0.0
23B	HARRIMAN LOAM, 2 TO 5 PERCENT SLOPES					8.3		8.3
23C	HARRIMAN LOAM, 5 TO 15 PERCENT SLOPES					5.3		5.3
26	HENLEY LOAM							0.0
28	HENLEY-LAKI LOAMS							0.0
38	LAKI LOAM							0.0
40	LAKI-HENLEY LOAMS	18.9				1.3		20.2
50E	LORELLA VERY STONY LOAM, 2 TO 35 PERCENT SOUTH SLOPES	6.4	0.3			26.4		33.1
51E	LORELLA-CALIMUS ASSOCIATION, STEEP NORTH SLOPES					4.5	0.1	4.6
58B	MODOC FINE SANDY LOAM, 2 TO 5 PERCENT SLOPES					0.2		0.2
74B	STUKEL-CAPONA LOAMS, 2 TO 15 PERCENT SLOPES							0.0
74D	STUKEL-CAPONA LOAMS, 15 TO 25 PERCENT SLOPES							0.0
	TOTALS	**50.6**	**0.3**	**0.0**	**0.0**	**57.3**	**0.5**	**108.7**

TABLE 3.2-3
Soil Area by Facility Feature—Incremental Temporary Disturbance (in Acres)

Symbol	Map Unit Name	Energy Facility	Construction Parking and Laydown	Subtotal: Energy Facility Site	Water Supply Well System	Water Supply Pipeline	Natural Gas Pipeline	Electric Transmission Line	Irrigated Pasture Access Road and Pipeline	Total Facility
6B	CALIMUS FINE SANDY LOAM, 2 TO 5 PERCENT SLOPES			0.0		0.3		4.8		5.1
7A	CALIMUS LOAM, 0 TO 2 PERCENT SLOPES	17.7	9.7	27.4		0.4	2.9		0.7	31.4
7B	CALIMUS LOAM, 2 TO 5 PERCENT SLOPES	4.7	15.6	20.3		1.1	6.1	1.9	4.3	33.7
7C	CALIMUS LOAM, 5 TO 15 PERCENT SLOPES	2.9		2.9		0.8		5.5		9.2
9B	CAPONA LOAM, 2 TO 5 PERCENT SLOPES			0.0			3.4			3.4
23B	HARRIMAN LOAM, 2 TO 5 PERCENT SLOPES			0.0				9.6		9.6
23C	HARRIMAN LOAM, 5 TO 15 PERCENT SLOPES			0.0				5.6		5.6
26	HENLEY LOAM			0.0			5.9			5.9
28	HENLEY-LAKI LOAMS			0.0					0.6	0.6
38	LAKI LOAM			0.0		0.6				0.6
40	LAKI-HENLEY LOAMS	18.9	17.1	36.0		2.2	0.5	1.6		40.3
50E	LORELLA VERY STONY LOAM, 2 TO 35 PERCENT SOUTH SLOPES	6.4	26.6	35.0	1.3	5.4	15.6	30.9		88.2
51E	LORELLA-CALIMUS ASSOCIATION, STEEP NORTH SLOPES			0.0		5.7		4.7	0.1	10.5
58B	MODOC FINE SANDY LOAM, 2 TO 5 PERCENT SLOPES			0.0				0.3		0.3
74B	STUKEL-CAPONA LOAMS, 2 TO 15 PERCENT SLOPES			0.0		2.9	8.1			11.0
74D	STUKEL-CAPONA LOAMS, 15 TO 25 PERCENT SLOPES			0.0			1.3			1.3
	TOTALS	**50.6**	**71.0**	**121.6**	**1.3**	**19.4**	**43.8**	**64.9**	**5.7**	**256.7**

TABLE 3.2-4
Irrigation Water Quality Criteria

Parameter	Units	Process Water Concentration	Ceiling Concentration for No Restriction on Irrigation Use
Sodium (sprinkler irrigation)	m_{eq}/L	0.88	3
Chloride (sprinkler irrigation)	m_{eq}/L	0.12	3
Boron	mg/L	0.54	0.7
EC	dS/m	0.32	0.7
TDS	mg/L	203	450

ds/m = deciSiemens per meter
EC = electrical conductivity
m_{eq}/L = milliequivalents per liter
mg/L = milligrams per liter
TDS = total dissolved solids

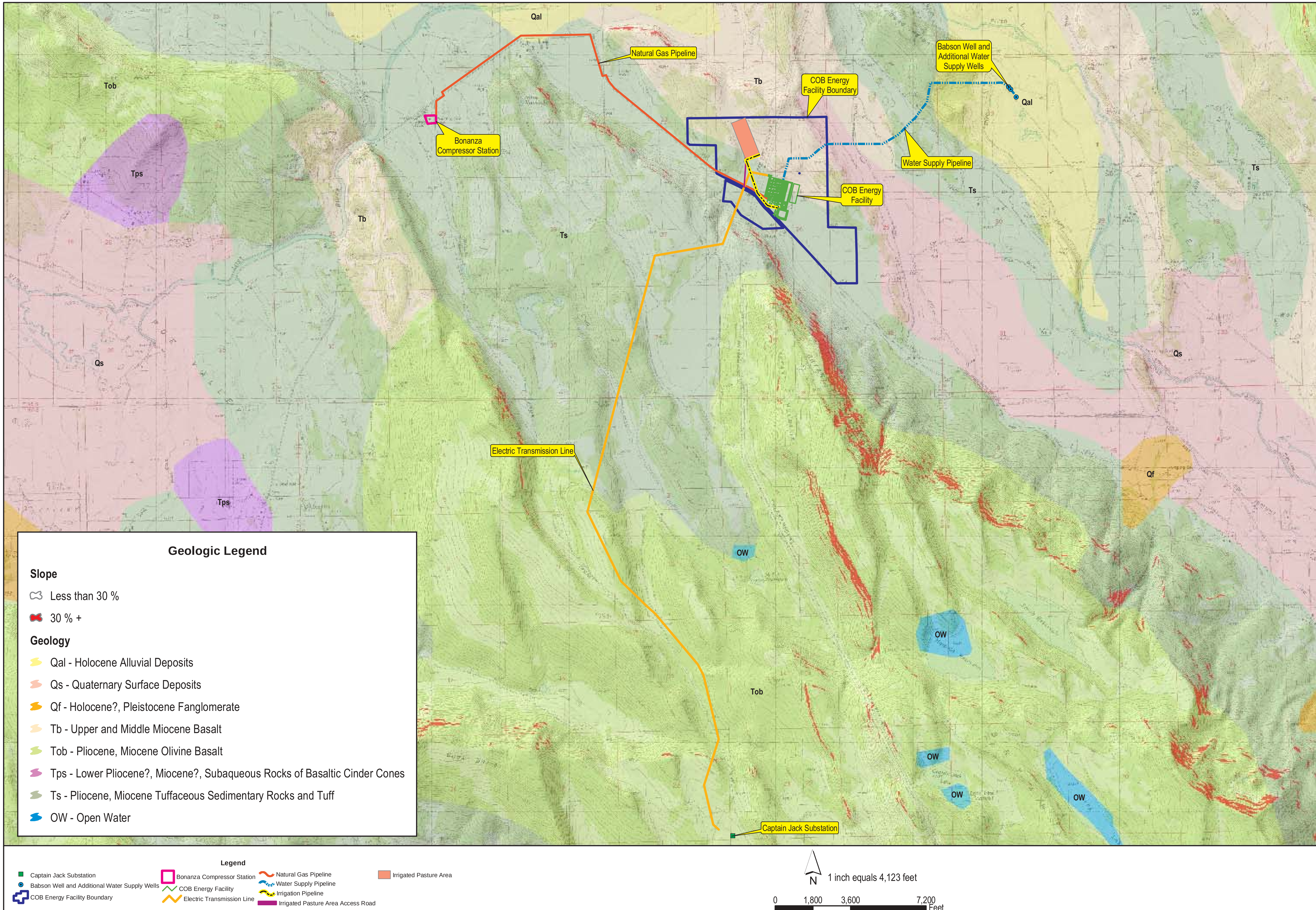


Figure 3.2-1
Geologic Hazards
COB Energy Facility
Bonanza, OR

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.2-1_geologic-hazards.mxd, Date: October 27, 2003 4:27:05 PM

Figure 3.2-1
11 x 17
Color
Back

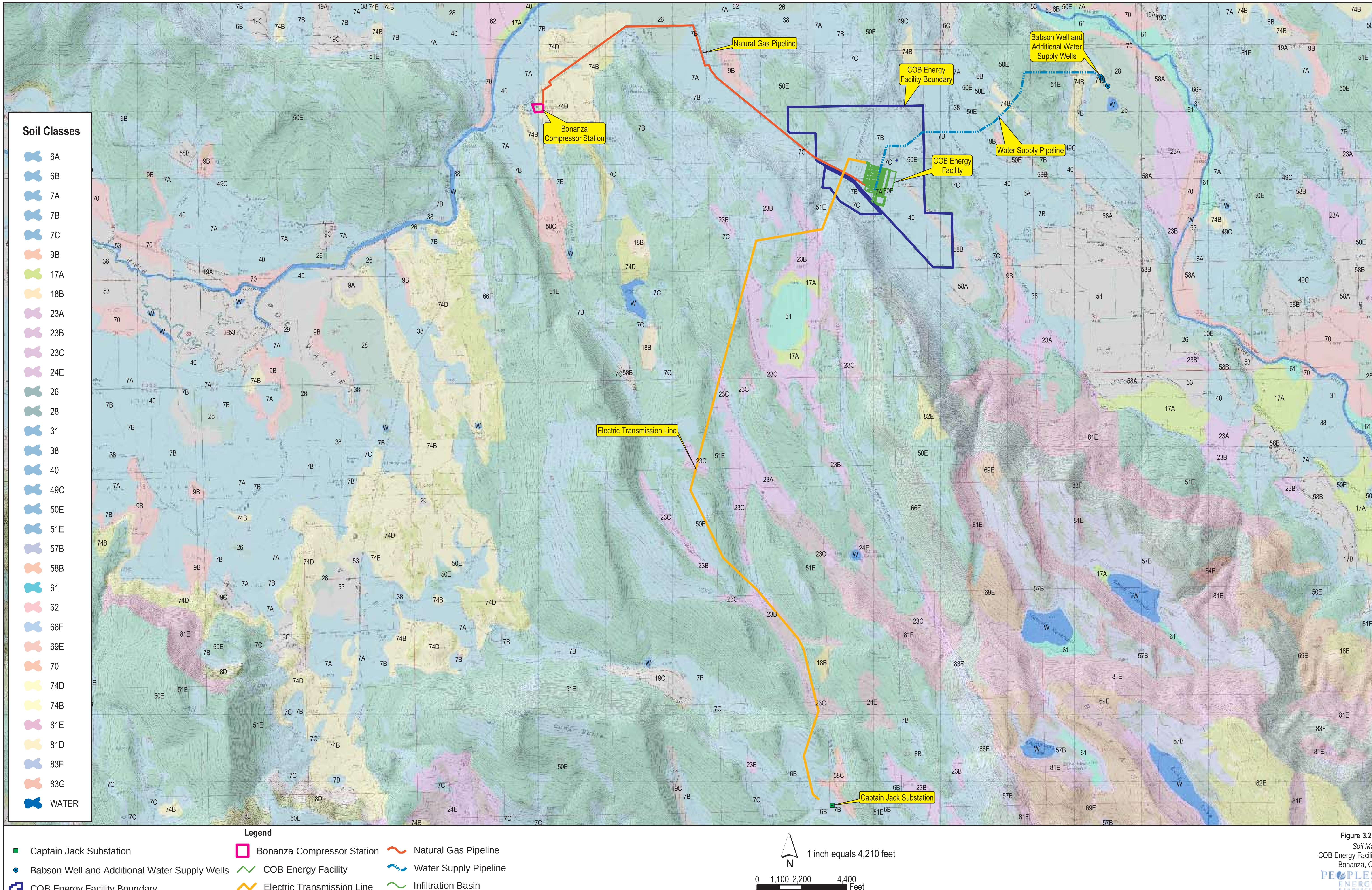
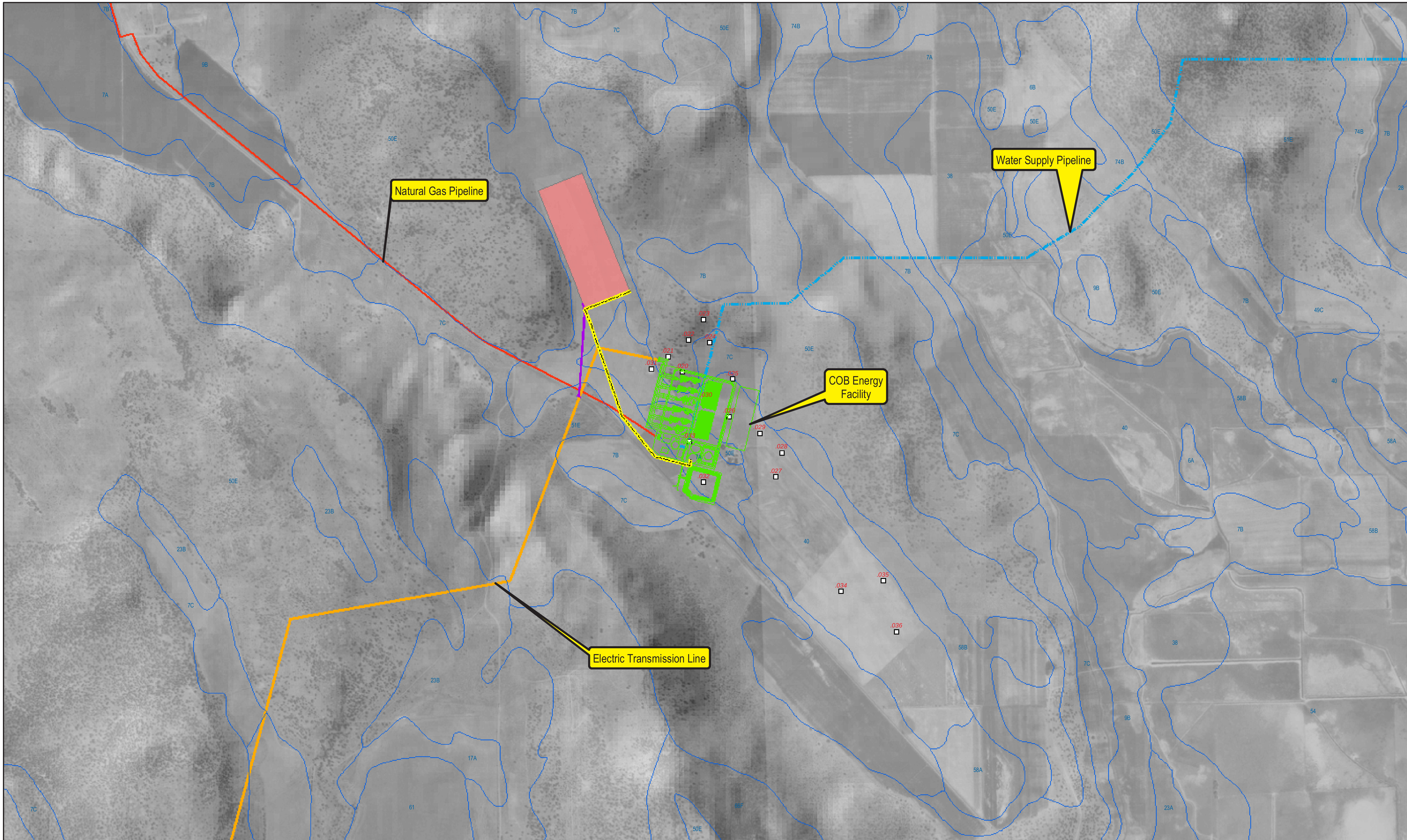


Figure 3.2-2
Soil Map
COB Energy Facility
Bonanza, OR

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.2-2_soils.mxd, Date: October 27, 2003 4:28:59 PM

Figure 3.2-2
11 x 17
Color
Back



Legend

- Field Sampling Locations
- COB Energy Facility
- Electric Transmission Line
- Natural Gas Pipeline
- Water Supply Pipeline
- Irrigation Pipeline
- Irrigated Pasture Area Access Road
- Irrigated Pasture Area

N

1 inch equals 1,299 feet

0 550 1,100 2,200 Feet

Figure 3.2-3

Soil Investigation Sample Locations

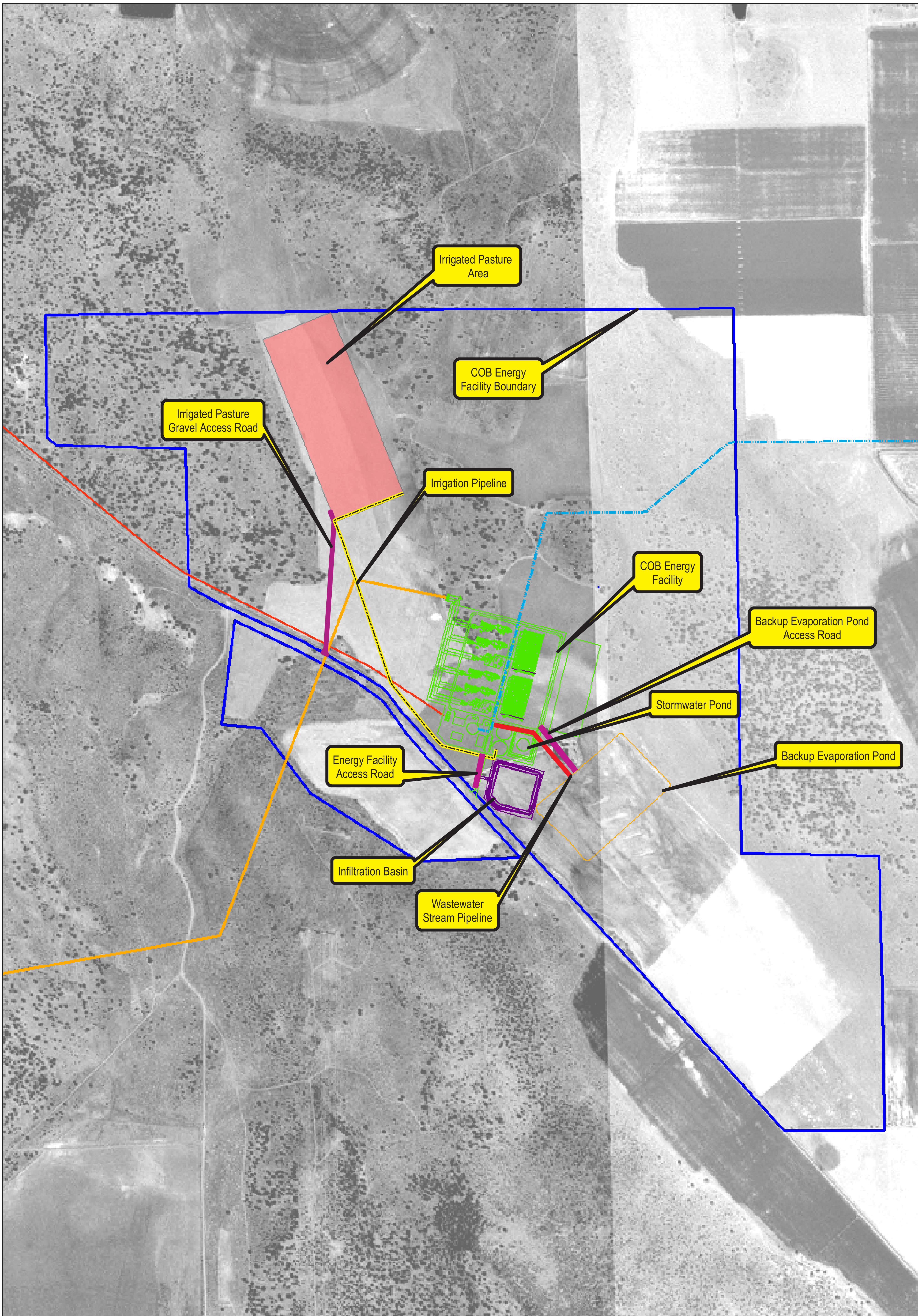
COB Energy Facility

Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.2-1_soil-investigation.mxd, Date: October 27, 2003 4:32:53 PM

Figure 3.2-3
11 x 17
Back



Legend

- COB Energy Facility
- Natural Gas Pipeline
- Water Supply Pipeline
- Wastewater Stream Pipeline
- Irrigation Pipeline
- Backup Evaporation Pond
- Infiltration Basin
- Access Roads
- Electric Transmission Line
- COB Energy Facility Boundary
- Irrigated Pasture Area

N

1 inch equals 850 feet

0 250 500 1,000 1,500 Feet

Figure 3.2-4

Energy Facility Site Layout

COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: P:\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.2-4_Facility_Layout.mxd, Date: October 27, 2003 4:46:43 PM

Figure 3.2-4
11 x 17
Back

3.3 Hydrology and Water Quality

The only perennial surface water body in the Facility vicinity is the Lost River. Intermittent seasonal drainages also exist within the area. Several irrigation canals facilitate seasonal surface drainage and water transport for agricultural crops and pasture lands in the basin areas. In addition, shallow and deep aquifers underlie the area. Construction and operation of the proposed Facility would utilize water from the deep basalt aquifer, which test data suggests is not hydraulically connected to the shallow aquifer or surface water features in the project vicinity. The Facility would reconfigure the Babson well so that it draws water only from the deep system. The Babson well is the only known well to intersect the deep aquifer system in the project area. There would be no discharge of wastewater to surface or groundwater.

Process wastewater from the Energy Facility would be managed by one of three alternatives:

- Beneficial use of the water for irrigated pasture
- Evaporation in an onsite, lined evaporation pond
- Temporary storage onsite and hauling to a WWTP for offsite disposal

Sanitary wastewater during operations would be treated and managed using an onsite septic drainfield. During construction, Portable toilets would be provided for onsite sewage handling during construction and would be pumped and cleaned regularly by a licensed contractor.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with the EFSC on July 25, 2003, and October 15, 2003, respectively.

3.3.1 Affected Environment

The analysis area[12] is located within the Klamath Ecological Province (East Cascades Ecoregion), on the eastern side of the Cascade Mountains. This region is characterized by large basins surrounded by ancient lake terraces and basaltic fault block mountains. Elevations range from around 4,000 to 8,400 feet. The soil in the area is derived from basaltic parent material and generally have loamy surface horizons overlaying loamy to clayey subsurface horizons. A silica cemented hardpan occurs at depths of around 3 feet in many of the ancient dry lakebeds in the area (Anderson et al., 1998; Franklin and Dyrness, 1988).

The climate is characterized by warm, dry summers and cool, moist winters. The average annual precipitation in Klamath County is 14 inches, of which only 27 percent occurs during the growing season. The average winter temperatures range between 16.4°F and 37.8°F, and the average summer temperatures range between 39°F and 71°F (Anderson et al., 1998).

[12] Analysis area as described in this section consists of the survey area of the Energy Facility site and a quarter mile on either side of the centerline of the linear features.

3.3.1.1 Surface Water

No surface water bodies are located on the Energy Facility site. The access road for electric transmission would cross three seasonal creeks. Regional and local hydrologic features are described below. As described in Section 3.3.1.2, the area's deep aquifer system is isolated from surface water in the vicinity of the proposed project.

Hydrology. The Facility site lies within the Klamath River Basin. By geographic definition, the Klamath Basin is the area drained by the Klamath River and its tributaries. As the Klamath is one of only three rivers that pierce both the Cascades and the Coastal mountain ranges before emptying into the Pacific Ocean, the entire Basin is an area encompassing portions of south-central Oregon and northern California—an area roughly twice the size of Massachusetts. In Oregon, the Klamath Basin occupies more than 5,600 square miles and covers almost all of Klamath County and smaller portions of Jackson and Lake Counties to the west and east. At the California-Oregon border, the Klamath River Canyon marks the Basin's low point and at an elevation of 2,755 feet, is its drain point. Water bodies within the Klamath Basin are overappropriated, and the state of Oregon is currently adjudicating Klamath River Basin water rights for those with claims dating prior to 1909.

Lost River. The Lost River watershed is a closed, interior basin covering approximately 3,000 square miles of the Klamath River watershed in southern Oregon and Northern California. The headwaters originate east of the Clear Lake Reservoir in Modoc County, California, and flow approximately 75 miles to the Tulelake Sump. Seasonal flows in the Lost River are controlled by releases from the Clear Lake Dam. Historical channel modification, water diversion, and wetland drainage associated with the U.S. Bureau of Reclamation's Klamath Project have resulted in a highly altered system. Water from the Lost River is currently used for domestic and industrial water supply, irrigation, and livestock. The Lost River is the only fish-bearing perennial habitat in proximity to the analysis area. The closest section of the Lost River is approximately 2 miles north of to the Energy Facility site. The Lost River is approximately 0.4 miles north and east of the Babson well.

Intermittent Creeks. Several intermittent creeks were observed in the analysis area during field surveys. These creeks were dry at the time of the surveys, but had defined bed and bank features. Most of the drainages either lacked vegetation or contained only sparse upland vegetation within the channel. The habitat values of these creeks are discussed in more detail in Section 3.5, Fish.

Irrigation Canals. Several irrigation canals have been excavated to facilitate surface drainage and water transport for agricultural crops and pasture lands in the basin areas. These channels appear to be routinely maintained and were largely devoid of vegetation.

Surface Water Quality. ODEQ is required by Section 303(d) of the Clean Water Act to identify water bodies that do not meet standards for conditions such as temperature, pH, or toxics. The standards set by ODEQ are designed to protect beneficial water uses like drinking, agricultural use, recreation, industrial water supply, and cold water fisheries. The Klamath Basin has portions of 46 different rivers and lakes which, for one reason or another, have failed to meet these standards. While the area's high summer temperatures account for many of the listings, water bodies such as the Klamath and Lost Rivers fail several different standards, some of which persist throughout the year.

3.3.1.2 Groundwater

Hydrology. Subsurface hydrology in the analysis area is characterized by a shallow aquifer system and a deep aquifer system. The deep aquifer system is overlain by approximately 1,100 feet of volcanic rock that confines the deeper aquifer system (below 1,500 feet). Above the 1,100 feet of volcanic rock that separates the deep aquifer system, lies approximately 500 feet of permeable rock that constitutes the upper (shallow) aquifer, a heavily appropriated basalt aquifer that is in varying degrees of hydraulic connection with the Lost River. The shallow aquifer system is used for irrigation, stock watering, and domestic water supply. The project proponent would not use water from the shallow aquifer system.

The sole source of water for construction and operation of the Energy Facility would be groundwater from the deep aquifer system intercepted by an existing well known as the Babson well. No other Langell Valley area wells or water rights in the deep aquifer system are known to exist. The Babson well is located approximately 2 to 3 miles east of the Energy Facility, and is reported to have been originally drilled to depths exceeding 5,000 feet for oil and gas exploration in the 1920s, and currently has partial obstructions at depths of 1,870 and 2,050 feet. Previous borehole geophysics and aquifer testing at the Babson well (CH2M HILL , 1994) indicated the presence of two separate aquifer systems within the upper 2,050 feet of the borehole. The deep water-bearing zones that are present below a depth of 1,500 feet would be the sole supply water for the Energy Facility.

Because of this lack of other deep wells to provide information, the areal extent, recharge area, and recharge rate of the deep aquifer system are not well known. Accordingly, an assessment of the likely recharge area was performed (CH2M HILL, 2002a). The assessment concluded that the recharge area probably is higher in altitude and located about 20 to 50 miles to the east and north of the Babson well. It also concluded that the recharge area likely is regional in scope, with a minimum size of approximately 1,100 square miles. Based on these conclusions, and using local precipitation figures and the most likely range of known aquifer recharge rates in central Oregon, it is conservatively estimated (i.e. a minimum estimate) that the deep aquifer's annual recharge volume is between 134 billion and 241 billion gallons. Table 3.3-1 provides a summary of the annual recharge volume calculations.

An intensive 30-day aquifer test in 1993 at the Babson well (CH2M HILL , 1994) suggested that the deep groundwater-bearing zones below 1,580 feet are hydraulically isolated from the shallow aquifer system and surface water in the vicinity of the Energy Facility. For the test, the deep aquifer at the Babson well was pumped at a rate of 3,260 gpm for 30 days while water levels were monitored at 23 different locations within approximately 4 miles of the Babson well. Because no other wells are known to be completed in the deep aquifer within the project area, the monitoring locations consisted of numerous wells completed in the shallow aquifer system, two staff gauges along the Lost River, the Bonanza Springs, a well hydraulically connected with the Bonanza Springs, and a well in connection with a nearby marsh. No effects due to pumping the deep aquifer were observed at any of the monitored wells, the Lost River, Bonanza Springs, or the nearby marsh. Consequently, the results of the aquifer test indicate there is no observable hydraulic connection between the deep aquifer system at the Babson well and the shallow aquifer or surface water features.

A second aquifer test was performed in the summer of 2002 (CH2M HILL , 2002b). The Babson well was pumped at an average rate of 6,800 gpm for approximately 30 days. An expanded observation well network was used (31 different locations) that included both shallow wells and deeper irrigation wells in Langell Valley, Yonna Valley, Swan Lake Valley, Malin, and Klamath Falls. There was a hydraulic response in the observation well network attributable to a leaking well packer. This aside, the data do not indicate that the deep system is in hydraulic connection to a shallow aquifer system. A reconstructed well should eliminate the minor response observed.

Deep aquifer response suggests extremely high aquifer transmissivity and supply: at the end of the 30-day pumping period, water levels had recovered to the pretest static level within 5 minutes. These observations show that the roughly 294 million gallons withdrawn for this test were insignificant relative to the rate and volume of water available to the Babson well. Appendix B presents the Executive Summary from the *Water Supply Supplemental Data Report: Deep Aquifer Testing at the COB Energy Facility Water Supply* (CH2M HILL, 2002a).

Groundwater Quality. Groundwater quality within the shallow aquifer varies to some degree depending on local soil conditions and degree of connectivity between ground and surface waters. Since July 1991, fecal coliform has been found in several of the town of Bonanza's domestic wells. According to OWRD, studies compiled by Klamath County hypothesize that consecutive drought years forced farmers and ranchers to irrigate more heavily with groundwater. The drawn down aquifer permitted infusions of Lost River water, which carried in the contaminants.

The proposed project, however, would utilize deep zone groundwater. The deep zone groundwater is of high quality, with very low dissolved solids and no parameters suggesting interaction with shallow groundwater and surface water. The deep zone groundwater from the Babson well meets Federal drinking water standards without treatment. Because testing has demonstrated that deep system withdrawals would not impact shallow system water levels and the Facility would not discharge wastewater to the shallow groundwater system or surface water, Facility operations would not have an impact on existing groundwater quality.

3.3.2 Environmental Consequences and Mitigation Measures

As described below, the Energy Facility would have no significant unavoidable adverse impacts on hydrology and water quality.

<u>Impact 3.3.1. Water for the Energy Facility would be diverted from the deep aquifer, which is not hydraulically connected to surface water bodies.</u>

<u>Assessment of Impact</u>. Under annual average conditions, the Energy Facility would need 162 gpm of water (72 gpm for year-round industrial use and 90 gpm for seasonal irrigation use) to supply its water requirements. Under maximum consumption conditions, that rate would increase to 300 gpm (210 gpm for year-round industrial use and 90 gpm for seasonal irrigation use) for brief periods of time. In addition, construction of the Facility would result in the use of approximately 6.5 million gallons of water. Tables 3.3-2 and 3.3-3 show estimated water use during Facility construction and operation, respectively.

Water to supply this demand would be withdrawn from the deep aquifer using a reconstructed Babson Well and two additional water supply wells. Figure 3.3-1 shows a schematic of how the Babson well would be reconstructed. The water would be conveyed to the Energy Facility site via a 2.8-mile pipeline. On April 24, 2002, the project proponent submitted to OWRD a water right application for this use. A draft water right permit was issued by OWRD in a PFO dated April 22, 2003.

Test data do not indicate that pumping at the proposed rates would lower the water level in the deep aquifer. A 2002 aquifer test conducted at near-maximum rates (approximately 6,800 gpm) withdrew more than 290 million gallons from the deep aquifer over a 30-day pumping period. Within 5 minutes of the test's conclusion, water levels in the deep zone had recovered to the pre-test static water level. The much faster than anticipated recovery suggests that the volume removed (290 million gallons) is not significant relative to the rate of recharge to the deep system and that pumping would not significantly impact deep zone water levels.

The annual groundwater usage proposed for the Energy Facility is a small fraction of the estimated annual recharge to the deep aquifer from precipitation. (Table 3.3-1). The recharge estimates presented in Table 3.3-1 are considered conservative (i.e., minimums, or under-estimates) because they account for only a portion of the total possible recharge area, and do not consider deep interbasin groundwater flow that likely contributes additional recharge to the Klamath Basin. On an annual basis, the Energy Facility would use approximately 110.4 million gallons of groundwater from the deep aquifer system, assuming the Energy Facility is operating under maximum water consumption conditions (maximum ambient conditions and using supplement duct firing) for 365 days per year. This is a conservative estimate; actual water usage would likely be much less. For example, if the Energy Facility operated at an annual 72 percent capacity factor, water use would be approximately 7.0 million gallons (assumes average annual ambient conditions and a typical summer daytime average for process water rates and a monthly profile of operating conditions with and without supplemental duct firing).

It has been estimated that the deep aquifer system receives, at a minimum, anywhere from 134 billion to 241 billion gallons (from 411,000 to 739,000 ac-ft) of recharge from precipitation. When compared to the range of recharge estimates, the Energy Facility's groundwater usage would amount to less than 0.05 percent of the water that recharges the deep aquifer from precipitation on an annual basis. With the likelihood that the deep aquifer is recharged over a broader area and receives additional recharge from other hydrologic basins, the Energy Facility's groundwater usage would probably be less than 0.05 percent of the aquifer's recharge volume. Therefore, the impact on the deep aquifer is expected to be insignificant, consistent with the observed hydraulic response to pumping.

Aquifer and borehole tests have indicated that the shallow and deep systems are not hydraulically connected. No other wells or water rights are known to exist in the deep aquifer system within the project area. Therefore, no adverse effects on those waters potentially affected would occur as a result of the proposed Energy Facility. Because the Energy Facility would be developing a new water source, not appropriating from existing sources, the proposed use would not impair the availability of water for beneficial purposes such as drainage, sanitation and flood control.

Recommended Mitigation Measures. The proposed Energy Facility would include a number of features to reduce water use. During construction, rinse and wash waters would be cascaded from system to system to minimize water use. In addition, steps would be instituted to ensure that dust suppression water use is not excessive or insufficient.

The Energy Facility was originally designed for wet cooling by control of the cycles of concentration (ratio of the concentration of contaminants in the circulating water divided by the incoming makeup water contaminant level) to approximate the quality of the water in the Lost River and water used by the local irrigation districts. This would have resulted in a peak water demand of approximately 9,900 gpm (14.26 mgd or 43.76 ac-ft/day or 22.06 cfs). The wet-cooled design was further refined to incorporate water treatment and recycling to increase the cycles of concentration and reduce the peak water use to 7,500 gpm (10.80 mgd or 33.14 ac-ft/day or 16.71 cfs)or by 24 percent.

In response to public comments regarding the amount of water use, the design was changed to switch from wet cooling to air cooling. Air cooling reduces the Energy Facility water requirements by 97 percent (210 gpm vs. 7,500 gpm). As with the original SCA, an additional 90 gpm would be used for irrigation around the Energy Facility site.

Water use in the Energy Facility would vary daily and seasonally in response to fluctuating electricity demand and weather conditions. As a result, actual daily water use at the Energy Facility is estimated to vary from 0 gpm when the Energy Facility is offline up to a maximum of 210 gpm (0.30 mgd or 0.92 ac-ft/day or 0.47 cfs). For average annual conditions with duct firing, it is anticipated that the average withdrawal rate from the water supply wells would be approximately 72 gpm (0.10 mgd or 0.31 ac-ft/day or 0.16 cfs).

Impact 3.3.2. Wastewater and stormwater discharge during Energy Facility construction and operation could affect surface and groundwater quality.

Assessment of Impact. Sanitary sewage, process blowdown, cooling system blowdown, and stormwater runoff would be generated by the Energy Facility. Treatment and management would occur on-site, with no discharge of wastewater to surface or groundwater under the preferred alternatives.

3.3.2.1 Process wastewater

Process wastewater from the Energy Facility would be managed by one of three alternatives:

- Beneficial use of the water for irrigated pasture
- Evaporation in an onsite, lined evaporation pond
- Temporary storage onsite and hauling to a WWTP for offsite disposal

Irrigated Pasture Beneficial Use. If process wastewater is managed by beneficial use of the water for irrigated pasture, water developed during the winter months would be stored and combined with process water produced in the summer months to irrigate approximately 31 onsite acres. The Energy Facility site and land immediately adjacent to the Energy Facility under option by the project proponent, encompasses sufficient acreage with soil types suitable for this activity that the process water can be managed without exceeding annual salt loading rates typical of nearby irrigated lands, or other facilities with permits to use similar water in a similar fashion (see Section 3.2.2 for more detail).

The process water would be used to improve grazing forage yield in areas currently without irrigation, and possibly to enhance the wildlife forage yield in habitat mitigation areas. This activity represents a beneficial use of the water that would not be made if it were evaporated or hauled offsite for disposal. The irrigated pasture use would occur only in areas with well-drained soil and with suitable slopes to minimize the potential for surface runoff or erosion. The irrigated use would not occur in areas that are drained by subsurface drain tiles to minimize any potential discharges to surface water. Annual application rates would occur at levels substantially lower than gross irrigation requirements for full irrigation and the irrigated use would not result in recharge to groundwater during periods of irrigation.

Onsite Evaporation Pond. If process wastewater is managed by evaporation in an onsite, lined evaporation pond, process wastewater from the Energy Facility would go to an approximate 20-acre, lined evaporation pond. The evaporation pond would most likely be designed to store approximately 7 MG and operate passively. A spray enhancement system would be installed if it proved economically viable. A wastewater stream pipeline would take wastewater from the Energy Facility to the evaporation pond. The evaporation pond would be designed and sized to contain sediment from the wastewater for the life of the plant with minimal need to cleanout the sediment. This would require that there be sufficient freeboard in the evaporation pond while taking into account sediment accumulation. See Table 3.3-4 for a comparison of wastewater quality in a land application scenario and an evaporation pond scenario.

The pond would be designed to include a composite liner system for containment of wastewater and sediment. Bentonite would be added to the soil at the base of the evaporation pond, mixed to a depth of approximately 12 inches, and then compacted to achieve a permeability of greater than $1x10^{-6}$ centimeters per second (cm/sec). Alternatives to the bentonite-treated soil would be to use a bentomat geotextile system. The bentomat geotextile system is available with a permeability as low as $5x10^{-9}$ cm/sec. A 60-mil HDPE liner would be placed over the bentonite-treated soil or the bentomat geotextile system, to form the top layer of the composite liner system. The evaporation pond would be netted to prevent access by birds and surrounded by a chain-link fence to prevent access by wildlife.

Storage and Hauling to Wastewater Treatment Plant. If this alternative is selected, process wastewater would be managed by temporarily storing wastewater onsite in two 5.0-MG tanks and hauling to a WWTP for offsite disposal. The project proponent has contacted the two municipal WWTPs in Klamath Falls—the South Suburban Sanitary District and the City of Klamath Falls Sanitary District. The ability of these two WWTPs to accept wastewater from testing and commissioning of the Energy Facility and the wastewater from operation of the Energy Facility is presently being evaluated. According to managers at both facilities, each would be required to evaluate whether they can meet the EPA categorical standard to accept industrial waste or whether local ordinance provide for acceptance of truck-hauled wastewater. Over the life of the Energy Facility, other WWTPs may be constructed or considered for management of wastewater generated at the Energy Facility. The project proponent would arrange with a trucking company to routinely haul the wastewater stored in the wastewater storage tanks at the Energy Facility to the WWTP.

3.3.2.2 Sanitary sewage

Sanitary wastewater from restroom and shower facilities would be routed to an onsite septic tank, which would discharge to a leach field. Approximate flows of up to 1,500 gallons per day or about 1 gpm are expected. The onsite system would be designed in accordance with Klamath County's standards for onsite disposal systems. Percolation into the ground of treated sanitary sewage from the septic system would not have a substantial adverse effect on groundwater quality. During construction, portable toilets would be provided for construction worker use.

3.3.2.3 Stormwater

Construction. During construction, stormwater would be managed according to NPDES General Construction Permit 1200-C, issued by ODEQ, and an erosion and sediment control plan. In general, construction erosion control would consist of BMPs, including techniques such as hay bales, silt fences, and revegetation, to minimize or prevent soil exposed during construction from becoming sediment to be carried offsite.

Operation. While stormwater is not considered wastewater, stormwater would be managed at the Energy Facility by a 4.7-acre infiltration basin and therefore would be covered under a Water Pollution Control Facility (WPCF) permit. Under the preferred alternative, there would be no discharge of stormwater from the Energy Facility into surface waters, stormwater drainage ditches, or irrigation canals.

Stormwater is managed through three separate systems, including the plant drains system, the storm sewer system, and the stormwater run-on diversion system. Figure 3.3-2 shows a schematic of the three separate and segregated systems designed to handle stormwater during Facility operations. The figure shows individual drainage systems as well as a breakdown of the drains connected to each system. The individual drainage systems are described in more detail below.

Plant Drains System. A dedicated plant drains system would be designed and constructed at the Facility to segregate stormwater that comes in direct contact with plant components from the storm sewer system, thus preventing runoff in the plant drains system from reaching the stormwater pond or the infiltration basin. This design would be accomplished by separating the runoff from drains with the potential to come in contact with pollutants from the remainder of the storm drainage system. Drains in areas with the potential for contact with pollutants from materials used or stored at the Energy Facility would be routed to the segregated plant drains system, which would discharge to an o/w separator. This system includes drains inside buildings and enclosures and drains from the interior of spill containment berms. The resulting o/w separator discharge water would be routed to a wastewater collection basin and then pumped back to the raw water tank for use as process water. No stormwater collected by the segregated plant drains system would be routed to the stormwater pond or infiltration basin.

The wastewater collection basin would be a concrete sump placed in a location accessible to inspection without interfering with Facility operations. It would hold approximately 5,000 to 10,000 gallons.

The oil from the o/w separator would be contained in the o/w separator itself. The o/w separator would include a level indicator with an alarm that would alert the operations staff when it needs to be emptied. At that point, a licensed contractor would pump the oil out and haul it offsite for proper disposal.

The dedicated plant drains system would consist of the following components:

- Combustion turbine enclosure floor drains
- Steam turbine area foundation and floor drains
- Heat recovery steam generator (HRSG) foundation and stack floor drains
- Warehouse/maintenance building floor drains
- Administration building floor drains

Storm Sewer System. Stormwater that falls inside the fenceline of the Energy Facility and is not routed to the plant drains system described above would be collected in the storm sewer system. The collection of rainfall runoff in this system would be limited to parking lots, roof drains, graveled areas, and vegetated areas. This storm sewer system would consist of ditches, culverts, and piping that are routed to the stormwater pond. From the stormwater pond, there would be two alternatives for stormwater discharge. The preferred alternative would be to discharge the stormwater into a 4.7-acre infiltration basin. The second alternative would be to discharge the stormwater through a ditch adjacent to the Energy Facility access road into the West Langell Valley Roadside ditch, where it would eventually enter the High Line Levee Ditch and then the Lost River. These alternatives are described in more detail below.

Stormwater Pond. The captured runoff from the Energy Facility in the storm sewer system would be conveyed to a 2.5-acre-foot (ac-ft), 1.5-acre, 750,000-gallon stormwater pond, located in the southeast corner of the Energy Facility (see Figure 3.2-4). This stormwater pond would serve two purposes: 1) provide pretreatment of the runoff before it enters the infiltration basin, and 2) provide temporary storage should unwanted material make its way into the stormwater.

The stormwater pond would provide a wide spot in the stormwater flow path. This wide spot would reduce the flow velocity of the stormwater, allowing suspended sediment to settle out. The operating life of the infiltration basin would be increased by removing the sediment.

A ditch would be constructed from the toe of the fill for the Energy Facility over to the infiltration basin to convey stormwater in the stormwater pond to the infiltration basin. An 18-inch-diameter discharge pipe would be installed through the southern end of the dyke of the stormwater pond. The outlet would discharge into the ditch. The pipe would include a manually operated valve that would normally be closed. The 18-inch-diameter discharge pipe would drain the 2.3 acre-foot (1.5-acre) stormwater pond if it were full in approximately 5 hours.

The stormwater pond is not designed to detain a 100-year, 24-hour storm. It would detain only approximately 34 percent (2.3 acre-feet divided by 6.7 acre-feet). The spillway would be sized to handle the peak flow from the 100-year, 24-hour storm, which is approximately 112 cubic feet per second (cfs). The dyke of the stormwater pond would include a 2-foot-deep, concrete-lined flume directly above the discharge pipe. This flume would act as an emergency spillway for storms greater than the volume of the stormwater pond. The spillway would route stormwater overflow to the ditch that directs water into the infiltration basin. The 112-cfs peak flow would occur for less than 15 minutes and is not representative of the average flow for a 100-year storm.

Infiltration Basin Alternative. Though not accounted for in the preliminary basin sizing, evaporation of the collected stormwater would occur during the summer months. Vegetation would be planted in the bottom of the infiltration basin to improve the infiltration functions and protect these surfaces from rain and wind erosion. There are three primary reasons to vegetate the basin with native grasses or other suitable vegetation:

- The #1 cause of soil erosion in Klamath County is wind on barren soil.
- The infiltration basin would be a collection basin for windblown soil and noxious weed seeds. Although the soil could become resuspended by the wind, some seeds would germinate and overtime the basin would be vegetated by noxious weeds and require greater maintenance to remove weeds.
- Vegetation would help uptake any nutrients or potential pollutants that could be in the stormwater.

A chain-link fence would be installed around the infiltration basin to prevent debris such as windblown vegetation or litter from entering and settling on the basin bottom. The fence would also serve to prevent unauthorized personnel or wildlife from entering the basin. A gate would be installed in the fence to allow access for maintenance personnel and equipment. An access road would be constructed from the access road to the Energy Facility over to the infiltration basin (see Figure 3.2-4).

Runoff calculations were performed using the TR-20 hydrologic model. This model was developed by the Soil Conservation Service and the U.S. Department of Agriculture. The 100-year, 24-hour storm event was used to size the infiltration basin. This return event is consistent for the design of stormwater retention systems. The probability of a 100-year storm event to occur in any 1 year is one percent.

The infiltration basin would be located adjacent to the Energy Facility on Calimus series loam soil. The NRCS (Natural Resources Conservation Service) Soil Survey for Klamath County lists the saturated infiltration rate for this soil as 0.6 inch per hour (in/hr) to 2.0 in/hr. The infiltration basin was sized using the lower value of 0.6 in/hr. Using this lower infiltration value provides a conservative infiltration basin size.

The primary controlling factor in sizing the infiltration basin is the surface area of the basin bottom, the depth of water storage, and 1 foot of freeboard. One foot of freeboard is a typical design standard for stormwater ponds. Over-designing the infiltration basin would reduce the chances of the water overtopping the infiltration basin should a storm larger than the 100-year event occur or if back-to-back smaller storm events occur. A 48-hour drawdown period of the 100-year stormwater volume was used for sizing the infiltration basin and is consistent with the design requirements of similar functioning ponds, such as extended dry detention ponds. The additional 1 foot of freeboard would provide approximately 40 percent additional storage volume that could be filled by stormwater before overtopping would occur. Drawdown duration would be less than 48 hours for the more frequent return storm events.

West Langell Valley Road Drainage System Alternative: In this alternative, the outflow from the stormwater pond would go to a Klamath County drainage ditch along the east side of West Langell Valley Road. This drainage ditch discharges to an irrigation canal, labeled High Line Levee Ditch on the U.S. Geological Survey quadrangle map. High Line Levee Ditch eventually discharges to the Lost River. The drainage ditch along the east side of West Langell Valley Road is approximately 8,000 feet long and the irrigation canal to the Lost River is approximately 32,000 feet long. Therefore, stormwater from the Energy Facility site would travel approximately 40,000 feet before it reaches the Lost River.

The stormwater runoff calculations were performed using TR-55 software, which employs the Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service [SCS]) method for computing stormwater runoff. A weighted curve number of 88 was used for the Energy Facility site. For the same area, a weighted curve number of 69 was used to calculate the predevelopment runoff. A 25-year storm event consisting of 2.5 inches of rainfall was used as the design case for the stormwater pond. This storm event resulted in 1.38 inches of runoff from the Energy Facility site, which is approximately 1.5 MG. The peak predevelopment flow was calculated at 12 cfs (5,386 gpm) and was used as the peak outflow from the stormwater pond. The peak runoff from the Energy Facility site was calculated at 85 cfs (38,151 gpm) and was used as the peak inflow to the stormwater pond. Based on the predevelopment flow and the Energy Facility site hydrographs, the 1.5-acre stormwater pond is sized for 2.3 acre-feet or approximately 750,000 gallons.

Offsite Stormwater Diversion System. Stormwater diversion ditches would be installed on the north and west sides of the Energy Facility to divert stormwater form undisturbed areas adjacent to the Energy Facility from flowing onto the Energy Facility. These diversion ditches would direct water into existing natural drainage system or into the drainage ditch along West Langell Valley Road. Runoff to the south and east of the Energy Facility would naturally drain away from the Energy Facility.

Ancillary Facilities. For the water supply pipeline and transmission line access roads, culverts would be properly sized and designed where the access road crosses intermittent creek to facilitate flow of stormwater or snowmelt runoff and to minimize erosion. Access roads would be surfaced with gravel to minimize erosion. Drainage would be maintained along the route of the access roads to prevent ponding of stormwater or snowmelt runoff.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.3.3. Chemical spills at the proposed Energy Facility could affect surface and groundwater quality.

Assessment of Impact. Various chemicals, such as sulfuric acid, sodium hypochlorite, and sodium hydroxide, would be stored at the Energy Facility. The chemicals would be stored in totes or aboveground storage tanks situated in the appropriate containment areas designed to hold the volume of the liquids stored plus freeboard, according to applicable regulations and BMPs. Aqueous ammonia would be stored in a 30,000-gallon aboveground storage tank. The tank would be contained within a bermed area and would be designed in accordance with applicable industry specifications. The tank would be equipped with a level gauge and would be monitored from the control room. The area for delivery of aqueous ammonia to the storage tank also would be bermed. Because of these design features, any chemical spill that might occur at the Energy Facility would not adversely affect surface or groundwater quality.

SPCC Plan. A Spill Prevention, Control, and Countermeasure (SPCC) plan would be prepared and implemented at the Energy Facility. The SPCC plan would include an inspection program consisting of regular inspections and recordkeeping. It would be a detailed, Facility-specific, written description of how Facility operations comply with the prevention guidelines in the Federal oil pollution prevention regulation. These guidelines include such measures as secondary containment, facility drainage, dikes or barriers, sump and collection systems, retention ponds, curbing, tank corrosion protection systems, and liquid level devices. This plan is another level of protection to prevent stormwater runoff from coming in contact with pollutants.

The project proponent is required to ensure that wastes are appropriately handled onsite and disposed of at the proper facility and are transported by a licensed and reputable firm. Materials would be stored in sealed containers, and to the extent possible, those sealed containers would be stored in inside buildings.

Tanks storing chemicals, diesel fuel, or lubricants not located in buildings would be inside secondary containment structure or arrangement, such as perimeter berms or dual walls, in the event of a spill. After a rainfall event, the secondary containment located outdoors would be inspected prior to releasing stormwater to the o/w separator in the plant drains system. If any pollutants are present, they would be handled as called for in the SPCC plan.

Additional Precautions. The following is a description of precautions taken to minimize the chance for pollutants to come in contact with stormwater runoff:

- The generator step-up transformer foundations would include concrete containment sized to hold 110 percent of the oil in the transformers, which would account for the contents of the transformer plus a design rainfall event.
- Two storage tanks of approximately 2,200 gallons each would be used to store fuel for the Energy Facility's emergency generators would be located outdoors. These tanks would be surrounded by a concrete curb for secondary containment. The secondary containment would be sized to hold 110 percent of the volume of the tank, which would allow for the contents of the tank plus a design rainfall event.
- A 30,000-gallon aqueous ammonia tank would be located outdoors and would be surrounded by a concrete secondary containment sized to hold 110 percent of the volume of the tank. This containment volume would allow for the contents of the tank, plus rainfall.

These containments would include a drain with a valve that would be normally locked closed. Following a rainfall event, the containments would be inspected for pollutants. If no pollutants are visible, the valve would be opened and the water would be released to the plant drains system and o/w separator. If there is a leak or spill, the stormwater would be pumped out and hauled offsite by a licensed contractor for proper processing and disposal.

EDTA, hydrazine, amine, sodium nitrite, and sodium phosphate would be stored in sealed 400- to 500-gallon totes. Generator lube oil, combustion turbine lube oil, cleaning fluid/detergent, glycol, and caustic would be stored in sealed 55-gallon drums. The totes and 55-gallon drums would be stored inside the warehouse maintenance building and would be surrounded by concrete curbs for secondary containment. These curbs would be sized to hold 110 percent of the volume of the containers. Because these areas would be exposed to rainfall, these containment curb areas would not have drains. If service water enters the secondary containment, it would be allowed to evaporate. If a leak or spill occurs in these areas, it would be handled as described in the SPCC plan.

<u>Recommended Mitigation Measures</u>. No measures beyond those included in the proposed project are recommended.

3.3.3 Cumulative Impacts

The proposed Energy Facility would use an average of approximately 72 gpm for year-round industrial use (power generation) plus 90 gpm for seasonal irrigation use from the deep basalt aquifer. A draft water right permit was issued by OWRD on April 22, 2003. This draft permit was issued as No. 1 by OWRD, indicating the draft permit is the first permit issued for this water source. On August 19, 2003, OWRD provided ODOE with a revised recommendation and draft water right reducing the maximum instantaneous rate to 210 gpm for industrial use. This reduction reflects the change from wet cooling to air cooling. The draft water rate of 90 gpm for seasonal irrigation use remained unchanged.

As described earlier in this section, use of water from the deep aquifer is expected to have no effect on existing uses of the shallow aquifer or surface waters in the area. The proposed withdrawal is likely to be insignificant relative to the recharge capacity of the deep aquifer. Based on existing information, there are no known, past, present, or reasonably foreseeable users of the deep aquifer in the vicinity of the proposed Energy Facility. As a result, no cumulative impacts are expected to result from operation of the proposed Energy Facility unless other users were to apply for and obtain water rights in the deep aquifer.

TABLE 3.3-1
Estimated Annual Groundwater Recharge Volume to the Deep Aquifer System

Estimated Recharge Area:	1,100 sq. miles (approximately 704,000 acres)
Estimated Average Annual Precipitation in Estimated Recharge Area:	28 inches
Estimated Annual Recharge Volumes:	
At 25% of annual precipitation: (recharge rate = 7.0 in/yr):	134 billion gallons (411,000 acre-feet)
At 45% of annual precipitation: (recharge rate = 12.6 in/yr):	241 billion gallons (739,000 acre-feet)

TABLE 3.3-2
Estimated Water Use During Construction and Testing/Commissioning

Activity	Required Quantity (gallons)	Wastewater Quantity (gallons)	Final Disposition
Service/fire protection system filling	1,675,000		EP or OTD or IPBU
Demineralized water system commissioning	325,000		EP or OTD or IPBU
HRSG and auxiliary boiler cleaning and flushing	740,000	1,520,000	EP or OTD or IPBU
BOP/CTG/STG piping tests, flushes, and cleaning		580,000	EP or OTD or IPBU
Air-cooled condenser testing and cleaning		500,000	EP or OTD or IPBU
HRSG commissioning/Steam blows	3,760,000	2,150,000	EP or OTD or IPBU
Subtotal	**6,500,000**	**4,750,000**	
RO Reject	**Included in HRSG/Commissioning/ Steam Blows**	2,200,000	Land Application or Evaporation
Dust Suppression	**200,000**		Evaporation/ Absorption

TABLE 3.3-2
Estimated Water Use During Construction and Testing/Commissioning

Note: Water requirements shown are net water requirements added to the system and do not include reused or recycled water from other commissioning activities.

BOP = balance of plant
CTG = combustion turbine generator
HRSG = heat recovery steam generator
EP = evaporation pond
IPBU = irrigated pasture beneficial use
OTD = offsite treatment and disposal by licensed contractor
STG = steam turbine generator
RO = reverse osmosis

TABLE 3.3-3
Estimated Water Use and Disposition During Operations

Process Where Flow Starts	Process Receiving Flow	Water System Flows (gpm)* Peak	Water System Flows (gpm)* Average	Final Disposition
Water supply wells	Raw water storage tank	210	115	Storage
Raw water storage tank	Demineralization process	317	130	Land application or evaporation
	HRSG blowdown tanks	100	100	Land application or evaporation
	Evaporative coolers	216	0	Land application or evaporation
	Potable water/sanitary systems	1	1	Septic system
	Service water	5	5	Land application or evaporation
	Fire protection	3,000	N/A	Storage
Reverse osmosis Treatment	Demineralization process	159	65	Demineralized water storage
	Wastewater storage tank	159	65	Land Application evaporation, or haul offsite to WWTP
Demineralized Process	Water/steam cycle	66	65	Land application or evaporation
	Wastewater collection basin	93	0	Land application or evaporation
Water/steam cycle	HRSG blowdown tanks	23	23	Land application or evaporation
	Evaporation	43	42	Evaporation
Evaporative coolers	Evaporation	108	0	Evaporation
	Wastewater collection basin	108	0	Land application or evaporation
HRSG blowdown tanks	Evaporation	8	8	Evaporation
	Wastewater collection basin	214	214	Land application or evaporation
Wastewater collection basin	Raw water storage tank	115	115	Storage
Stormwater from disturbed areas on Energy Facility site	Stormwater pond	Variable	Variable	Infiltration
	Stormwater infiltration basin	Variable	Variable	
Stormwater run-on from undisturbed areas	Plant stormwater by-pass drainages	Variable	Variable	Existing drainages and West Langell Valley Road drainage ditch

* Rates are for two blocks (1,160 MW) and are with supplemental duct firing.
HRSG = heat recovery steam generator
WWTP = wastewater treatment plant

TABLE 3.3-4
Process Wastewater Characteristics

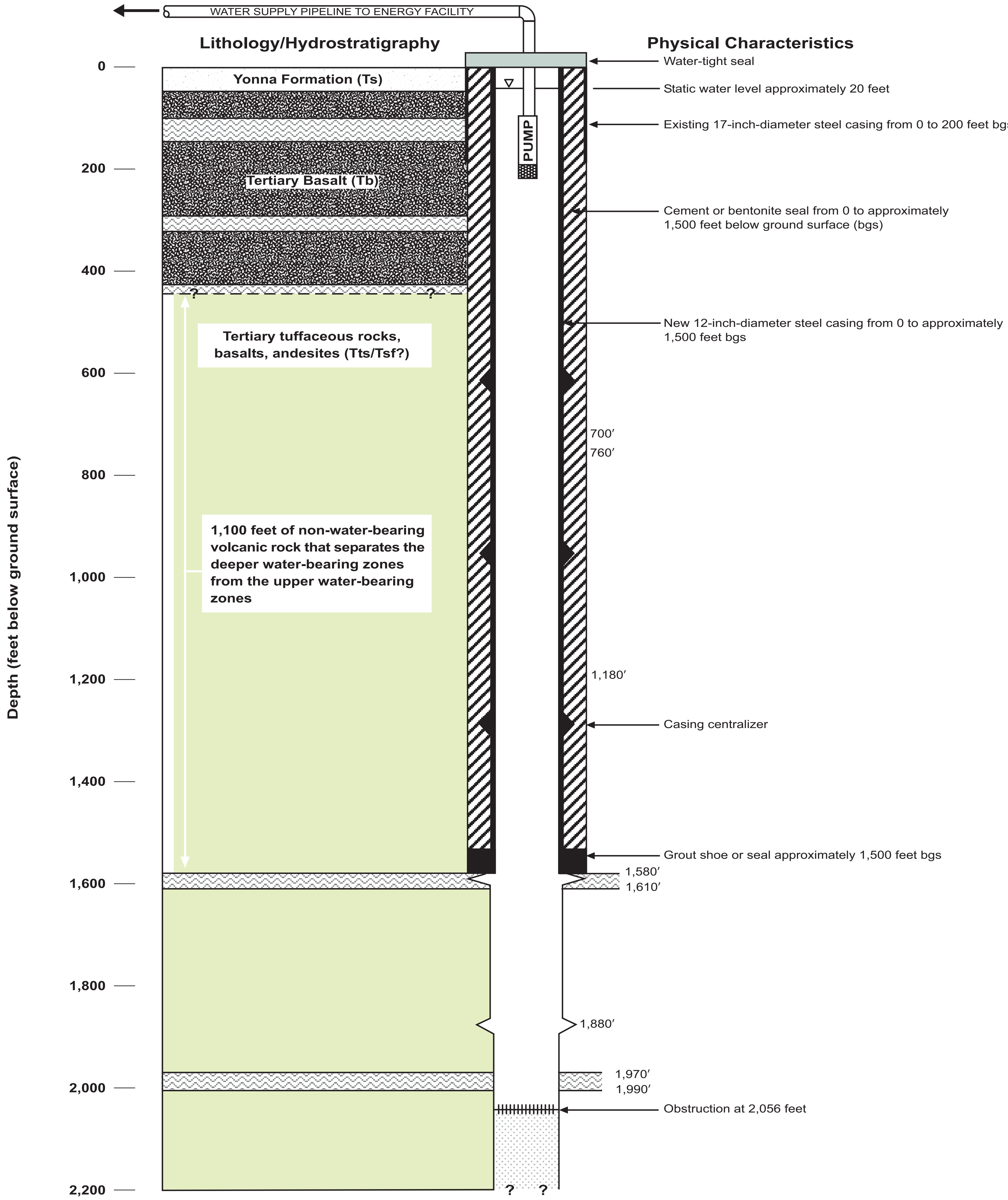
Parameter	Land Application Case	Evaporation Pond Case	Units
pH	7.5-9.0	7.5-9.0	Standard units
Iron	0.14	0.68	mg/L
Copper	0.00	0.032	mg/L
Manganese	0.02	0.044	mg/L
Calcium	28.92	65.6	mg/L
Magnesium	11.74	26.6	mg/L
Sodium	20.12	52.0	mg/L
Potassium	4.22	9.57	mg/L
Boron	0.54	1.22	mg/L
Silica	71.12	183.0	mg/L
Chloride	4.14	15.7	mg/L
Nitrate as N	0.84	1.9	mg/L
Nitrite as N	0.02	0.044	mg/L
Ammonia as N	0.00	0.35	mg/L
Sulfate	6.29	269.8	mg/L
Total Alkalinity	164.12	250.0	mg/L as $CaCO_3$
Fluoride	0.20	0.44	mg/L
Phosphorous	0.05	20	mg/L
Orthophosphate as P	0.05	20	mg/L
Sulfite	1.00	25.0	mg/L
Oil and Grease	0.30	10.7	mg/L
TOC	1.50	69.6	mg/L
TDS [1]	203	1,077	mg/L
TSS	1.00	1.0	mg/L
Phosphonates [2]	0.00	30.0	mg/L
Polyacrylate [2]	0.00	20.0	mg/L
Free Chlorine [2]	0.00	0.20	mg/L

[1] Includes treatment chemicals identified in [2].

[2] Added as treatment chemical.

$CaCO_3$ = calcium carbonate
mg/L = milligrams per liter
TDS = total dissolved solid
TOC = total organic content
TSS = total suspended solid

Proposed Babson Well Reconstruction Diagram—Air Cooled



LEGEND

Ts — Tuffaceous sedimentary rocks and tuff (Piocene and Miocene), AKA Yonna Formation—Semiconsolidated to well-consolidated mostly lacustrine tuffaceous sandstone, siltstone, mudstone, concretionary claystone, pumicite, diatomite, air-fall and water-deposited vitric ash, palagonite tuff and tuff breccia, and fluvial sandstone and conglomerate. Palagonite tuff and breccia grade laterally into altered and unaltered basalt flows of unit Tob.

Tb — Basalt (Upper and Middle Miocene)—Basalt flow, flow breccia, basaltic peperite, minor andesite flows, and some interbeds of tuff and tuffaceous sedimentary rocks.

Tts/tsf — This unit represents rocks that are indicated to occur beneath Tb in the project area but could not be differentiated here. Tts: Moderately well-indurated lacustrine tuff, palagonitic tuff, pumice, lesser siltstone, and sandstone and conglomerate. Tsf: Rhyolitic to dacitic bedded tuff, lapilli tuff, welded and nonwelded ash-flow tuff, and interbedded basalt and andesite flows.

Groundwater production zone.

1,080′ — Large void or fracture zone and corresponding depth in feet

Lithologic contact (dashed line)

Hydrostratigraphic contact (solid line)

Notes

Borehole diameters will decrease as follows to 2,056 feet (diameters are approximations only):

20" = 200-380 feet
18" = 380-1,010 feet
17" = 1,010-1,090 feet
16" = 1,090-1,700 feet
14" = 1,700-Total Depth

Lithologic and hydrostratigraphic relationships are interpreted from borehole geophysics conducted by CH2M HILL in April 1993 and the stratigraphic descriptions provided in the Geologic Map of Oregon (Walker and MacLeod, 1991).

Figure 3.3-1
Proposed Babson Well Reconstruction Diagram—Air Cooled
COB Energy Facility
Bonanza, Oregon

PEOPLES ENERGY Resources

Figure 3.3-1
11 x 17

back

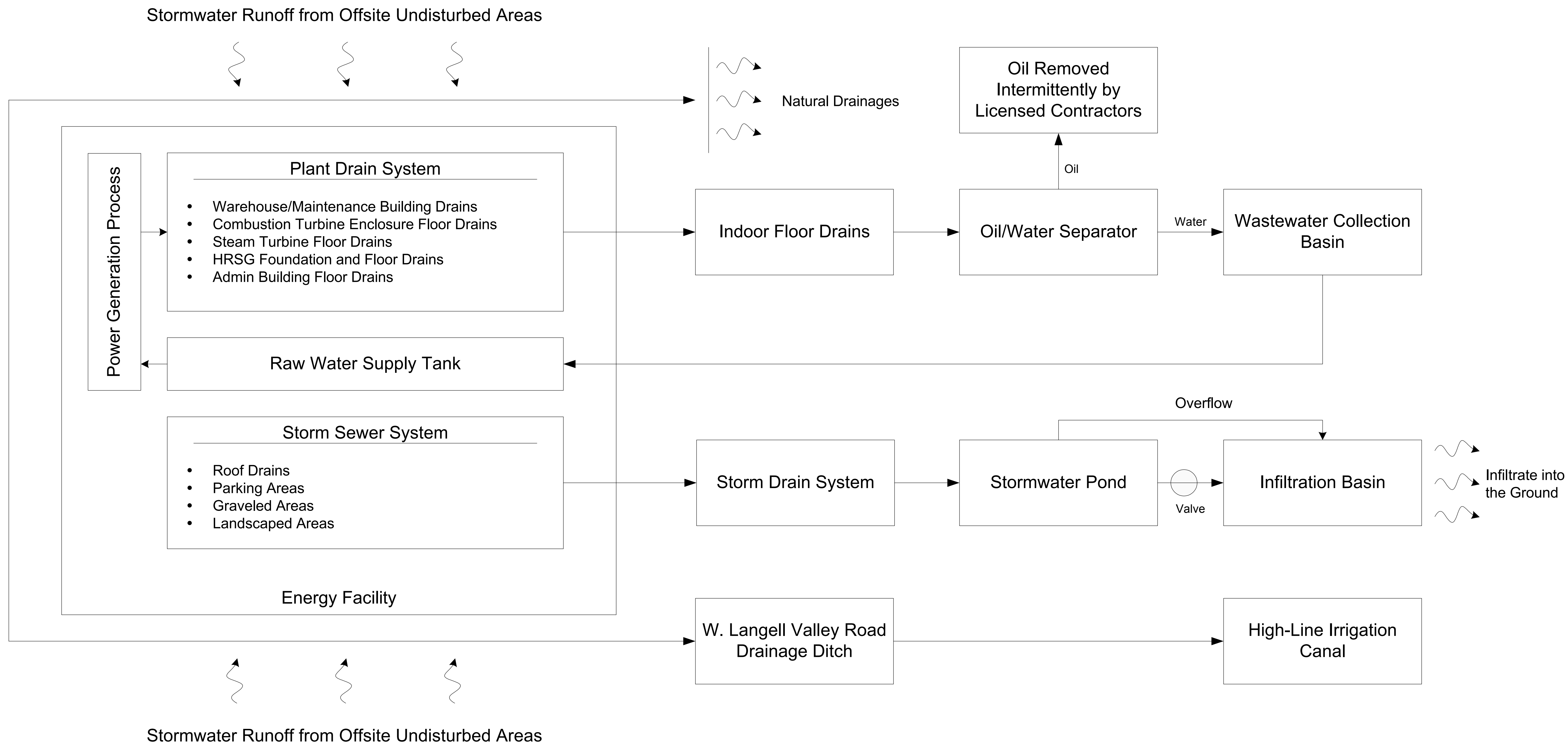


FIGURE 3.3-2
Stormwater Drainage Flow Schematic
COB Energy Facility
Bonanza, OR

PEOPLES ENERGY Resources

PDX/032950009.VSD

Figure 3.3-2

11x17

back

3.4 Vegetation and Wildlife

Vegetation and wildlife habitat and species at the proposed Energy Facility site and along the alignments of the natural gas, water pipeline, and electric transmission line could potentially be affected by the proposed Facility. For the purpose of analysis, vegetation and wildlife habitat was identified within the survey area of the Energy Facility site and ¼ mile on either side of the proposed project's linear features. Potential effects from construction or operation of the proposed Energy Facility are expected to stay within or close to the proposed Energy Facility site and within the established construction easements of the proposed related or supporting facilities.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.4.1 Affected Environment

The analysis area is located within the Klamath Ecological Province (East Cascades Ecoregion), on the eastern side of the Cascade Mountains (see Figure 3.4-1). This region is characterized by large basins surrounded by ancient lake terraces and basaltic fault block mountains. Elevations range from around 4,000 to 8,400 feet. The soil in the area is derived from basaltic parent material and generally has loamy surface horizons overlaying loamy to clayey subsurface horizons (Anderson et al., 1998; Franklin and Dyrness, 1988). The climate is characterized by warm, dry summers and cool, moist winters. The average annual precipitation in Klamath County is 14 inches, of which only 27 percent occurs during the growing season.

3.4.1.1 Vegetation Communities and Habitats

Methodology. Reconnaissance-level surveys for the proposed Energy Facility site and associated natural gas and water supply pipelines were conducted on October 10 and 11, 2001. Detailed habitat assessment and field surveys for biological resources were conducted by three biologists at the Energy Facility site, and along the proposed natural gas, water supply, and electric transmission line alignments from May 6 to May 10, 2002. Additional rare plant and breeding bird surveys were conducted from June 17 to 20, 2002, and on July 9 and 10, 2002. Prior to conducting the 2002 biological surveys, the centerlines of the proposed related or supporting facilities were flagged in the field by surveyors. Gross level habitat surveys were conducted for areas within 0.25-mile of the Energy Facility and the natural gas pipeline, water supply pipeline, and electric transmission line. Aerial photography, topographic maps, visual estimation, and field verification at specific locations were used to categorize habitat types.

Habitat Classifications. Habitat classifications within the analysis area were based on plant community types developed by Kagan and Caicco (1992). General habitat descriptions also incorporate ecological data from *Wildlife-Habitat Relationships in Oregon and Washington* (Johnson and O'Neil, 2001) and *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness, 1988). Five major vegetative communities occur at the Facility site and along the electric transmission line corridor (Figure 3.4-1). These vegetation communities provide primary habitat for wildlife in the area. They include agricultural lands, ruderal areas, western juniper woodland, ponderosa pine forest, and sagebrush-steppe habitat. Developed areas and aquatic habitats are also found within the project area. Descriptions of each habitat type are provided below. Each habitat type is further categorized in relation to the Oregon Department of Fish and Wildlife (ODFW) habitat classification system. The total acreage and ODFW category for each habitat type are summarized in Table 3.4-1. ODFW habitat categories are shown in Figure 3.4-2.

Western Juniper Woodland. Western juniper woodland is the driest forest community in the Pacific Northwest and is generally found in the transition zone between ponderosa pine forest and shrub-steppe habitats. This type occurs widely throughout eastern Oregon on shallow, often rocky soil, at elevations ranging between 1,500 and 6,500 feet. This habitat type is widespread throughout the analysis area on low hills and terraces at elevations between 4,000 and 5,000 feet. It is found on well-drained stony to very stony loams derived from weathered tuff and basalt, as well as on loamy soil derived from lacustrine and alluvial deposits (NRCS, 1985).

This habitat type is characterized by the almost sole dominance of western juniper (*Juniperus occidentalis*) in the canopy layer. Throughout much of this habitat type the trees are generally widely spaced, creating a savanna-like setting with shrub cover between 10 to 40 percent in the understory. In some areas, western juniper creates a woodland or forested habitat with only a few scattered shrubs in the understory. Low sagebrush (*Artemisia arbuscula*) is the dominant shrub in most areas with big sagebrush (*Artemisia tridentata*), desert gooseberry (*Ribes velutinum*), and rabbitbrush (*Chrysothamnus nauseosus*, *C. viscidiflorus*) also found within the shrub layer. Native bunchgrasses such as Sandberg's bluegrass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Thurber's needlegrass (*Achnatherum thurberianum*) and squirrel tail (*Elymus elymoides*) make up approximately 5 to 25 percent of the ground cover in most areas. Common native forbs include larkspur (*Delphinium nuttallianum*), lupine (*Lupinus lepidus*), phlox (*Phlox diffusa*), lomatium (*Lomatium* spp.), and alpine waterleaf (*Hydrophyllum capitatum*). Where intensive livestock grazing has occurred in this habitat type, the understory vegetation is relatively sparse and made up of non-native species. Shrubs and native perennial bunchgrasses are either absent or very sparse in these areas. See Table 3.4-2 for a list of the types of plant species.

Ponderosa Pine Forest. Ponderosa pine habitats are widely distributed throughout eastern Oregon and are often found adjacent to sagebrush-steppe and western juniper habitat types. Ponderosa pine forests generally occur on dry sites characterized by coarse-textured, well-drained soil at elevations between 1,000 and 6,000 feet. Within the analysis area, ponderosa pine forest was observed on low hills and basins along the southern sections of the proposed electric transmission line alignment at elevations between 4,300 and 4,600 feet. This habitat type generally occurs on well-drained, loamy soil derived from weathered sandstone, basalt, and lacustrine sediments (NRCS, 1985).

Ponderosa pine (*Pinus ponderosa*) is the dominant species in the canopy layer of this forested habitat. Western juniper, curl-leaf mountain mahogany (*Cercocarpus ledifolius*), and Klamath plum (*Prunus subcordata*) are present in the lower canopy layer. The soil is covered by a moderate accumulation of duff, with Sandberg's bluegrass and Idaho fescue the most common species in the herbaceous layer, accounting for 10 to 50 percent of the cover. Table 3.4-2 includes a full list of present species. This habitat is considered to have moderately high commercial value (USDA, 1979) and some of these areas have been selectively logged in the past.

Sagebrush-Steppe. Sagebrush-steppe is extensively distributed throughout southeastern Oregon on stony shallow soil at elevations ranging from 3,500 to 7,000 feet. Within the analysis area this habitat type generally occurs between 4,000 and 5,000 feet, adjacent to western juniper habitats on well-drained loams and stony loams derived from weathered tuff and basalt (NRCS, 1985).

This habitat is characterized by shrubs. Low sagebrush is the most common species, accounting for 15 to 30 percent of the cover. Big sagebrush and rabbitbrush are also common in some areas. Sandberg's bluegrass is the most common species in the herbaceous layer, accounting for 10 to 20 percent of the cover. Other grasses such as Idaho fescue, Thurber's needlegrass, cheatgrass, and intermediate wheatgrass (*Elytrigia intermedia*) were also present but generally made up less than 5 percent of the cover. Common forbs included blue-eyed Mary, stoneseed (*Lithospermum ruderale*), phlox, buckwheat (*Eriogonum umbellatum*), and fleabane (*Erigeron* spp.). Refer to Table 3.4-2 for a full listing of vegetative species.

Ruderal Areas. Ruderal areas were observed along the margins of agricultural and developed areas at elevations between 4,100 and 4,200 feet. This habitat type occurs on loamy soil derived from weathered diatomite, basalt, and tuff as well as sandy loams formed from alluvial and lacustrine sediments. The vegetation in these areas is generally sparse and characterized by dominance of non-native species such as cheatgrass, tansy mustard, and clasping pepperweed (*Lepidium perfoliatum*). Native species are either absent or provide only minimal cover.

Agricultural Lands. The majority of the lowland areas within the analysis area have been converted to agricultural use. These areas occur on the loamy soil, formed in alluvial and lacustrine deposits on low terraces throughout the analysis area. Agricultural lands include cultivated crops, irrigated pasture, unimproved pasture, and fallow fields.

Cultivated crops areas are intensely managed for agricultural production. Common crops within the analysis area include alfalfa, wheat, barley, and oats. Irrigated pastures are areas that have been disked and planted with forage crops such as intermediate wheatgrass, tall fescue (*Festuca arundinacea*), and Kentucky bluegrass (*Poa pratensis*). Pasture land within the analysis area is used for cattle, sheep, and horses. In the higher elevations and more remote basins, pasture areas are not irrigated. The unimproved pasture areas appear to have been disked at some point and planted with forage grasses such as intermediate wheatgrass, tall fescue, and Kentucky bluegrass. Rabbitbrush and low sage are often present along the margins of unimproved pastures. These habitats are currently used for sheep and cattle grazing. Fallow fields are areas that were recently used for dryland farming of wheat and barley, but are no longer in production. These areas are characterized by a sparse cover (10 to 15 percent) of intermediate wheatgrass and ruderal species such as tansy mustard, clasping pepperweed, blue-eyed Mary, and yellowspine thistle (*Cirsium ochrocentrum*). Most of these lands are currently leased for seasonal cattle grazing.

Aquatic Habitats. Aquatic habitats within the analysis area include the Lost River, freshwater marsh, seasonal wetlands, sedge wet meadows, wet meadows, stock ponds, and agricultural canals.

The Lost River watershed is a closed, interior basin covering approximately 3,000 square miles of the Klamath River watershed in southern Oregon and Northern California. The headwaters originate east of the Clear Lake Reservoir in Modoc County, California, and flow approximately 75 miles to the Tulelake Sump. Seasonal flows in the Lost River are controlled by releases from the Clear Lake Dam. The Lost River was the only fish-bearing perennial habitat observed in proximity to the analysis area.

Several intermittent creeks were observed in the analysis area during field surveys. These creeks were dry at the time of the, but had defined bed and bank features. Most of the drainages either lacked vegetation or contained only sparse upland vegetation within the channel. Several irrigation canals have been excavated to facilitate surface drainage and water transport for agricultural crops and pasture lands in the basin areas. These channels appear to be routinely maintained and were largely devoid of vegetation.

Freshwater marsh habitat was characterized by a mosaic of perennial, emergent monocots and areas of open water. Species such as cattail (*Typha latifolia*) and bulrush (*Scirpus* sp.) are found in the deeper areas where sedges (*Juncus* sp.) and rushes (*Carex* sp.) are found in the seasonally-flooded areas around the perimeter of the marsh. These wetlands occur on the somewhat poorly-drained soil formed in alluvial lacustrine sediments. A hardpan is present between 20 and 40 inches and the water table is typically shallow, ranging from 1 to 3.5 feet below the ground surface (NRCS, 1985).

Sedge wet meadow habitat is characterized by seasonal inundation, with surface water present during the winter and early spring, but absent by the end of the growing season. This habitat type occurs on soil derived from weathered diatomite, tuff, and basalt (NRCS, 1985). The vegetation is characterized by a dense cover of low-growing monocots such as sedges and rushes. A few forb species such as dock (*Rumex crispus*), mouse-tail (*Myosurus minimus*) and Bach's downingia (*Downingia bacigalupii*) were observed along the outer margins during field surveys, but accounted for only a minimal amount of the total vegetative cover. Aquatic buttercup (*Ranunculus aquatilus*) was present where there was open water.

Wet meadow habitats occurred on poorly-drained clay soil that formed in sediments from weathered tuff and basalt (NRCS, 1985). This habitat is characterized by the presence of surface water during the winter and early spring, and the absence of water during the summer months. Characteristic vegetation includes species such as tufted hairgrass (*Deschampsia cespitosa*), Baltic rush (*Juncus balticus*), and sedges (*Carex* spp.). Some areas have been disked and planted with pasture grasses such as tall fescue, timothy (*Phleum pratense*), and meadow foxtail (*Alopecurus pratensis*).

Stock ponds were observed in areas where berms had been constructed within natural drainages to retain water for livestock. The hydrology in these areas was variable, with some ponds containing several inches of water and other areas dry at the time of the survey. Vegetation in these areas included sedges, rushes, aquatic buttercup, and dock.

Developed Areas. Developed areas include residential, agricultural, and industrial sites within the analysis area such as farm homes, dairies, the PG&E GTN compressor station, and Captain Jack Substation. The natural vegetation has been extensively disturbed in these areas.

Oregon Department of Fish and Wildlife Habitat Categories. The ODFW habitat classification system, as described in OAR 635-415-0025, ranks habitats according to six categories based on their relative distribution, importance to fish and wildlife, and mitigation potential. Each ODFW habitat category is associated with specific mitigation goals and standards. Habitats identified within 0.25 mile of the analysis area and associated pipelines and electric transmission lines were assigned to one of the six habitat categories (Figure 3.4-2).

Definitions. To assign each habitat in the analysis area to an ODFW habitat category, determinations must be made for each habitat regarding whether it is "essential," "limited," or "important."

- *Essential habitat* is defined as "any habitat or set of habitat conditions which if diminished in quality or quantity, would result in depletion of fish or wildlife species."
- *Limited habitat* is defined as "an amount insufficient or barely sufficient to sustain wildlife populations over time."
- *Important habitat* is defined as "any habitat recognized as a contributor to sustaining fish and wildlife populations on a physiographic province basis over time."
- *Species* is all members of an individual taxon.
- *Population* is an interacting group of individuals of the same species occupying a defined geographic area.

The following ODFW habitat categorizations were developed by applying the ODFW definitions after consultation with ODFW staff (McEwen, 2002). A complete description of ODFW habitat classifications is found in Table 3.4-3.

ODFW Habitat Category 1. The proposed Energy Facility would not impact any Category 1 habitats. Category 1 is considered irreplaceable, essential habitat for fish and wildlife species. No plant communities or landforms identified in the analysis area were considered to be Category 1 habitats.

ODFW Habitat Category 2. Category 2 is considered essential and limited habitat for fish and wildlife species. The Lost River provides essential habitat for the Federal and state-listed Endangered shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Deltistes luxatus*). Certain wetland areas including freshwater marsh and sedge wet meadows, provide important habitat for a variety of species. Natural wetland habitats are relatively rare in the Klamath Ecological Province, making them important.

Areas classified by Klamath County as high-density winter mule deer range are designated as Category 2 habitat and are limited in Klamath County. Most of these areas provide important foraging habitat for mule deer and pronghorn antelope. A variety of birds (including migratory species and raptors) and small mammals also forage in this habitat type. Approximately 46 acres of impacts may occur in high-density deer range. However, of the County-mapped high-density deer winter range that would be permanently disturbed by the Facility, a portion (approximately 13.9 acres) actually consists of fallow agricultural fields which provide minimal habitat and forage value for wintering deer. These areas do not provide biological value consistent with their Category 2 designation.[13] Nonetheless, the project proponent has evaluated and mitigated for them as Category 2 lands.

High-density winter mule deer range is covered by Klamath County's Significant Resource Overlay (SRO), which is discussed in Section 3.10, Land Use Plans and Policies.

ODFW Habitat Category 3. Category 3 is considered essential or important, but of limited habitat value for wildlife. The Category 3 habitats identified in the analysis area include juniper-sagebrush, sagebrush-steppe, and ponderosa pine habitats. The vegetation in these areas is characterized by relatively intact natural plant communities. Contiguous areas dominated by native vegetation generally provide better habitat for native fish and wildlife species than areas that have been altered by human activity or have become dominated by nonnative plant species (Johnson and O'Neal, 2001).

Certain wetland habitats such as wet meadows and intermittent creeks provide important seasonal habitat for a variety of wildlife species and are considered to be Category 3 habitats.

Medium-density winter mule deer range is classified as Category 3 habitat. This habitat is similar to the Category 2 habitat, but may not contain the quality or quantity of foraging habitat or cover to warrant a higher category status. A variety of birds (including migratory species and raptors) and mammals forage in this habitat type. Medium-density winter mule deer range is covered by Klamath County's SRO, which is discussed in Section 3.10, Land Use Plans and Policies. Approximately 29.9 acres of impacts may occur in areas classified as Category 3 habitats.

ODFW Habitat Category 4. Category 4 includes those habitats that are important, but not essential or limited. The western juniper woodland with a sparse understory consisting primarily of sparse non-native annual grasses and forbs is of relatively low value for wildlife and considered Category 4 habitat. This area is adjacent to the high-density winter mule deer range and may be used as a migration corridor, but provides minimal forage value. This type of habitat may provide mule deer bedding and hiding cover.

Agricultural canals are classified as Category 4 habitats. These areas provide minimal habitat value for fish and aquatic species, but are considered part of the Lost River watershed and therefore important to the overall water quality of the region.

Cultivated crops, irrigated pasture, unimproved pasture, fallow fields, and ruderal areas are classified as Category 4 habitat. These areas have been altered by human activity and generally support few or no native plant species, but provide habitat for a variety of wildlife species. These areas also provide foraging habitat for mule deer and pronghorn antelope. A variety of birds including migratory species and raptors forage in agricultural fields and

[13] The County mapped high-density deer winter range at a very gross scale and created winter range boundaries based on property lines rather than habitat delineations. Accordingly, some lesser-value land is included on the maps. In the present case, if the 57.6 acres referred to in the text were to be rated based on biological criteria rather than inclusion on the County maps, they would be rated Category 4.

pastures. Approximately 32.8 acres of impacts may occur in areas classified as Category 4 habitats.

ODFW Habitat Category 5. No Category 5 habitat was identified within the analysis area. Category 5 has high potential to become either essential or important habitat for fish and wildlife. No plant communities or landforms identified in the analysis area were considered to be Category 5 habitats.

ODFW Habitat Category 6. Category 6 habitat has low potential to become essential or important for fish and wildlife. Developed areas such as residential areas, dairy farms, and electrical substations and natural gas pumping stations are considered to provide low-value habitat for wildlife species. No landforms identified in the analysis area were considered to be Category 6 habitats.

3.4.1.2 Plant and Animal Species

Plant and Animal Species in the Project Area. The area around the Energy Facility supports a variety of plant and animal life. A survey of areas in the vicinity of the Energy Facility was conducted in May 2002 to identify and document animal and plant species occurring within the Energy Facility site and adjacent features. Additional surveys were conducted in June and July 2002. Table 3.4-4 provides a listing of animal species observed during the survey; Table 3.4-2 provides a listing of plant species, including those identified as noxious weeds by the Oregon Department of Agriculture (ODA). Some of the species identified as occurring or having the potential to occur in the area are listed by state or Federal regulations as having special protection status. These are described below under the heading "Special-Status Species." Species that are listed as state or Federal threatened and endangered species are also described below.

Noxious Weeds. The following noxious weeds have been observed in the Facility area and have the potential to spread as a result of increased disturbance, inhibit natural regeneration of desirable species, and reduce the success of revegetation efforts:

- Bull thistle (*Cirsium vulgare*)—Widespread, but not abundant in the project area
- Field bindweed (*Convolvulus arvensis*)—Common in fallow agricultural fields, but limited distribution in the project area
- Medusa-head (*Taeniatherum caput-medusae*)—Limited to the area around Captain Jack Substation; species is present, but not abundant
- Quack grass (*Elytrigia repens*)—Limited distribution in the project area in pastures and along roadsides
- Scotch thistle (*Onopordum acanthium*)—Locally common in disturbed areas, limited where dense native vegetation is present
- Musk thistle (*Carduus nutans*)—Locally common in disturbed areas, limited where dense native vegetation is present

Other non-native, weedy species common in the Facility area included:

- Yellow spine thistle (*Cirsium ochrocentrum*)—Common in fallow agricultural fields

- Cheatgrass (*Bromus tectorum*)—Locally common in highly disturbed areas, but limited where dense native vegetation is present
- Tansy mustard (*Descurainia sophia*)—Common in fallow agricultural fields and highly disturbed areas
- Field pepperweed (*Lepidium campestre*)—Common in fallow agricultural fields
- Tumble mustard (*Sisymbrium altissimum*)—Common in fallow agricultural fields
- Tubercled crowfoot (*Ranunculus testiculatus*)—Common in some highly disturbed areas
- Common mullein (*Verbascum thapsus*)—Locally abundant in areas of recent development

Special-Status Species. Special-status species are those identified by Federal or state resource agencies as requiring special protective management measures due to potential threats to their continued survival. In the Energy Facility area, both Federal and state special-status species occur. Federal and state designations for special-status species are discussed briefly below. Table 3.4-5 shows Federal and state special-status species identified by Federal and state agencies as having the potential to be present in the Facility area. Species identified by the Oregon Natural Heritage Program (ONHP) and the Nature Conservancy Natural Heritage Network are also shown in Table 3.4-5. In addition, Table 3.4-5 notes whether those species, or suitable habitat for those species, were observed during the survey conducted in June and July of 2002.

The state of Oregon designates a number of categories of special-status species. Agencies with jurisdiction over these species are ODFW and the ONHP. Categories of special-status species include:

- ODFW
  - C - Candidate for state listing as Threatened or Endangered
  - V - Vulnerable, species for which listing as threatened or endangered is not believed to be imminent, and can be avoided through protective measures and monitoring.
  - U - Undetermined status, more information is needed to determine the conservation status of the species
  - P - Peripheral or naturally rare species, species on the edge of their natural range in Oregon, or have naturally low populations within the state
- ONHP
  - 1—Taxa are threatened, endangered throughout their range
  - 2—Taxa which are threatened or endangered in Oregon, but more secure elsewhere
  - 3—Review list, taxa for which more information is needed to determine the conservation status
  - 4—Species which are of conservation concern, but are not currently threatened or endangered

- BLM
  - BS—Bureau Sensitive in Oregon and Washington—species that could easily become endangered or extinct in Oregon and Washington, and are eligible for Federal or state listing or candidate status
  - BSO—Bureau Sensitive in Oregon—same as above but specific to Oregon
  - BSW—Bureau Sensitive in Washington—same as above but specific to Washington
  - BA—Bureau Assessment in Oregon and Washington—species that are not presently eligible for official Federal or state status but are of concern in Oregon and Washington
  - BAO—Bureau Assessment in Oregon—same as above but specific to Oregon
  - BAW—Bureau Assessment in Washington—same as above but specific to Washington
  - BT—Bureau Tracking in both Oregon and Washington—an early warning for species that may become of concern in the future in Oregon and Washington
  - BTO—Bureau Tracking in Oregon—same as above but specific to Oregon
  - BTW—Bureau Tracking in Washington—same as above but specific to Washington

Special-status species observed in the analysis area included the pygmy rabbit (*Brachylagus idahoensis*), American white pelican (*Pelecanus erythrorhynchos*), and the greater sandhill crane (*Grus canadensis*). In addition to these species, there were unconfirmed sightings of the sagebrush lizard (*Sceloporus graciosus*) and tricolored blackbird (*Agelaius tricolor*) during the surveys. Evidence of little brown bats (*Myotis* sp.) was also observed in several old structures south of the water supply pipeline alignment. No special status plant species were found, and no sites are known to occur on adjacent BLM land. As documented in Table 3.4-4, suitable habitat for a number of other species was observed during the visit, although the species themselves were not seen. Species descriptions for these additional species are found in Appendix C.

Pygmy Rabbit. Pygmy rabbit habitat consists of areas dominated by sagebrush with deep, friable, sandy soil (Verts and Carraway, 1998). Several areas with open sagebrush cover within the analysis area were identified as potential habitat for pygmy rabbits. These habitat areas were surveyed extensively and pygmy rabbits were observed at three locations along the proposed electric transmission line alignment. The first sighting was documented just west of the proposed electric transmission line approximately 2.5 miles north of the Captain Jack Substation, the second observation was just north of Captain Jack Substation, and the third observation was in the northern portion of the electric transmission line approximately 1 mile southwest of the Energy Facility site (Figure 3.4-3).

Northern Sagebrush Lizard. The northern sagebrush lizard inhabits high elevation sites throughout most of southern and central Oregon, but is seldom found above 6,000 feet (Nussbaum et al., 1983 and Brown et al., 1995). Northern sagebrush lizards are often found in open areas, such as sagebrush-steppe with plentiful light and shady hiding places among shrubs, rocks, or roots. They are often associated with volcanic rocks, which absorb heat and allow for efficient thermoregulation. Suitable habitat was present throughout much of the analysis area and a single northern sagebrush lizard was potentially identified on the northern portion of the proposed Energy Facility site (Figure 3.4-3).

American White Pelican. During breeding season, American white pelicans are found at inland lakes and marshes. A predator-free island is required for nesting. During nonbreeding seasons, they may occur on almost any body of water, including oceans (Marshall, 1992, Paullin et al., 1988). Five white pelicans were observed at high altitude, circling over the proposed Energy Facility site. A single white pelican carcass was found approximately 1,250 feet east of the electric transmission line about 2 miles southwest of the Energy Facility site (Figure 3.4-3). Several white pelicans were also observed in the Lost River, several miles west of the analysis area.

Tricolored Blackbird. Tricolored blackbirds are found in freshwater marshes with emergent vegetation (cattails and bulrushes) or in thickets of wouldows or other shrubs such as Himalayan blackberry, growing in and around wetland areas. Tricolored blackbirds are often found breeding in the company of red-winged blackbirds (*Agelaius phoenicus*) (Orians, 1961). Tricolored blackbirds were potentially identified in a flock of red-winged blackbirds in a freshwater marsh approximately 1,200 feet southeast of the Babson well site (Figure 3.4-3).

Greater Sandhill Crane. Sandhill cranes would nest in marshes and wet meadows or in drier grasslands and pastures, including irrigated hay meadows (Littlefield and Paullin, 1990.). A single sandhill crane was observed foraging adjacent to a freshwater marsh approximately 1,200 feet southeast of the water supply well system site (Figure 3.4-3).

Little Brown Bat. *Myotis* species are closely associated with water and are generally found in moist forests and riparian woodlands. This bat may also use structures such as abandoned buildings, barns, and houses for roosts (Fenton and Barclay, 1980). Evidence of little brown bats was observed in several abandoned buildings approximately 300 feet south of the proposed water supply pipeline (Figure 3.4-3).

Federally and State Protected Threatened and Endangered Species. The Endangered Species Act (ESA) is the primary Federal law protecting animal and plant species believed to be in danger of extinction. The ESA establishes a process for designating species for protection and for ensuring that Federal actions do not jeopardize the continued existence of species "listed" under the ESA. The Act includes prohibitions against "taking" individuals of a listed species, and authorizes the Federal government to deny funding and permit approvals for projects or actions that would result in such a taking. The ESA designates species under one of several categories of protection: endangered, threatened, proposed for listing, candidate for listing, and species of concern. Endangered and threatened species are fully protected by the provisions of the Act; species proposed for listing are generally afforded the same level of protection as listed species; and candidate species and species of concern are under study for listing, but are not afforded the level of protection ESA provides listed species.

These species are listed or being considered for listing as threatened or endangered, pursuant to the Federal ESA. The only sensitive species observed in the field or known to occur at or near the proposed Energy Facility site or along the pipeline and electric transmission line easements is the bald eagle. No special-status plant species were found during surveys conducted in 2001 and 2002. See Table 3.4-6 for a list of threatened, endangered, and candidate species known or suspected to occur in the analysis area. See Figure 3.4-4 for a map of rare, threatened, and endangered species locations.

Bald Eagle. The bald eagle is known to occur in the analysis area and suitable nesting habitat was identified within the ponderosa pine (*Pinus ponderosa*) habitat for a 1.3-mile section of the electric transmission line approximately 2 miles north of the Captain Jack Substation. No nests were observed during surveys conducted in 2001 and 2002. Nest locations are found in tall trees and rocky cliffs, and may be located as far as 10 miles from foraging areas (Csuti et al., 1997). Approximately 80 percent of the nest locations in the Klamath River Basin are in ponderosa pine habitat (Anthony et al., 1982). With the exception of the area described earlier, none of the areas potentially impacted by the Energy Facility provides suitable nesting habitat for bald eagles. Suitable foraging habitat (small mammals, and carrion in the form of pronghorn antelope, wintering and resident deer, and cattle) occurs on the Energy Facility site and near associated linear facilities.

During the mid-June surveys for nesting birds and raptors, two adult and two juvenile bald eagles were observed at McFall Reservoir, approximately 0.75 mile east of the electric transmission line. On June 11, 2002, Steve Hayner (biologist for the Bureau of Land Management) reported a nest site at McFall Reservoir to Frank B. Isaacs, Senior Faculty Research Assistant at Oregon State University. Mr. Isaacs is a recognized bald eagle expert in this region. At this time two mostly feathered chicks, two adults, and four juvenile bald eagles were observed (Isaacs, 2002). Adult and juvenile bald eagles were also observed flying and foraging over the water supply well area, the water supply pipeline, the electric transmission line, and the Energy Facility site. On July 9, 2002, six juvenile and one adult bald eagle were observed at McFall Reservoir.

3.4.1.3 Wetlands

Information on wetlands was obtained from review of U.S. Geological Survey (USGS) 7.5-minute quadrangles, aerial photographs, National Wetland Inventory (NWI) maps, and soil maps for Klamath County, Oregon. No regional or local wetland maps have been prepared for the Energy Facility (Cary, 2001). Field investigations and wetland delineations were conducted between May 6 and May 10, 2002.

Waters of the state are defined as natural waterways, including tidal and nontidal bays, intermittent creeks, constantly flowing streams, lakes, wetlands, and other bodies of water in the state, navigable and nonnavigable. Wetlands are defined as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Wetlands and wetland habitat identified in the study area included the Lost River, freshwater marsh, seasonal wetlands and creeks, and agricultural canals. A summary of wetland areas identified is provided in Table 3.4-7. Waters-of-the-state and wetland locations are shown in Figure 3.4-5. A wetland delineation report was filed with the U.S.

Army Corps of Engineers (Eugene, Oregon) and the Oregon Division of State Lands (Bend, Oregon) on August 22, 2003.

The Lost River. The Lost River is described under "Aquatic Habitats" in Section 3.4.1.1. The proposed natural gas and water supply pipelines would be located approximately 900 feet and 1,500 feet south of the Lost River, respectively. The proposed Energy Facility site is more than 1.3 miles south of the Lost River.

Freshwater Marsh. The freshwater marsh habitat is described in Section 3.4.1.1. East Langell Valley Road creates the eastern boundary of the wetland feature. This habitat type was observed approximately 900 feet south of the water supply well system site at the east end of the proposed water supply pipeline.

Seasonal Wetland. The only seasonal wetland area observed in the immediate vicinity of the Energy Facility was Dry Lake. This feature is located approximately 200 feet west of the middle of the proposed electric transmission line route. The wetland was observed in a slight topographic depression where surface water is present for extended periods early in the growing season, but is likely absent by the end of the season in most years. The vegetation was characterized by a dense cover of rushes (*Eleocharis* sp.) and sedges (*Juncus* sp.). Surrounding vegetation consisted of western juniper (*Juniperus occidentalis*), low sagebrush (*Artemisia arbuscula*) Sandberg's bluegrass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Pseudoroegneria spicata*).

Seasonal Creeks. Seasonal creeks are typically characterized by relatively narrow, but well-defined channels in which surface water is present for extended periods of time early in the growing season, but is absent by the end season in most years (Cowardin et al., 1979). Five seasonal creeks were observed in the areas where Energy Facility features are located.

Seasonal Creek #1. Seasonal creek #1 is an unnamed drainage along the electric transmission line route just south of where the northern portion of the electric transmission route turns south. The channel was incised between 12 and 18 inches with an average width of 5 feet bank-to-bank. No water was present at the time of the survey. The substrate was characterized by dense cobbles underlain by sandy soil. Sandberg's bluegrass (*Poa secunda*) was scattered throughout the channel. No suitable fish habitat was observed in this area.

Seasonal Creek #2 (Wright Creek). Wright Creek is a seasonal drainage located in the approximate middle of the electric transmission line easement. The creek channel was approximately 20 feet wide, with water depth ranging between 0 and 6 inches. The substrate was characterized by sandy soil with scattered cobbles. The channel was densely vegetated with rushes, sedges, and moss. Other plant species observed included dock (*Rumex crispus*.) and mouse-tail (*Myosurus minimus*). No suitable fish habitat was observed in this area.

Seasonal Creek #3. Seasonal creek #3 is an unnamed drainage along the west side of a section of the southern portion of the electric transmission line. The drainage was characterized by an incised channel approximately 12 to 18 inches deep and 4 feet wide, with defined bed and bank features. The sandy soil of the channel was covered by a dense layer of pine needle thatch and sparse upland vegetation such as cheatgrass (*Bromus tectorum*), yarrow (*Achillea millefolium*), and sagebrush (*Artemisia arbuscula*). No water was observed in the channel at the time of the survey. A small stock pond (approximately 15 by

25 feet) was observed 2 miles north of Captain Jack Substation. Approximately 6 to 12 inches of water was present in the basin at the time of the survey. No vegetation was observed within the ponded area. No suitable fish habitat was present.

Seasonal Creek #4. Seasonal creek #4 was observed along the natural gas pipeline on the west side of a dairy, approximately 3,150 feet northwest of the PG&E GTN compressor station. This feature crosses under Harpold Road through a 36-inch-diameter, corrugated metal culvert. On the south side of the road, the creek channel is weakly expressed and lacks a well-defined bed and bank. No water was observed in this section of the creek and the channel is devoid of vegetation. With the exception of western juniper observed adjacent to the creek, the surrounding landscape is generally devoid of vegetation. On the north side of the road, the creek is channelized and diverted to the east along the south end of an alfalfa field for approximately 1,200 feet, at which point the channel turns north and continues for an additional 1,500 feet where it empties into the Lost River. The realigned portion of the creek channel is approximately 8 feet wide and apparently used for agricultural runoff. A few areas of intermittent ponding were observed in the channel resulting from irrigation of the adjacent alfalfa fields. No vegetation was observed in the channel at the time of the survey. The proposed natural gas pipeline would cross under a portion of the realigned channel that flows north into the Lost River, approximately 1,600 feet west of West Langell Valley Road. No evidence of recent flow was observed at the time of the survey.

Seasonal Creek #5. Seasonal creek #5 was observed on the west side of the PG&E GTN Bonanza compressor station, approximately 200 feet west of the proposed natural gas pipeline. No water was observed at the time of the survey, and with the exception of a few scattered clumps of intermediate wheatgrass (*Elytrigia intermedia*), the channel was devoid of vegetation. The channel passes under Harpold Road through a 10-foot-by-6 foot cement box culvert, where it continues roughly northwest through a horse pasture for approximately 500 feet, after which the channel is realigned and diverted due west into the Lost River. No evidence of recent flow was observed at the time of the survey.

Agricultural Canals. Six agricultural drainages were observed in the vicinity of the Energy Facility. These areas have been excavated to facilitate surface drainage and water transport for agricultural crops and pasturelands in the basin areas. These channels appear to be routinely maintained.

Agricultural Canal #1. Agricultural canal #1 was observed along the southeastern boundary of the proposed Energy Facility site. This earthen canal was approximately 14 feet wide and 2 to 3 feet deep. Approximately 4 inches of ponded water were present at the time of the survey. Vegetation within the channel included canary grass (*Phalaris* sp.) and spikerush (*Eleocharis* sp.). Soil in this area includes Calimums and Laki-Henly loams. This soil ranges from well-drained to somewhat poorly drained. No suitable fish habitat was observed in this area. Adjacent land use is wheat grass pasture.

Agricultural Canal #2. Agricultural canal #2 is a small, earthen irrigation canal located approximately 25 feet north of the proposed water supply pipeline at the easternmost extent of the alignment, adjacent to the Babson Well. The channel ranges between 3 and 4 feet wide and is between 1 and 2 feet deep. No vegetation was observed in the channel. Soil in this area is mapped as Calimus loams and Stukel-Capona loams, both of which are well-drained.

Grazing in both improved and unimproved pasture is the predominant land use in the adjacent areas.

Agricultural Canal #3. Agricultural canal #3 was observed along the proposed water supply pipeline approximately 450 feet west of East Langell Valley Road. This feature is an earthen irrigation canal approximately 15 feet wide with 2 to 3 feet of water flowing through the channel at the time of the survey. No vegetation was observed in the channel at the time of the survey. Soil in this area is mapped as Stukel-Capona loams, and is well-drained. Grazing in both improved and unimproved pasture is the predominant land use in the adjacent areas.

Agricultural Canal #4. Agricultural canal #4 is located approximately 2,000 feet west of Teare Lane and 50 feet south of the proposed water supply pipeline. This shallow, earthen canal is approximately 12 feet wide and 2 to 3 feet deep. Approximately 2 to 3 inches of ponded water were observed in the channel at the time of the survey. Grasses such as Kentucky bluegrass (*Poa pretense*), beardgrass (*Polypogon* sp.), and sedges were observed in the channel. Soil in this area is mapped as Laki Loam, and is moderately well-drained. Adjacent land uses in this area include pasture, hay crops, and western juniper-low sagebrush rangeland.

Agricultural Canal #5. Agricultural canal #5 is located approximately 100 feet south of the proposed water supply pipeline parallel to canal #4. This earthen channel was approximately 10 feet wide and 4 feet deep. No water was present at the time of the survey and the channel was devoid of vegetation. Soil in this area is mapped as Laki Loam, and is moderately well drained. Adjacent land uses in this area include pasture, hay crops, and western juniper-low sagebrush rangeland.

Agricultural Canal #6. Agricultural canal #6 is located approximately 30 feet south of Harpold Road, on the east side of the dairy and on the north side of an irrigated alfalfa field along the natural gas pipeline. This shallow, earthen canal was approximately 15 feet wide and 2 feet deep. Some grasses, sedges, and rushes were observed in the channel. Ponded water to a depth of 6 inches was observed at the west end of the canal, and was likely the result of irrigation runoff from the adjacent field. Soil in this area is mapped as Henley loams, and is somewhat poorly-drained.

3.4.2 Environmental Consequences and Mitigation Measures

Temporary (construction-related) and permanent impacts to habitats are quantified in Table 3.4-1. Temporary impacts from the proposed Energy Facility would result from construction of features of the Energy Facility and temporary construction parking and laydown areas. Permanent impacts over the 30-year operating life of the Energy Facility would occur at the Energy Facility site, the water supply well system, and at transmission tower locations and along the access roads for the electric transmission line. A summary of potential impacts and proposed mitigation measures for special-status species is presented in Table 3.4-8. There would be no impacts to any special-status species. As described below, the Energy Facility would have no significant unavoidable adverse impacts on vegetation and wildlife.

Impact 3.4.1. Construction and operation of the proposed Energy Facility could cause a temporary or permanent loss of vegetation and wildlife habitat.

Assessment of Impact. The Energy Facility would be located in a fallow agricultural field that has minimal habitat value. However, a portion of the field is mapped by Klamath County as high-density mule deer winter range and accordingly is classified conservatively as Category 2. There are 13.9 acres of Category 2 land. However, the soil is poor quality and non-native species such as intermediate wheatgrass have been planted in some areas as forage. The Energy Facility would also impact 4.2 acres of Category 3 land and 32.5 acres of Category 4 land (including the stormwater infiltration basin). The Category 3 areas consist entirely of fallow fields. Category 4 areas are characterized by ruderal and non-native species such as intermediate wheatgrass, tansy mustard, and clasping pepperweed. The high-density mule deer winter range (ODFW Category 2 habitat) and the medium-density mule deer winter range (ODFW Category 3 habitat) are within Klamath County's Big Game Winter Range SRO, which is discussed in Section 3.10.

Wastewater would be land applied to a 31-acre site that is fallow agricultural land (Category 2). The wastewater would be used during the growing season to irrigate pasture for cattle grazing, but the area would also be accessible to wildlife. This acreage is not included in the overall project impacts because it consists of existing fallow fields and would be irrigated only during the growing season providing forage for deer and antelope and cover for game birds. Approximately 5.7 acres would be temporarily impacted by an access road and pipeline to the irrigated fields. Permanent impacts would be 0.5 acre of Category 2 habitat.

A 4.7-acre stormwater infiltration basin would be constructed adjacent to the Energy Facility. This basin lies entirely in Category 4 designated habitat and is included in the overall impacts related to the Energy Facility.

The electric transmission line would be approximately 7.2 miles in length and would originate from the Energy Facility site to the Captain Jack Substation. The majority of the electric transmission line easement would be in Category 2 and 3 juniper-sagebrush habitat. Category 3 and 4 habitat types within the electric transmission line easement include ponderosa pine, sagebrush-steppe, fallow fields, and unimproved pasture. A total of 38 lattice-type transmission towers would be used along the alignment. Each tower would rest on four concrete footings. The total tower area would cover approximately 3,600 square feet. Construction of towers would require clearing of the vegetation within the easement at each tower location. The cleared areas would be revegetated with grasses and shrubs once construction has been completed. The open lattice structure of the towers would allow for wildlife use of the area under the towers.

For safe and reliable operation, vegetation above 10 feet within the 154-foot easement would be cleared. Wooded habitat types within the easement include Category 2 high-density deer range, Category 3 juniper-sagebrush, and Category 3 ponderosa pine forest. Removal of juniper trees is expected to provide an overall benefit to the habitat by improving understory growth of grasses and shrubs (Sitter, 2002). Permanent clearing in nonwooded habitats would be limited to the construction or improvement of access roads to the proposed tower locations.

Approximately 4.9 miles of existing and 6.6 miles of new access roads would be used for construction and operation of the electric transmission line. In some areas, existing roads may require improvements such as limited widening or surfacing with gravel. The existing roads would be mostly on privately owned land and the project proponent has access agreements to use the existing roads. Construction of new roads would occur entirely within the 154-foot easement where possible to minimize additional clearing. The project proponent would place locked gates at the entry and exit points of the new roads to control harassment and displacement of wildlife species.

A 4.1-mile natural gas pipeline would extend from the PG&E GTN compressor station to the Energy Facility site. The construction easement for the gas pipeline would be 80 feet wide. Construction of the natural gas pipeline would result in temporary impacts to approximately 43.8 acres, including approximately 13.1 acres of Category 2 high-density winter deer range (fallow field and juniper-sagebrush), 27.1 acres of Category 4 habitat, and 3.6 acres of Category 6 habitat. Other impacted general habitat types include 23.9 acres of agricultural crops, 9.0 acres of juniper-sagebrush, 0.8 acre of pasture, 3.5 acres of fallow fields, 3.0 acres of ruderal habitat, and 3.6 acres of developed land. There would be no permanent disturbance for the natural gas pipeline. Topography and vegetation would be returned to preconstruction conditions following construction.

A 2.8-mile water supply pipeline would extend from the water supply well system to the Energy Facility site. The construction easement for the water supply pipeline would be 60 feet wide. Construction of the water supply pipeline would result in temporary impacts to approximately 19.4 acres, including 6.6 acres of Category 2 habitat (juniper-sagebrush and fallow fields), approximately 1.8 acres of Category 3 habitat, and 11.0 acres of Category 4 habitat. Approximately 10.2 acres of juniper-sagebrush habitat along the easement has an understory of native shrubs, grasses, and forbs. Other habitats that would be temporarily impacted include approximately 6.3 acres of irrigated pasture, 1.4 acres of agricultural crops, 2.9 acres of fallow field, 0.8 acres of fallow field, and 0.7 acre of ruderal habitat. Of the 11.9 acres of juniper-sagebrush, 5 acres has been heavily grazed and the understory vegetation is sparse and contains non-native annual species such as cheatgrass and tansy mustard.

During operations, the Energy Facility would use water for steam generation, demineralized water production, potable water and sanitary systems, and service water. During construction, water would be used for dust suppression, compaction, vehicle and equipment cleanup, testing and commissioning of the Energy Facility systems, and miscellaneous construction-related uses. The water supply well system would consist of an existing well and two additional water supply wells. The water supply well system would permanently impact 0.3 acre of Category 4, irrigated pasture land on the east side of East Langell Valley Road. The pasture has been heavily grazed.

<u>Recommended Mitigation Measures</u>. To the extent practicable, the Energy Facility site, the natural gas pipeline, water supply pipeline, and electric transmission line would be located in disturbed areas or in areas with minimal habitat value. In addition, the following measures would be used to reduce, avoid, and mitigate for impacts to natural habitats, wildlife, and native plant species:

- Workers would be given environmental training to inform them of wildlife and habitat issues. This training would include information about sensitive wildlife, plants, and habitat areas as well as the required precautions to avoid and minimize impacts. Such measures shall include maintaining reasonable driving speeds to avoid harassing or accidentally striking wildlife. Construction personnel would be instructed to be particularly cautious and to drive at slower speeds from 1 hour before sunset to 1 hour after sunrise when some wildlife species are the most active. Speed limits would be posted on signs throughout the construction zone. Sensitive habitat areas would be identified in the field with appropriate signs and flagging.
- Where feasible, construction would be limited in natural areas during the breeding period of deer and antelope (April through September), as well as the nesting period of raptors (May through September).
- Maps would be prepared to show sensitive areas that are off-limits during the construction phase.
- Signs would be posted around the perimeters of any sensitive habitat areas to be avoided.
- To the extent practicable, the final design of the transmission tower locations within the ponderosa pine habitat would minimize habitat impacts by avoiding densely wooded areas.
- Construction of new roads for the electric transmission line would remain within the cleared easement where possible to minimize additional clearing.
- Following construction, topography and vegetation would be returned to preconstruction condition or better in areas of temporary disturbance. In areas where natural vegetation is removed, native perennial bunchgrasses, sagebrush, bitterbrush, and curly-leaf mountain mahogany would be planted according to a revegetation plan. A proposed mitigation plan is included in Appendix A to the Biological Assessment (which is Appendix A to this EIS).
- Certified "weed free" seed mixes and mulches would be used for restoration and revegetation.
- Revegetation seed mixes and habitat enhancement locations would be developed in consultation with ODFW and BLM.
- Wildlife watering troughs would be used to encourage use of mitigation areas by wildlife.
- Preventive measures would be employed to reduce the introduction of noxious weeds by construction vehicles (e.g., washing vehicles before bringing them to the site and other best management practices).
- Grading and clearing of vegetation would be limited to the minimum extent necessary for practical and safe working areas.

- Fences that are temporarily removed for construction purposes would be replaced with antelope-friendly fence (design to be approved by ODFW and U.S. Fish and Wildlife Service).

Figure 3.4-6 shows the proposed mitigation area for vegetation and wildlife. In addition, the proposed project would restore 91 acres of fallow agricultural land to high-quality deer habitat and another 145 acres of habitat would be improved (see Section 3.10 for additional information).

<u>Impact 3.4.2. Construction and operation of the proposed Energy Facility would cause noise and lighting that could disturb wildlife; however, biological surveys of the Energy Facility site found no evidence of wildlife species that would be uniquely sensitive to noise.</u>

<u>Assessment of Impact</u>. The proposed Energy Facility site would be located in a rural and relatively quiet area with ambient background noise at approximately 20 to 30 dBA. Peaks exceed 70 dBA near farm equipment.

Biological surveys of the Energy Facility site found no evidence of wildlife species that would be uniquely sensitive to noise. Because the Energy Facility site would be located in a low area (relative to surrounding topography), noise impacts to nearby habitat areas would be limited in geographic area and would likely be minor. Based on the available research and the estimated noise level increase during operations, it is unlikely that operation of the Energy Facility would result in adverse effects on the wildlife-inhabiting areas near the Energy Facility site.

No specific regulation has been identified for the Energy Facility site that applies to noise levels in wildlife areas. Noise regulations typically apply to noise-sensitive property defined in human terms such as residences, schools, churches, and hospitals. It is possible that a new noise source could cause reduced wildlife use of surrounding habitat, thereby reducing the value of that habitat. In assessing this possibility, potential impacts to wildlife generally are evaluated on a physiological and behavioral level.

Noise during construction would be temporary and may cause some wildlife species to reduce their use of nearby habitats (behavioral) during the construction period (an indirect disturbance). Some species, such as nesting birds and deer, may modify their behavior during the day when construction noise is present by modifying foraging and nesting locations slightly. The extent of these indirect disturbances would depend on the particular tolerances of species.

Animals are more likely to habituate to operational noise than to construction noise. It is expected that the species currently inhabiting the area around the Energy Facility site would become habituated to the consistent and slight increase in the ambient noise level that would occur during operations. The closest habitat area for wildlife, including the wildlife mitigation area, would be approximately 2,500 feet from the Energy Facility. A noise level of 40 dBA is predicted at this distance. This level is well below the reported levels (80 to 100 dB sound pressure level [SPL]) known to be detrimental to wildlife. Approximately half of the wildlife mitigation area would be within the 40 dBA contour and the remaining half would be below 40 dBA. Operation of the Energy Facility would not impact the wildlife mitigation area.

Operation of the Energy Facility would result in an increase in ambient light. The disturbance effects would be localized to the immediate area of the Energy Facility and wildlife is expected to habituate to these changes. Low-impact directional lighting would be used to focus the light directly toward the Energy Facility, thus reducing ambient light into adjacent areas.

Recommended Mitigation Measures. Workers would be given environmental training to inform them of wildlife and habitat issues. This training would include information about sensitive wildlife, plants, and habitat areas as well as the required precautions to avoid and minimize impacts. Such measures shall include maintaining reasonable driving speeds to avoid harassing or accidentally striking wildlife. Construction personnel would be instructed to be particularly cautious and to drive at slower speeds from 1 hour before sunset to 1 hour after sunrise when some wildlife species are the most active. Speed limits would be posted on signs throughout the construction zone. Sensitive habitat areas would be identified in the field with appropriate signs and flagging.

Where feasible, construction would be limited in natural areas during the breeding period of deer and antelope (April through September), as well as the nesting period of raptors (May through September).

The topographic position of the proposed Energy Facility would minimize indirect effects of noise and ambient light on adjacent habitats.

Impact 3.4.3. Bald Eagles and other birds could be injured or killed by collisions with power lines.

Assessment of Impact. The Energy Facility may impact the bald eagle as a result of collisions with the electric transmission lines. To reduce the potential of avian collisions, the project proponent would provide mitigation by installing bird flight diverters (BFDs) on the top static wires along the entire electric transmission line. BFDs on overhead groundwires have reduced collisions in the range of 57 percent to 89 percent (Avian Power Line Interaction Committee, 1994).

Critical factors in determining the potential for a strike include the height of the towers and lines compared with the normal flight behavior of the bird, wing-loading and its effects on maneuverability, visibility, and the number of times a bird crosses the electric transmission line during daily flight. Collisions by raptors and songbirds are considered to be low due to the maneuverability and flight behavior of these birds (APLIC, 1994). Most areas with high rates of collisions are located close or parallel to areas used by waterfowl (high-wing-load birds) with adverse sight conditions (e.g., fog and low clouds). Collisions typically occur when birds are moving between foraging areas and resting areas during bad weather conditions.

The electric transmission line would not pose risk of electrocution to raptors. The towers would be designed and constructed with adequate separation between phase conductors and conductors to ground so that it would be physically impossible for a bird's wings to bridge any space that would result in the conduction of current. With these design features, there should be no risk of electrocution from the electric transmission line.

Electric transmission lines may allow for population increases of some raptors in areas where natural nesting substrate is limiting (APLIC, 1996). Unlike nests on cliffs with southern exposures, tower nests on beams and cross-braces offer shading for the birds (Anderson, 1975; Nelson and Nelson, 1976; Steenhof et al., 1993). In addition, the height of the nests and their openness (compared to a heat-absorbing cliff) provide air circulation for cooling. Tower-nesting raptors may also benefit by increased protection from ground predators and range fires (Steenhof et al., 1993).

A biological assessment has been developed for potential impacts to bald eagles and is included in Appendix B.

Recommended Mitigation Measures. No mitigation measures beyond those described in the impacts section above are needed.

Impact 3.4.4. Construction and operation of the proposed Energy Facility would disturb less than 0.5 acre of wetlands.

Assessment of Impact. Construction of the electric transmission line access road would require placement of culverts and minor amounts of fill material in three intermittent creeks affected by the proposed project. No other fill or removal would occur in any of the wetland features identified within the Energy Facility area. None of the drainages identified within the Energy Facility area are fish-bearing streams or designated as a Scenic Waterway. No other wetland features would be impacted.

Seasonal Creek #1. This drainage would be crossed in two locations by a 14- to 16-foot-wide access road for construction and maintenance of the electric transmission line. The roadbed would be 14 to 16 feet wide. A culvert would be placed under the roadway to allow for uninterrupted flow of the drainage.

Seasonal Creek #2 (Wright Creek). This drainage would be crossed by the 14- to 16-foot-wide electric transmission line access road. A culvert would be installed to ensure the uninterrupted flow of water through the channel.

Seasonal Creek #3. This channel would be crossed by the 14- to 16-foot-wide electric transmission line access road. A culvert would be placed within the channel to facilitate uninterrupted water flow.

Recommended Mitigation Measures. Impacts to wetland features, including agricultural canals, would be avoided using conventional boring techniques to install the water supply and natural gas pipelines. Erosion control measures would be used where necessary to prevent impacts to wetland areas in close proximity to work areas. Existing grades and drainages would be preserved.

Fill material placed in the seasonal creek to facilitate vehicle access along the electric transmission line would be the minimum amount necessary to allow crossing of the channel. Culverts would be placed under the roadway to facilitate and maintain existing drainage.

Impact 3.4.4. For the process wastewater management alternative by beneficial use of the water for irrigated pasture, constituents in the process wastewater would not be expected to be toxic to wildlife.

Assessment of Impact. A Screening-Level Ecological Risk Assessment (ERA) following EPA and ODEQ guidance was conducted to determine the potential risk to plants, soil invertebrates, and wildlife from the wastewater application. Soil screening-level values for plants, invertebrates, birds, and mammals were available from ODEQ (2001) for many of the inorganic wastewater constituents. For birds, cobalt, iron, silver, thallium, and tin were lacking ODEQ screening values, but studies from which benchmarks could be developed for these metals were available. Similarly, iron, silver, tin, cyanide, and phenol benchmarks were developed for mammals from other sources. Unlike the ODEQ screening values, which are presented as mg constituent per kg soil, these benchmarks are presented as a dose (mg constituent/kg body weight/day) to the receptor. For comparison of these benchmarks, doses based on the maximum soil concentration, literature-derived wildlife parameters (i.e., diet, body weight, food ingestion rate, and soil ingestion rate), and literature-derived bioaccumulation factors for wildlife food items (i.e., plants and arthropods) were calculated for one bird (western meadowlark) and one mammal (deer mouse) for which exposure is likely to be high.

This assessment is included in Appendix C to the biological assessment (which is Appendix C to this EIS). The process wastewater constituents evaluated, except aluminum, barium, boron, chromium III, copper, fluoride, iron, manganese, molybdenum, and nickel, passed the screening evaluation and would be considered to present no risk to ecological receptors.

After further evaluation, background concentrations were found to be the primary driver for screening failures of aluminum, barium, chromium III, copper, fluoride, iron, manganese, and nickel, with negligible incremental contributions of these constituents to the risk estimation. Considering the bioavailability of boron to plants (less than 5 percent of total boron) substantially reduced the risk estimation for boron. Although both incremental and total (incremental + background) boron concentrations continued to exceed screening levels for sensitive plant species, incremental and total exposures were below toxicity thresholds for invertebrates and for boron-tolerant plant species when adjusted for boron bioavailability. Estimated maximum concentrations of molybdenum exceeded the soil benchmark for plants; however, risk to terrestrial plants from molybdenum exposure is considered low because of the low exceedance of the screening value and the highly conservative assumptions applied to the risk estimation. Thus, none of the constituents evaluated are considered to present significant risk to ecological receptors.

Recommended Mitigation Measures. No mitigation measures are recommended because, given the current information, there would not be a significant risk to ecological receptors.

3.4.3 Cumulative Impacts

In the Klamath Ecological Province, past and present agricultural development has had a substantial impact on the amount of native plant communities in areas like the Energy Facility site. These areas have been overgrazed and soil productivity is low. Biodiversity has been reduced by the loss and fragmentation of native habitats. Of the 108.7 acres permanently impacted, approximately 49 acres have been previously impacted by farming practices and the remaining acreage has been grazed by livestock periodically in the past.

The proposed project would not add to the cumulative degradation of the area's habitat, but would rather improve it. The project proposes to restore 91 acres of fallow field to high-quality deer habitat and to improve habitat values on another 145 acres of Facility-owned property. In addition, 31 acres would be irrigated with project wastewater. This irrigated area would produce forage crops for cattle, deer, and antelope.

Construction of the electric transmission line would require the filling and placement of culverts in three small intermittent drainages. This construction and filling would impact less than 0.5 acre of wetlands. This impact would contribute to cumulative impacts to wetlands in the vicinity of the project.

The construction of the transmission towers and electrical lines may result in potential cumulative impacts on eagles, other raptors, and songbirds. To minimize the potential cumulative impacts, mitigation measures as identified in Section 3.4.2 would be implemented.

TABLE 3.4-1
Acreage of Permanent and Temporary Impacts by Habitat

Feature	Total	Habitat Category ODFW 2	Habitat Category ODFW 3	Habitat Category ODFW 4	Habitat Category ODFW 5	Habitat Category ODFW 6	Juniper-Sage	Sage-Steppe	Pine	Ag Field	Pasture	Unimproved Pasture	Fallow	Ruderal	Developed
Permanent Disturbance During the 30-Year Operating Life of the Energy Facility															
Energy Facility Site	50.6	13.9	4.2	32.5									50.6		
Water supply well system	0.3			0.3							0.3				
Water supply pipeline	0.0														
Natural gas pipeline	0.0														
Electric transmission line	57.3	31.6	25.7				31.6	10.4	12.4			2.1	0.8		
Access road to pasture	0.5	0.5											0.5		
Total	**108.7**	**46.0**	**29.9**	**32.8**	**0.0**	**0.0**	**31.6**	**10.4**	**12.4**	**0.0**	**0.3**	**2.1**	**51.9**	**0.0**	**0.0**
Temporary and Permanent Disturbance															
Energy Facility (includes infiltration basin)	50.6	13.9	4.2	32.5									50.6		
Construction parking/laydown	71.0	19.7	6.4	44.9									71.0		
Subtotal—Energy Facility Site	121.6	33.6	10.6	77.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	121.6	0.0	0.0
Water supply well system	1.3			1.3							1.3				
Water supply pipeline	19.4	6.6	1.8	11.0			10.2			1.4	6.3		0.8	0.7	
Natural gas pipeline	43.8	13.1		27.1		3.6	9.0			23.9	0.8		3.5	3.0	3.6
Electric transmission line	64.9	36.3	28.6				35.2	12.2	14.0			2.4	1.1		
Access road to pasture	0.5	0.5											0.5		
Irrigation pipeline to pasture	5.2	4.8		0.4									5.2		
Total	**256.7**	**94.9**	**41.0**	**117.2**	**0.0**	**3.6**	**54.4**	**12.2**	**14.0**	**25.3**	**8.4**	**2.4**	**132.7**	**3.7**	**3.6**

TABLE 3.4-2
Plant Species Observed During Botanical Surveys of the Analysis Area
*(Taxonomy follows Hickman 1993. An * indicates species is an Oregon Department of Agriculture List B noxious weed.)*

Scientific Name	Common Name	Native/ Non-native	Habit
Apiaceae			
Lomatium nudicaule	Pestle lomatium	Native	Perennial
Lomatium triternatum	Lewis' lomatium	Native	Perennial
Lomatium utriculatum	Common lomatium	Native	Perennial
Perideridia oregana	Oregon yampah	Native	Perennial
Asclepiadaceae			
Asclepias speciosa	Showy milkweed	Native	Perennial
Asteraceae			
Achillea millefolium	Yarrow	Native	Perennial
Agoseris glauca	Pale agoseris	Native	Perennial
Antennaria rosea	Rosy pussytoes	Native	Perennial
Anthemis arvensis	Corn chamomile	Non-native	Annual
Artemisia arbuscula	Low sagebrush	Native	Shrub
Artemisia tridentata	Big sagebrush	Native	Shrub
Balsamorhiza sagittata	Arrow-leaved balsam-root	Native	Perennial
Bidens cernua var. *cernua*	Nodding bur-marigold	Native	Perennial
Blepharipappus scaber	Blepharipappus	Native	Annual
*Carduus nutans**	Musk thistle	Non-native	Perennial
Chrysothamnus nauseosus	Grey rabbitbrush	Native	Shrub
Chrysothamnus viscidiflorus	Green rabbitbrush	Native	Shrub
*Cirsium ochrocentrum**	Yellow-spine thistle	Non-native	Perennial
*Cirsium vulgare**	Bull thistle	Non-native	Bien.
Crepis acuminata	Tapertip hawksbeard	Native	Perennial
Crepis modocensis	Low hawksbeard	Native	Perennial
Crocidium multicaule	Spring gold	Native	Annual
Erigeron bloomeri	Scabland fleabane	Native	Perennial
Erigeron filifolius var. *filifolius*	Thread-leaved fleabane	Native	Perennial
Eriophyllum lanatum	Wooly sunflower	Native	Perennial
Microseris laciniata	cutleaf silverpuffs	Native	Perennial
Microseris nutans	Nodding microseris	Native	Perennial
Onopordum acanthium ssp. *acanthium**	Scotch thistle	Non-native	Bien.
Psilocarphus brevissimus	Dwarf wooly-heads	Native	Annual
Senecio canus	Grey groundsel	Native	Perennial
Senecio integerrimus var. *exaltatus*	Western groundsel	Native	Perennial

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Plant Species Observed During Botanical Surveys of the Analysis Area
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Scientific Name	Common Name	Native/ Non-native	Habit
Senecio integerrimus var. *major*	Lambstongue groundsel	Native	Perennial
Stenotus stenophyllus	Narrow -leaf goldenweed	Native	Annual
Taraxacum officinale	Dandelion	Non-native	Perennial
Tragopogon dubius	Goat's beard	Non-native	Perennial
Wyethia angustifolia	Narrow-leaf mule ears	Native	Perennial
Boraginaceae			
Amsinckia sp.	Fiddleneck	---	---
Cryptantha ambigua	Basin cryptantha	Native	Annual
Cryptantha sp.	Cryptantha	---	---
Hackelia cusickii	Cusicks stickseed	Native	Perennial
Lithospermum ruderale	Stoneseed	Native	Perennial
Plagiobothrys stipitatus	Popcorn flower	Native	Annual
Brassicaceae			
Alyssum alyssoides	Small alyssum	Non-native	Annual
Arabis X*divaricarpa*	Rockcress	Non-native	Perennial
Descurainia sophia	Tansy mustard	Non-native	Annual
Idahoa scapigera	Flat-pod	Native	Annual
Lepidium campestre	Field pepperweed	Non-native	Annual
Lepidium perfoliatum	Clasping pepperweed	Non-native	Annual
Phoenicaulis cheiranthoides	Daggerpod	Native	Perennial
Sisymbrium altissimum	Tumble mustard	Non-native	Annual
Campanulaceae			
Downingia sp.	Downingia	---	---
Caprifoliaceae			
Sambucus mexicana	Blue elderberry	Native	Shrub
Caryophyllaceae			
Arenaria aculeata	Needleleaf sandwort	Native	Perennial
Arenaria congesta var. *congesta*	Ballhead sandwort	Native	Perennial
Silene sp.	Campion	---	---
Chenopodiaceae			
Chenopodium album	Lambs quarters	Non-native	Annual
Salsola tragus	Russian thistle	Non-native	Annual
Convolvulaceae			
*Convolvulus arvensis**	Field bindweed	Non-native	Annual

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Plant Species Observed During Botanical Surveys of the Analysis Area
*(Taxonomy follows Hickman 1993. An * indicates species is an Oregon Department of Agriculture List B noxious weed.)*

Scientific Name	Common Name	Native/ Non-native	Habit
Cupressaceae			
Juniperus occidentalis	Western juniper	Native	Tree
Cyperaceae			
Carex filifolia	Thread-leaf sedge	Native	Perennial
Carex sp.	Sedge	---	---
Eleocharis macrostachya	Creeping spikerush	Native	Perennial
Scirpus acutus	Tule	Native	Perennial
Dryopteridaceae			
Cystopteris fragilis	Fragile fern	Native	Fern
Euphorbiaceae			
*Euphorbia esula**	Leafy spurge	Non-native	Perennial
Fabaceae			
Astragalus curvicarpus var. *curvicarpus*	Curvepod milkvetch	Native	Perennial
Astragalus filipes	Basalt milkvetch	Native	Perennial
Astragalus purshii	Pursh's milkvetch	Native	Perennial
Lupinus lepidus var. *sellulus*	Prairie lupine	Native	Perennial
Lupinus leucophyllus	Velvet lupine	Native	Perennial
Medicago sativa	Alfalfa	Non-native	Perennial
Melilotus indica	Sour clover	Non-native	Annual
Vicia americana	American vetch	Non-native	Annual
Gentianaceae			
Swertia albicaulis	Whitestem gentian	Native	Perennial
Geraniaceae			
Erodium cicutarium	Storksbill	Non-native	Annual
Grossulariaceae			
Ribes velutinum	Desert gooseberry	Native	Shrub
Hydrophyllaceae			
Hydrophyllum capitatum	Alpine waterleaf	Native	Perennial
Nemophila pedunculata	Meadow nemophila	Native	Annual
Phacelia hastata	Silverleaf phacelia	Native	Perennial
Phacelia heterophylla ssp. *virgata*	Varileaf phacelia	Native	Perennial
Phacelia linearis	Threadleaf phacelia	Native	Annual
Juncaceae			
Juncus balticus	Baltic rush	Native	Perennial

TABLE 3.4-2
Plant Species Observed During Botanical Surveys of the Analysis Area
*(Taxonomy follows Hickman 1993. An * indicates species is an Oregon Department of Agriculture List B noxious weed.)*

Scientific Name	Common Name	Native/ Non-native	Habit
Lamiaceae			
Agastache urticifolia	Nettle-leaved horsemint	Native	Perennial
Marrubium vulgare	Horehound	Non-native	Perennial
Lemnaceae			
Lemna minor	Duckweed	Native	Perennial
Liliaceae			
Calochortus macrocarpus	Sagebrush mariposa lily	Native	Perennial
Fritillaria atropurpurea	Spotted fritillary	Native	Perennial
Smilacina racemosa	Western Solomon's seal	Native	Perennial
Zigadenus venenosus var. *venenosus*	Death camas	Native	Perennial
Linaceae			
Hesperolinon micranthum	Threadstem flax	Native	Annual
Linum lewisii	Western blue flax	Native	Perennial
Loasaceae			
Mentzelia veatchiana	Veatchs blazingstar	Native	Annual
Malvaceae			
Malva neglecta	Common mallow	Non-native	Perennial
Sidalcea oregana	Oregon checker mallow	Native	Perennial
Onagraceae			
Camissonia tanacetifolia	Tansy-leaved evening primrose	Native	Perennial
Clarkia rhomboidea	Forest clarkia	Native	Annual
Pinaceae			
Pinus ponderosa	Ponderosa pine	Native	Tree
Poaceae			
Achnatherum thurberianum	Thurber's needlegrass	Native	Perennial
Alopecurus pratensis	Meadow foxtail	Non-native	Perennial
Agropyron desertorum	Desert crested wheatgrass	Non-native	Perennial
Agrostis exarata	Spike bentgrass	Native	Perennial
Beckmannia syzigachne	Slough grass	Native	Annual
Bromus madritensis ssp. *rubens*	Red brome	Non-native	Annual
Bromus tectorum	Cheat grass	Non-native	Annual
Deschampsia danthonioides	Annual hairgrass	Native	Annual
Elymus elymoides	Squirreltail	Native	Perennial
Elytrigia elongata	Tall wheatgrass	Non-native	Perennial

TABLE 3.4-2
Plant Species Observed During Botanical Surveys of the Analysis Area
*(Taxonomy follows Hickman 1993. An * indicates species is an Oregon Department of Agriculture List B noxious weed.)*

Scientific Name	Common Name	Native/ Non-native	Habit
Elytrigia intermedia	Intermediate wheatgrass	Non-native	Perennial
*Elytrigia repens**	Quack grass	Non-native	Perennial
Festuca arundinacea	Tall fescue	Non-native	Perennial
Festuca idahoensis	Idaho fescue	Native	Perennial
Hordeum murinum spp. *leporinum*	Farmers foxtail	Non-native	Annual
Leymus triticoides	Creeping wildrye	Native	Perennial
Poa pratensis	Kentucky bluegrass	Non-native	Perennial
Poa secunda	Bluegrass	Native	Perennial
Polypogon monspeliensis	Annual beardgrass	Non-native	Annual
Pseudoroegneria spicata	Bluebunch wheatgrass	Native	Perennial
Secale cereale	Cereal rye	Non-native	Annual
*Taeniatherum caput-medusae**	Medusa head	Non-native	Annual
Polemoniaceae			
Collomia grandiflora	Mountain collomia	Native	Annual
Ipomopsis aggregata	Scarlet gilia	Native	Perennial
Navarretia leucocephala	White-headed navarretia	Native	Annual
Phlox diffusa	Spreading phlox	Native	Perennial
Polygonaceae			
Eriogonum sphaerocephalum var. *halimioides*	Rock buckwheat	Native	Perennial
Eriogonum umbellatum	Sulfur-flower buckwheat	Native	Perennial
Rumex crispus	Curly dock	Non-native	Perennial
Portulacacaea			
Claytonia perfoliata	Miner's lettuce	Native	Annual
Potomagetonaceae			
Potamogeton sp.	Pondweed	---	---
Primulaceae			
Dodecatheon conjugens	Shooting star	Native	Perennial
Dodecatheon pulchellum	Dark-throat shooting star		Perennial
Ranunculaceae			
Adonis aestivalis	Summer pheasant's eye	Non-native	Annual
Delphinium nuttallianum	Dwarf larkspur	Native	Perennial
Myosurus minimus	Mouse-tail	Native	Annual
Ranunculus aquatilus	Aquatic buttercup	Native	Perennial
Ranunculus glaberrimus	Sagebrush buttercup	Native	Perennial

TABLE 3.4-2
Plant Species Observed During Botanical Surveys of the Analysis Area
*(Taxonomy follows Hickman 1993. An * indicates species is an Oregon Department of Agriculture List B noxious weed.)*

Scientific Name	Common Name	Native/ Non-native	Habit
Ranunculus testiculatus	Tubercled crowfoot	Non-native	Annual
Rosaceae			
Amelanchier alnifolia	Service-berry	Native	Shrub
Cercocarpus ledifolius	Mountain mahogany	Native	Perennial
Geum triflorum	Old man's beard	Native	Perennial
Prunus subcordata	Klamath Plum	Native	Perennial
Purshia tridentata	Antelope bitterbrush	Native	Shrub
Rosa woodsii	Interior rose	Native	Shrub
Rubiaceae			
Galium aparine	Common bedstraw	Native	Annual
Galium sp.	Bedstraw	---	---
Salicaceae			
Populus tremuloides	Quaking aspen	Native	Tree
Saxifragaceae			
Lithophragma parviflorum	Woodland star	Native	Perennial
Scrophulariaceae			
Castilleja linariifolia	Desert paintbrush	Native	Perennial
Collinsia parviflora	Blue-eyed Mary	Native	Annual
Penstemon laetus	Mountain blue penstemon	Native	Perennial
Penstemon rydbergii var. *oreocharis*	Meadow beardtongue	Native	Perennial
Penstemon speciosus	Showy penstemon	Native	Perennial
Verbascum thapsus	Common mullein	Non-native	Perennial
Veronica anagallis-aquatica	Water speedwell	Non-native	Perennial
Veronica peregrina var. *xalapensis*	Purslane speedwell	Native	Annual
Solonaceae			
Nicotiana attenuata	Coyote tobacco	Native	Annual
Typhaceae			
Typha latifolia	Broad-leaved cattail	Native	Perennial
Valerianaceae			
Plectritis brachystemon	Short-spurred plectritis	Native	Annual
Violaceae			
Viola bakeri	Baker's violet	Native	Perennial

TABLE 3.4-3
Oregon Department of Fish and Wildlife Mitigation Policy Habitat Classification

Habitat Category	Definition	Mitigation Goal
1	Irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on a physiographic province or site-specific basis, depending on the individual species, population, or unique assemblage	No loss of either habitat quantity or quality
2	Essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on a physiographic province or site-specific basis, depending on the individual species, population, or unique assemblage	If impacts are unavoidable, no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality
3	Essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited on a physiographic province or site-specific basis, depending on the individual species or population	No net loss of either habitat quantity or quality
4	Important habitat for fish and wildlife species	No net loss in either existing habitat quantity or quality
5	Habitat for fish and wildlife having high potential to become either essential or important habitat.	If impacts are unavoidable, to provide a net benefit in habitat quantity or quality
6	Habitat that has low potential to become essential or important for fish and wildlife	Minimize impacts

Source: OAR 635-415-0025

TABLE 3.4-4
Wildlife Species Observed During Field Surveys Within the Analysis Area

Common Name	Scientific Name	Observed Habitat*
Birds		
Pied-billed grebe	*Podilymbus podiceps*	WO
American white pelican	*Pelecanus erythrorhynchos*	T, P
Great blue heron	*Ardea herodias*	WO
Sandhill crane	*Grus canadensis*	WO
Green-winged teal	*Anas crecca*	WO
Mallard	*Anas platyrhynchos*	WO, T
Northern shoveler	*Anas clypeata*	WO
American wigeon	*Anas americana*	WO
Bufflehead	*Bucephala albeola*	WO
Common merganser	*Mergus merganser*	WO
Turkey vulture	*Cathartes aura*	P, GP, WO, T
Bald eagle	*Haliaeetus leucocephalus*	WO, P, T, GP
Northern harrier	*Circus cyaneus*	WO, GP, P
Sharp-shinned hawk	*Accipiter striatus*	T
Cooper’s hawk	*Accipiter cooperii*	T
Red-tailed hawk	*Buteo jamaicensis*	T, WO, GP, P
Swainson’s hawk	*Buteo swainsoni*	WO, T, GP, P
Rough-legged hawk	*Buteo lagopus*	WO, GP, P
California quail	*Callipepla californica*	WO, P
American coot	*Fulica americana*	WO
Killdeer	*Charadrius vociferus*	T, WO, GP, P
Wouldet	*Catoptrophorus semipalmatus*	WO
Common snipe	*Gallinago gallinago*	WO
Gull	*Larus* sp.	WO, P, GP
Forster’s tern	*Sterna forsteri*	WO
Rock dove	*Columba livia*	WO, GP
Mourning dove	*Zenaida macroura*	T, GP
Great horned owl	*Bubo virginianus*	T
Common nighthawk	*Chordeiles minor*	T
Anna’s hummingbird	*Calypte anna*	T, WO
Calliope hummingbird	*Stellula calliope*	T
Red-breasted sapsucker	*Sphyrapicus ruber*	T
Downy woodpecker	*Picoides pubescens*	T
Northern flicker	*Colaptes auratus*	T, WO, GP, P
Say’s phoebe	*Sayornis saya*	T
Ash-throated flycatcher	*Myiarchus cinerascens*	T, WO
Western kingbird	*Tyrannus verticalis*	WO, GP, P, T
Cliff swallow	*Hirundo pyrrhonota*	WO, GP
Steller’s jay	*Cyanocitta stelleri*	WO, T, P
Western scrub jay	*Aphelocoma coerulescens*	P, T, WO
Black-billed magpie	*Pica pica*	T, WO, GP, P
American crow	*Corvus brachyrhynchos*	GP
Common raven	*Corvus corax*	WO
Black-capped chickadee	*Parus atricapillus*	T
Mountain chickadee	*Parus gambeli*	P
White-breasted nuthatch	*Sitta carolinensis*	T
Rock wren	*Salpinctes obsoletus*	T
Ruby-crowned kinglet	*Regulus calendula*	T
Western bluebird	*Sialia mexicana*	WO, P
Mountain bluebird	*Sialia currucoides*	T

TABLE 3.4-4
Wildlife Species Observed During Field Surveys Within the Analysis Area

Common Name	Scientific Name	Observed Habitat*
American robin	*Turdus migratorius*	WO, T
Northern mockingbird	*Mimus polyglottos*	WO, P
Loggerhead shrike	*Lanius ludovicianus*	GP
European starling	*Sturnus vulgaris*	WO, P
Warbling vireo	*Vireo gilvus*	WO, P
Yellow-rumped warbler	*Dendroica coronata*	WO
Western tanager	*Piranga ludoviciana*	WO, T
Spotted towhee	*Pipilo maculatus*	T
Lark sparrow	*Chondestes grammacus*	T, WO, P
Song sparrow	*Melospiza melodia*	WO
Golden-crowned sparrow	*Zonotrichia atricapilla*	T, WO, P
White-crowned sparrow	*Zonotrichia leucophrys*	WO
Dark-eyed junco	*Junco hyemalis*	P
Red-winged blackbird	*Agelaius phoeniceus*	WO
Tricolored blackbird	*Agelaius tricolor*	WO
Western meadowlark	*Sturnella neglecta*	WO, T, GP
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	WO
Brewer's blackbird	*Euphagus cyanocephalus*	WO
Brown-headed cowbird	*Molothrus ater*	WO
Northern oriole	*Icterus galbula*	WO
House finch	*Carpodacus mexicanus*	GP, P, WO, T
Evening grosbeak	*Coccothraustes vespertinus*	WO, T
Mammals		
Pygmy rabbit	*Brachylagus idahoensis*	T
Nuttall's cottontail	*Sylvilagus nuttallii*	T, P, WO, GP
Black-tailed hare	*Lepus californicus*	WO, P
Least chipmunk	*Tamias minimus*.	T, P
Townsend's ground squirrel	*Spermophilus townsendii*	T, P, WO, GP
California ground squirrel	*Spermophilus beecheyi*	T, P, WO, GP
Golden-mantled ground squirrel	*Spermophilus lateralis*	T
Yellow-bellied marmot	*Marmota flaviventris*	WO, P, T
Northern pocket gopher	*Thomomys talpoides*	P
Ord's kangaroo rat	*Dipodomys ordii*	P
Dusky-footed woodrat	*Neotoma fuscipes*	P
Bushy-tailed woodrat	*Neotoma cinerea*	T
Coyote	*Canis latrans*	T, WO, GP, P
Mule deer	*Odocoileus hemionus*	WO, T, GP, P
Pronghorn	*Antilocapra americana*	T, P
Amphibians and Reptiles		
Western fence lizard	*Sceloporus occidentalis*	P, WO, GP, T
Sagebrush lizard	*Sceloporus graciosus*	P, WO, GP, T
Racer	*Coluber constrictor*	T
Garter snake	*Thamnophis elegans*	T
Bullfrog	*Rana catesbeiana*	W

* Linear types in which species were observed during surveys.

GP = natural gas pipeline route
P = Energy Facility site
T = electric transmission line route
WO = water supply pipeline route overland

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Fish						
Interior redband trout *Oncorhynchus mykiss* sp. *O. newberri*	SoC	BT	V	2	Lake dwelling fish, but would move into tributary rivers and streams to spawn	Lost River watershed, no suitable habitat within the survey area.
Klamath large scale sucker *Chasmistes brevirostris*	SoC	BT	--	2	Inhabits riverine systems, known to inhabit both lentic and lotic environments	Lost River watershed, no suitable habitat within the survey area
Pacific lamprey *Lampetra tridentata*	SoC	BT	SV	2	Anadromous, parasitic species with the period of parasitism occurring in the ocean. Live in fresh water habitats where they are burrowing filter feeders.	Lost River watershed, no suitable habitat within the survey area
Reptiles						
Northern sagebrush lizard *Sceloporus graciosus graciosus*	SoC	BT	V	4	Sagebrush-steppe, juniper woodland, and conifer forest habitats in areas with open ground and rocks for basking	Potential sighting of an individual species on northern portion of proposed Energy Facility site
Northwestern pond turtle *Clemmys marmorata marmorata*	SoC	BS	C	1	Quiet waters such as lakes, ponds, marshes, and slow moving creeks	Pond turtles reported in the vicinity of the Lost River; however, none observed within analysis area
Birds						
Bald Eagle *Haliaeetus leucocephalus*	FT				Nests in large, old-growth trees or dominant live trees with open branches. Most nests are within one mile of water. Roosts communally in winter	Foraging throughout the project area
American white pelican *Pelecanus erythrorhynchos*	--	BA	V	2	Inland lakes and wetlands	Suitable habitat in vicinity; observed flying over proposed Facility site; carcass observed east of proposed electric transmission line
Black tern *Chlidonias niger*	SoC	BT	--	4	Emergent vegetation along marshes, rivers, and ponds	Not observed; Suitable habitat present

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Greater sandhill crane *Grus canadensis tabida*	--	BT	V	4	Marshes, wet meadows, grasslands, irrigated pastures	Suitable habitat present, one foraging bird observed east of water pipeline near freshwater marsh
Lewis' woodpecker *Melanerpes lewis*	SoC	BS	V	4	Oak woodlands, ponderosa pine woodlands, cottonwood riparian forests	Not observed; Suitable habitat along the electric transmission line alignment
Mountain quail *Oreortyx pictus*	SoC	BT	U	4	Open forests and woodlands with dense shrubby undergrowth, chaparral, riparian woodlands	Not observed; Suitable habitat present
Northern goshawk *Accipiter gentilis*	SoC	BS	C	2	Conifer forests with dense canopies, possibly in more open ponderosa pine woodlands and quaking aspen groves	Not observed; Marginal habitat present along electric transmission line alignment
Olive-sided flycatcher *Contopus cooperi*	SoC	BT	V	4	Mixed conifer forests, usually with open, uneven canopy layers	Not observed; Limited habitat along the electric transmission line alignment
Tricolored blackbird *Agelaius tricolor*	SoC	BA	P	2	Dense emergent vegetation or in wouldow or other shrubs in and around wetland areas	Potential sightings of individuals approximately 1,200 feet southwest of the Babson well site
Western sage grouse *Centrocercus urophasianus*	SoC	BT	V	1	Sagebrush-steppe	Not observed; suitable habitat present
White-headed woodpecker *Picoides albolarvatus*	SoC	--	C	4	Ponderosa pine and mixed conifer forests	Not observed; Suitable habitat along the electric transmission line alignment
Wouldow flycatcher *Empidonax trailli adastus*	SoC	BT	--	4	Brush thickets along stream and marshes, shrubs along the margins of forests and grasslands in areas close to water	No suitable habitat present
Yellow rail *Coturnicops noveboracensis*	SoC	BS	C	2	Freshwater wetlands, with emergent vegetation, usually in areas surrounded by wouldows	Not observed; Limited habitat present south of water supply alignment

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Mammals						
Fringed myotis *Myotis thysanodes*	SoC	BT	V	2	Sagebrush-grass steppe, oak and pinyon juniper woodlands	Not observed; Suitable habitat present
Long-eared myotis *Myotis evotis*	SoC	BT	U	4	Coniferous forests, does occur in semiarid shrublands, sage, chaparral, agricultural areas	Not observed; Suitable habitat present
Long-legged myotis *Myotis volans*	SoC	BT	U	4	Primarily in coniferous forests, also seasonally in desert habitats	None observed; Suitable habitat present
Pallid bat *Antrozous pallidus*	--	BT	V	3	Arid and semiarid, lowland habitats such as desert scrub, grasslands, and oak woodlands	Not observed; Suitable habitat present
Pronghorn antelope *Antilocapra americana*	--	--		--	Grasslands, sagebrush flats, and shad-scale covered valleys of the central and southeastern part of Oregon. Low sagebrush is an important habitat component.	Observed in analysis area; and along electric transmission line alignment, and on the Energy Facility site
Pygmy rabbit *Brachylagus idahoensis*	SoC	--	V	2	Sagebrush-steppe in areas with deep friable soil	Observed in analysis area; three sightings along the electric transmission line alignment
Silver-haired bat *Lasionycteris noctivagans*	SoC	BT	U	4	Mixed conifer/hardwood forests, in winter and during seasonal migrations in low elevation, more xeric habitats	Not observed; Suitable habitat present
Small-footed myotis *Myotis ciliolabrum*	SoC	BT	U	4	Deserts, chaparral, riparian zones, and western coniferous forest; most common above pinyon-juniper forest	Not observed; Suitable habitat present
Townsend's big-eared bat *Corynorhinus townsendii*	SoC	--	C	2	Sagebrush-grass steppe, agricultural areas, near caves and structures for roosting	Not observed; potential foraging areas is present
Yuma myotis *Myotis yumanensis*	SoC	BT	--	4	Variety of habitats including arid scrublands and deserts, forests	Suitable habitat present; likeliest species to be night roosting near Babson Well

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Invertebrates						
Apatania tavala Cascades apatanian caddisfly	SoC	--	--	4		
California floater (mussel) *Anodonta californiensis*	SoC	BT	--	3	Shallow areas of lakes, reservoirs and streams with sandy or muddy substrates	No suitable habitat present
Cockrell's striated disc (snail) *Discus shimeki cockerelli*	SoC	BT	--	--	Montane environments at elevations between 7,000 and 12,000 feet under rocks and dead wood in a variety of habitat types	No suitable habitat present
Homoplectra schuhi Schuh's homoplectran caddisfly	SoC	--	--	3		
Lake of the Woods pebblesnail and Lost River pebblesnail *Fluminicola sp.*	--	SMA	--	1	Spring fed tributaries in the Klamath watershed, gravelly or cobble substrates	No suitable habitat present
Lost River springsnail *Pyrgulopsis sp.*	--	--	--	1	Cold flowing waters with high dissolved oxygen and gravelly or cobbly substrates	No suitable habitat present
Peaclam *Pisidium ultramontanum*	SoC	BS	--	--	Lakes, rivers and streams lacking dense vegetation with high dissolved oxygen, and sparse macrophytic vegetation, sand/gravel substrates.	No suitable habitat present
Plants						
American pillwort *Pilularia americana*	--	--	--	2	Vernal pools and along the margins of lakes, ponds and reservoirs at elevations below 5,500 feet	Not observed; Some habitat present, known to occur along margins of reservoirs east of analysis area.
Baker's globe mallow *Illiama bakerii*	--	--	--	1	Chaparral, sagebrush and juniper woodland habitats at elevations between 3,000 and 8,500 feet	Not Observed, Suitable habitat present

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Bellinger's meadowfoam *Limnanthes floccossa* ssp. *Bellingeriana*	--	--	C	1	Vernal pools, moist meadows and seeps in open pine-oak woodlands at elevations between 900 and 4,000 feet	Not observed; Limited habitat present
Blue-leaved penstemon *Penstemon glaucinus*	--	--	--	1	High elevation lodgepole and white fir forests	No suitable habitat; All known populations occur on 6400 acres of Federal lands managed by the Fremont NF, Winema NF and the BLM.
Columbia yellowcress *Rorippa columbiae*	--	--	C	1	Along streams, lakes, wet meadows and other seasonally saturated areas at elevations between 4,000 and 6,000 feet	Not observed; Suitable habitat present
Creeping woody rock cress *Arabis suffrutescens var horizontalis*	SoC	--	C	1	Sagebrush scrub, Yellow pine forest and red fir forest at elevations less than 5,000 feet	Not observed; Suitable habitat present
Disappearing monkeyflower *Mimulus evanescens*	SoC	--	C	1	Great basin scrub, lower montane conifer forest, pinyon juniper woodland; gravelly, rocky; vernally moist areas at elevations between 4,000 and 6,000 feet	Not observed; Suitable habitat present
Flaccid sedge *Craex leptalea*	--	--	--	3	Bogs, fens, marshes, swamps, seeps and wet meadows at elevations less than 2,500 feet	Not observed; Limited habitat present; above known elevation range of species
Fringed campion *Silene nuda ssp. Insectivora*	--	--	--	4	Meadows in ponderosa / lodgepole pine forest openings at elevations between 4,000 and 6,000 feet	Meadows in ponderosa / lodgepole pine forest openings
Greene's Mariposa lily *Calachortus greenei*	SoC	--	C	1	Oak woodland, pinyon juniper woodland, coniferous forest, meadows and seeps, volcanic soil, at elevations between 3,000 and 6,500	Not observed; Suitable habitat present
Green-flowered wild ginger *Asarum wagneri*	--	--	C	1	Mixed conifer and lodgepole pine forests at elevations ranging from 4,500 to 8,500 feet	Not observed; Limited habitat present

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Green-tinged paintbrush *Castilleja chlorotica*	--	--	--	1	Dry gravelly slopes, and grassy openings in ponderosa pine or lodgepole pine forests at elevations between 5,000 and 8,200 feet	Not observed; Suitable habitat present
Howell's false caraway *Perideridia howellii*	--	--	--	4	Ponderosa pine, mixed conifer, meadows, along streams and on moist slopes at elevations between 2,000 and 5,000 feet	Not observed; Suitable habitat present
Lady slipper orchid *Cypripedium fasciculatum*	SoC	SMC	C	C/1	Open conifer forest at elevations, generally acidic soil, at elevations between 500 and 7,500 feet	Not observed; Limited habitat present
Least phacelia *Phacelia minutissima*	--	--	C	1	Open, ephemerally moist areas in meadows, sagebrush-steppe, lower montane forests and riparian areas at elevations between 4,000 and 8,000 feet	Not observed; Suitable habitat present
Lemmon's catchfly *Silene lemmonii*	--	--	--	3	Oak woodlands and conifer forests at elevations between 2,800 and 9,000 feet	Not observed; Suitable habitat present
Long-bearded Mariposa lily *Calachortus longebarbatus*	--	--	--	1	Meadows or along the edges of ponderosa pine, lodgepole pine forests and in juniper woodlands at elevations between 4,000 and 6,000 feet	Meadows in ponderosa / lodgepole pine forest openings
Mountain lady's slipper *Cypripedium montanum*	--	SMC	--	4	Mixed conifer forests and woodlands at elevations ranging from 300 to 6,000 feet	Not observed; Suitable habitat present
Mt. Mazama collomia *Collomia mazama*	--	--	--	1	Alpine meadows and on slopes in association with mixed conifer, true fir and lodgepole pine forests, generally on open or disturbed areas at elevations generally above 5,000 feet	No suitable habitat present

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Newberry's gentain *Gentiana newberryi*	--	--	--	2	Vernally wet to dry, subalpine and alpine meadows, along mountain streams at elevations between 5,000 and 12,000 feet	No suitable habitat present
Playa phacelia *Phacelia inundata*	SoC	--	--	1	Sagebrush scrub, yellow pine forests, alkali sinks and playas, on alkaline soil 4,500 to 6,000 feet.	Not observed; Limited habitat present
Profuse –flowered mensa mint *Pogogyne floribunda*	SoC	--	--	1	Vernal pools, seasonal lakes and intermittent drainages at elevations between 3,200 and 5,000 feet	Not observed; limited habitat present
Prostrate buckwheat *Erigonum procidum*	SoC	--	C	1	Dry, rocky slopes, and flats within juniper-sagebrush and Jeffery pine woodlands at elevations between 4,000 and 8,500 feet	Not observed; Suitable habitat present
Rafinesque's pondweed *Potamogeton diversifolius*	--	--	--	2	Ponds, streams and reservoirs below 8,000 feet	Not observed; Limited habitat present
Red-root yampah *Perideridia erythrorhiza*	SoC	--	C	1	Meadows, pastures, and open areas in pine-oak woodlands at elevations less than 5,000 feet	Not observed; Suitable habitat present
Salt heliotrope *Heliotropum curvassavicum*	--	--	--	3	Many different plant communities at elevations less than 7,000 feet, but is generally associated with saline soil	Not observed; Suitable habitat present
Shockley's ivisia *Ivesia shockleyi*	--	--	--	2	Open gravelly, rocky areas associated with subalpine fir and pine forests, at elevations between 9,000 and 13,000 feet	No suitable habitat present
Short-podded thelypody *Thelypodium brachycarpum*	--	--	--	2	Irrigated pasture, sagebrush shrub, pond and stream edges; adjacent to ponderosa pine forests; alkali soil at elevations between 3,000 and 6,500 feet	Not observed; Suitable habitat present

TABLE 3.4-5
Special-Status Species Potentially Occurring Within the Analysis Area

Species	FWS	BLM	ODFW ODA	ONHP	Habitat Requirements	Potential Occurrence in Analysis Area
Slender bulrush *Scirpus heterochaetus*	--	--	--	3	Marshes, swamps and around lake edges, in lower montane conifer forests at elevations around 5,000 feet	Not observed; Limited habitat present
Tricolor monkeyflower *Mimulus tricolor*	--	--	--	2	Moist flats on wet clay soil and in vernal pools within woodlands and grasslands, at elevations less than 5,000 feet	Not observed; Limited habitat present
Warner Mountain bedstraw *Gallium serpenticum* var. *warnerense*	--	--	--	2	Meadows and seeps, pinyon / juniper woodland, conifer forest and rocky talus at elevations between 4,500 and 9,000 feet	Not observed; Suitable habitat present

United States Fish and Wildlife Service (FWS)
SoC Federal Species of Concern

Bureau of Land Management, Klamath Falls Resource Area Special Status Species (BLM)
BA Bureau Tracking Species
BS Bureau Assessment Species
BS Bureau Sensitive Species
SMA Survey and Manage Category A Species
SMB Survey and Manage Category B Species
SMC Survey and Manage Category C Species

Oregon Department of Fish and Wildlife (ODFW) / Oregon Department of Agriculture (ODA)
C Candidate for state listing as threatened or endangered
V Vulnerable species for which listing as threatened or endangered is not believed to be imminent
U Undetermined status; more information is needed to determine the conservation status of the species
P Peripheral or naturally rare species, species on the edge of their natural range in Oregon, or have naturally low populations within the state

Oregon Natural Heritage Program (ONHP)
1 Taxa that are threatened or endangered throughout their range
2 Taxa that are threatened or endangered in Oregon, but more secure elsewhere
3 Review list, taxa for which more information is needed to determine the conservation status
4 Species that are of conservation concern, but are not currently threatened or endangered

TABLE 3.4-6
Threatened, Endangered, and Candidate Species Known or Suspected to Occur in the Analysis Area

Species	USFWS Status	ODFW Status	Available Habitat in the Analysis Area	Detected in Analysis Area
Bald Eagle (*Haliaeetus leucocephalus*)	T, AD	T	Yes, foraging habitat	Yes, observed throughout the Energy Facility site and its associated linear facilities.
Shortnose Sucker (*Chasmistes brevirostris*)	E	E	No*	No
Lost River Sucker (*Deltistes luxatus*)	E	E	No*	No
Gentner's Fritillaria (*Fritillaria gentneri*)	E	E	No	No
Peck's Milk-Vetch (*Astragalus peckii*)	SoC	T	Yes	No
Applegate's Milk-Vetch (*Astragalus applegatei*)	E	E	No	No
Pumice Grape Fern (*Botrychium pumicola*)	T	T	No	No
Oregon Spotted Frog (*Rana pretiosa*)	C	SC	No	No

AD=candidate for delisting, C=candidate for listing, E=endangered, SC=critical species, SoC=species of concern, T=threatened

ODFW=Oregon Department of Fish and Wildlife
USFWS=U.S. Fish and Wildlife Service

*Species may occur in the Lost River watershed, which is in the proximity of the analysis area.

TABLE 3.4-7
Wetland Features in the Analysis Area

Wetland	Classification*	Description	Location	Area of Impact
Lost River	R2ABH	Regulated riverine habitat, flow controlled by Clear Lake Dam	Approximately 1.3 miles north of proposed Energy Facility site, and 900 feet east of Babson well site	None
Freshwater Marsh	PEMF/PEMC	Cattails, bulrush, and open water habitat	Approximately 900 feet south of water supply pipeline, on the west side of East Langell Valley Road	None
Seasonal Wetland	PEMF	Shallow, seasonally flooded depression. Vegetation characterized by sedges and rushes.	Approximately 200 feet west of electric transmission line easement, approximately 2 miles south of proposed Energy Facility site	None
Seasonal Creek #1	None	Narrow, cobbly drainage channel. Vegetation characterized by Sandberg's bluegrass.	Just south of where the northern portion of the electric transmission route turns south	0.003 acre
Wright Creek	PEMA	Shallow channel, characterized by sedges, rushes, and moss	Approximately 1.7 miles southwest of the Energy Facility along the electric transmission line route	0.01 acre
Seasonal Creek #3	PABHh (stock pond only)	Narrow shallow drainage and associated stock pond, no wetland plants	Approximately 4 south of the Energy Facility site on the east side of existing natural gas pipeline easement	0.003 acre
Seasonal Creek #4	PEMCx	Realigned seasonal creek, now used for agricultural drainage	Along natural gas pipeline, approximately 0.3 mile from West Langell Valley Road, in alfalfa fields	None
Seasonal Creek #5	PEMC	Dry creek channel, lacking vegetation	Approximately 200 feet west of natural gas pipeline at PG&E GTN compressor station	None
Agricultural Canal #1	NA	Agricultural drainage canal, along edge of pasture	On adjacent property at southeast end of the proposed Energy Facility site	None
Agricultural Canal #2	NA	Lateral irrigation canal within pastureland	Approximately 25 feet north of natural gas pipeline, near Babson well	None
Agricultural Canal #3	R4SBFx	Water conveyance canal	Approximately 450 feet east of East Langell Valley Road along water supply pipeline	None
Agricultural Canal #4	NA	Two to 3 inches of water present, some grasses and sedges within channel	Within irrigated pasture, approximately 0.5 mile east of Teare Lane	None

TABLE 3.4-7
Wetland Features in the Analysis Area

Wetland	Classification*	Description	Location	Area of Impact
Agricultural Canal #5	R2ABFx	Dry earthen ditch, no vegetation observed	Within irrigated pasture, approximately 0.5 mile east of Teare Lane and 100 feet south of water supply pipeline	None
Agricultural Canal #6	NA	Few inches of ponded water at west end, lacking vegetation	South side of Harpold Road, at north end of alfalfa field, south of natural gas pipeline	None

* National Wetland Inventory (NWI) Abbreviations (Cowardin et al., 1979)

PABHh—Palustrine, Aquatic Bed, Permanently Flooded, Impounded
PEMF—Palustrine Emergent, Semipermanently Flooded
PEMC—Palustrine Emergent, Seasonally Flooded
PEMCx—Palustrine Emergent, Seasonally Flooded, Excavated
R2ABFx—Riverine, Lower Perennial, Aquatic Bed, Semipermanently Flooded, Excavated
R2ABH—Riverine, Lower Perennial, Aquatic Bed, Permanently Flooded
R4SBFx—Riverine, Streambed, Semipermanently Flooded, Excavated

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Fish	**Potential Impacts**			**Proposed Mitigation**		
	Construction of new access roads along the transmission line corridor would result in less than 0.5 acre of impact to intermittent creeks.			Construction during the dry season is recommended as a mitigation measure to avoid the presence of fish and minimize erosion and sedimentation. Culverts would be installed to ensure the uninterrupted flow of water through the channel.		
Interior redband trout *Oncorhynchus mykiss* sp. *O. newberrii*	SoC	V/2	Lake dwelling fish, but would move into tributary rivers and streams to spawn	No suitable habitat present	No impacts	No mitigation
Klamath large scale sucker *Chasmistes brevirostris*	SoC	--/2	Inhabits riverine systems, known to inhabit both lentic and lotic environments	No suitable habitat present	No impacts	No mitigation
Pacific lamprey *Lampetra tridentata*	SoC	SV/2	Anadromous, parasitic species with the period of parasitism occurring in the ocean. Live in fresh water habitats where they are burrowing filter feeders.	No suitable habitat present	No impacts	No mitigation
Wildlife	**Potential Impacts**			**Proposed Mitigation**		
	Construction and operation of the proposed Energy Facility could cause a temporary or permanent loss of vegetation and wildlife habitat.			To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures would be implemented during construction to the minimum extent of area needed for practical and safe working areas, to identify off-limits area, and revegetate disturbed areas. Workers would receive training regarding wildlife and habitat and safe vehicle speeds.		
	Construction and operation of the proposed Energy Facility would cause noise and lighting that could disturb wildlife.			Where feasible, construction would be limited in natural areas during the breeding period of deer and antelope (April-September), as well as the nesting period of raptors (May –September). Low-impact directional lighting would be used to reduce ambient light into adjacent areas.		
	Bald eagles and other birds could be injured or killed by collisions with power lines.			Flight diverters would be installed on the top shield wires. Facility water sources (a potential draw for waterfowl) would be designed to discourage avian use. Towers would be designed and constructed so that it would be physically impossible for a bird's wings to bridge any space that would result in the conduction of current.		
	Construction and operation of the proposed Energy Facility would disturb wetlands.			Directional boring techniques and a minimum amount of fill would be used to avoid impacts to wetlands. Erosion control measures would be implemented to protect wetlands and existing grades and drainages would be preserved (including culverts under roadways).		

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Reptiles						
Northern sagebrush lizard *Sceloporus graciosus graciosus*	SoC	V/4	Sagebrush-steppe, juniper woodland, and conifer forest habitats in areas with open ground and rocks for basking	Observed on northern portion of proposed Energy Facility site	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat	Low-impact directional lighting would be used to reduce ambient light into adjacent areas. To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures would be implemented, such as re-planting sagebrush in areas vegetation removed.
Northwestern pond turtle *Clemmys marmorata marmorata*	SoC	C/1	Quiet waters such as lakes, ponds, marshes, and slow moving creeks	Pond turtles observed in the vicinity of the Lost River; however, none observed within analysis area	Possible disturbance by noise and/or lighting	Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Birds						
American white pelican *Pelecanus erythrorhynchos*	--	V/2	Inland lakes and wetlands	Suitable habitat in vicinity; observed flying over proposed Facility site; carcass observed east of proposed electric transmission line	Temporary and/or permanent loss of habitat. Possible disturbance by noise and/or lighting. Could be injured or killed by collisions with power lines.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Facility water sources (a potential draw for waterfowl) would be designed to discourage avian use. Bird flight diverters would be added to the top ground wires of the transmission line.
Bald eagle *Haliaeetus leucocephalus*	FT		Nests in large, old-growth trees or dominant live trees with open branches. Most nests are within one mile of water. Roosts communally in winter	Known to occur in the analysis area and suitable nesting habitat was identified within the ponderosa pine (Pinus ponderosa) habitat for a 1.3-mile section of the electric transmission line approximately 2 miles north of the Captain Jack Substation. No nests	Temporary and/or permanent loss of habitat. Possible disturbance by noise and/or lighting Could be injured or killed by collisions with power lines.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Where feasible, construction would be limited in natural areas during the nesting period of raptors (May –September). Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Bird flight diverters would be added to the top

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
				were observed during surveys conducted in 2002.		ground wires of the transmission line.
Black tern *Chlidonias niger*	SoC	--/4	Emergent vegetation along marshes, rivers, and ponds	Not observed; Suitable habitat present	No impacts	No mitigation
Greater sandhill crane *Grus canadensis tabida*	--	V/4	Marshes, wet meadows, grasslands, irrigated pastures	Suitable habitat present, one foraging bird observed east of water pipeline near freshwater marsh	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat. Could be injured or killed by collisions with power lines.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Bird flight diverters would be added to the top ground wires of the transmission line.
Lewis' woodpecker *Melanerpes lewis*	SoC	V/4	Oak woodlands, ponderosa pine woodlands, cottonwood riparian forests	Not observed; Suitable habitat along the electric transmission line alignment	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat. Could be injured or killed by collisions with power lines.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Risk of collisions by songbirds are considered to be low due to maneuverability and flight behavior. Bird flight diverters would be added to the top ground wires of the transmission line.
Mountain quail *Oreortyx pictus*	SoC	U/4	Open forests and woodlands with dense shrubby undergrowth, chaparral, riparian woodlands	Not observed; Suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Northern goshawk *Accipiter gentilis*	SoC	C/2	Conifer forests with dense canopies, possibly in more open ponderosa pine woodlands and	Not observed; Marginal habitat present along electric transmission line	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.

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Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
			quaking aspen groves	alignment	Could be injured or killed by collisions with power lines.	Where feasible, construction would be limited in natural areas during the nesting period of raptors (May –September). Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Risk of collisions by raptors with lines are considered to be low due to maneuverability and flight behavior. Bird flight diverters would be added to the top ground wires of the transmission line.
Olive-sided flycatcher *Contopus cooperi*	SoC	V/4	Mixed conifer forests, usually with open, uneven canopy layers	Not observed; Limited habitat along the electric transmission line alignment	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat. Could be injured or killed by collisions with power lines.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Risk of collisions by songbirds are considered to be low due to maneuverability and flight behavior. Bird flight diverters would be added to the top ground wires of the transmission line.
Tricolored blackbird *Agelaius tricolor*	SoC	P/2	Dense emergent vegetation or in willow or other shrubs in and around wetland areas	Observed approximately 1,200 feet southwest of the Babson well site	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat. Could be injured or killed by collisions with power lines.	Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Risk of collisions by songbirds are considered to be low due to maneuverability and flight behavior. Bird flight diverters would be added to the top ground wires of the transmission line.
Western sage grouse *Centrocercus urophasianus*	SoC	V/1	Sagebrush-steppe	Not observed; suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
White-headed	SoC	C/4	Ponderosa pine and	Not observed;	Possible disturbance by	To the extent practicable, the facilities would be

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
woodpecker *Picoides albolarvatus*			mixed conifer forests	Suitable habitat along the electric transmission line alignment	noise and/or lighting Temporary and/or permanent loss of habitat. Could be injured or killed by collisions with power lines.	located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas. Risk of collisions by songbirds are considered to be low due to maneuverability and flight behavior. Bird flight diverters would be added to the top ground wires of the transmission line.
Willow flycatcher *Empidonax trailli adastus*	SoC	--/4	Brush thickets along stream and marshes, shrubs along the margins of forests and grasslands in areas close to water	No suitable habitat present	No impacts	No mitigation
Yellow rail *Coturnicops noveboracensis*	SoC	C/2	Freshwater wetlands, with emergent vegetation, usually in areas surrounded by willows	Not observed; Limited habitat present south of water supply alignment	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Mammals						
Fringed myotis *Myotis thysanodes*	SoC	V/2	Sagebrush-grass steppe, oak and pinyon juniper woodlands	Not observed; Suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Long-eared myotis *Myotis evotis*	SoC	U/4	Coniferous forests, does occur in semiarid shrublands, sage, chaparral, agricultural areas	Not observed; Suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Long-legged myotis	SoC	U/4	Primarily in coniferous	None observed;	Possible disturbance by	To the extent practicable, the facilities would be

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Myotis volans			forests, also seasonally in desert habitats	Suitable habitat present	noise and/or lighting Temporary and/or permanent loss of habitat.	located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Mule deer *Odocoileus hemionus*	--	--	Early and intermediate successional stages of most forest, woodland, and brush habitats. Prefers mosaic of various-aged vegetation.	Mapped by Klamath County as high-density mule deer winter range	Possible disturbance by noise and/or lighting Permanent loss of wintering range	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Where feasible, construction would be limited in natural areas during the breeding period of deer and antelope (April-September). Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Pallid bat *Antrozous pallidus*	--	V/3	Arid and semiarid, lowland habitats such as desert scrub, grasslands, and oak woodlands	Not observed; Suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Pronghorn *Antilocapra americana*	--	--	Grasslands, sagebrush flats, and shad-scale covered valleys of the central and southeastern part of Oregon. Low sagebrush is an important habitat component.	Observed in analysis area; and along electric transmission line alignment, and on the Energy Facility site	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Where feasible, construction would be limited in natural areas during the breeding period of deer and antelope (April-September). Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Pygmy rabbit *Brachylagus idahoensis*	SoC	V/2	Sagebrush-steppe in areas with deep friable soil	Observed in analysis area; three sightings along the electric transmission line alignment	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.

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Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Silver-haired bat *Lasionycteris noctivagans*	SoC	U/4	Mixed conifer/hardwood forests, in winter and during seasonal migrations in low elevation, more xeric habitats	Not observed; Suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Small-footed myotis *Myotis ciliolabrum*	SoC	U/4	Deserts, chaparral, riparian zones, and western coniferous forest; most common above pinyon-juniper forest	Not observed; Suitable habitat present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Townsend's big-eared bat *Corynorhinus townsendii*	SoC	C/2	Sagebrush-grass steppe, agricultural areas, near caves and structures for roosting	Not observed; potential foraging areas present	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of foraging habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Yuma myotis *Myotis yumanensis*	SoC	--/4	Variety of habitats including arid scrublands and deserts, forests	Suitable habitat present; likeliest species to be night roosting near Babson Well	Possible disturbance by noise and/or lighting Temporary and/or permanent loss of habitat.	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented. Low-impact directional lighting would be used to reduce ambient light into adjacent areas.
Invertebrates						
California floater (mussel) *Anodonta californiensis*	SoC	--/3	Shallow areas of lakes, reservoirs and streams with sandy or muddy substrates	No suitable habitat present	No impacts	No mitigation
Cockerell's striated disc (snail) *Discus shimeki cockerelli*	SoC	--/--	Montane environments at elevations between 7,000 and 12,000 feet under rocks and dead wood in a variety of habitat types	No suitable habitat present	No impacts	No mitigation

TABLE 3.4-8
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Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Lake of the Woods pebblesnail and Lost River pebblesnail *Fluminicola sp.*	--	--/1	Spring fed tributaries in the Klamath watershed, gravelly or cobble substrates	No suitable habitat present	No impacts	No mitigation
Lost River springsnail *Pyrgulopsis sp.*	--	--/1	Cold flowing waters with high dissolved oxygen and gravelly or cobbly substrates	No suitable habitat present	No impacts	No mitigation
Peaclam *Pisidium ultramontanum*	SoC	--/--	Lakes, rivers and streams lacking dense vegetation with high dissolved oxygen, and sparse macrophytic vegetation, sand/gravel substrates.	No suitable habitat present	No impacts	No mitigation
Plants	**Potential Impacts**			**Proposed Mitigation**		
	Construction and operation of the proposed Energy Facility would disturb soil, existing vegetation, and a very small area of wetlands.			Mitigation measures would be implemented during construction to the minimum extent of area needed for practical and safe working areas, to identify off-limits area, and revegetate disturbed areas. Workers would receive training regarding wildlife and habitat and safe vehicle speeds. Directional boring techniques and a minimum amount of fill would be used to avoid impacts to wetlands.		
American pillwort *Pilularia americana*	--	--/2	Vernal pools and along the margins of lakes, ponds and reservoirs at elevations below 5,500 feet	Not observed; Some habitat present, known to occur along margins of reservoirs east of analysis area.	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Baker's globe mallow *Illiama bakerii*	--	--/1	Chaparral, sagebrush and juniper woodland habitats at elevations between 3,000 and 8,500 feet	Not Observed, Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Bellinger's meadowfoam *Limnanthes floccossa* ssp. *bellingeriana*	--	C/1	Vernal pools, moist meadows and seeps in open pine-oak woodlands at elevations between 900 and 4,000 feet	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Blue-leaved penstemon *Penstemon glaucinus*	--	--/1	High elevation lodgepole and white fir forests	No suitable habitat; All known populations occur on 6400 acres of Federal lands managed by the Fremont NF, Winema NF and the BLM.	No impacts	No mitigation
Columbia yellowcress *Rorippa columbiae*	--	C/1	Along streams, lakes, wet meadows and other seasonally saturated areas at elevations between 4,000 and 6,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Creeping woody rock cress *Arabis suffrutescens var horizontalis*	SoC	C/1	Sagebrush scrub, Yellow pine forest and red fir forest at elevations less than 5,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Disappearing monkeyflower *Mimulus evanescens*	SoC	C/1	Great basin scrub, lower montane conifer forest, pinyon juniper woodland; gravelly, rocky; vernally moist areas at elevations between 4,000 and 6,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Flaccid sedge *Craex leptalea*	--	--/3	Bogs, fens, marshes, swamps, seeps and wet meadows at elevations less than 2,500 feet	Not observed; Limited habitat present; above known elevation range of species	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Fringed campion *Silene nuda ssp. insectivora*	--	--/4	Meadows in ponderosa/ lodgepole pine forest openings at elevations between 4,000 and 6,000 feet	Meadows in ponderosa/ lodgepole pine forest openings	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Greene's Mariposa lily *Calachortus greenei*	SoC	C/1	Oak woodland, pinyon juniper woodland, conif-erous forest, meadows	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
			and seeps, volcanic soil, at elevations between 3,000 and 6,500			including restoration would be implemented.
Green-flowered wild ginger *Asarum wagneri*	--	C/1	Mixed conifer and lodgepole pine forests at elevations ranging from 4,500 to 8,500 feet	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Green-tinged paintbrush *Castilleja chlorotica*	--	--/1	Dry gravelly slopes, and grassy openings in pon-derosa pine or lodgepole pine forests at elevations between 5,000 and 8,200 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Howell's false caraway *Perideridia howellii*	--	--/4	Ponderosa pine, mixed conifer, meadows, along streams and on moist slopes at elevations between 2,000 and 5,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Lady slipper orchid *Cypripedium fasciculatum*	SoC	C/1	Open conifer forest at elevations, generally acidic soil, at elevations between 500 and 7,500 feet	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Least phacelia *Phacelia minutissima*	--	C/1	Open, ephemerally moist areas in meadows, sagebrush-steppe, lower montane forests and riparian areas at elevations between 4,000 and 8,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Lemmon's catchfly *Silene lemmonii*	--	--/3	Oak woodlands and conifer forests at elevations between 2,800 and 9,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Long-bearded	--	--/1	Meadows or along the	Meadows in ponderosa /	Possible harm from	To the extent practicable, the facilities would be

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
Mariposa lily *Calachortus longebarbatus*			edges of ponderosa pine, lodgepole pine forests and in juniper woodlands at elevations between 4,000 and 6,000 feet	lodgepole pine forest openings	construction of Facility features	located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Mountain lady's slipper *Cypripedium montanum*	--	--/4	Mixed conifer forests and woodlands at elevations ranging from 300 to 6,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Mt. Mazama collomia *Collomia mazama*	--	--/1	Alpine meadows and on slopes in association with mixed conifer, true fir and lodgepole pine forests, generally on open or disturbed areas at elevations generally above 5,000 feet	No suitable habitat present	No impacts	No mitigation
Newberry's gentain *Gentiana newberryi*	--	--/2	Vernally wet to dry, subalpine and alpine meadows, along mountain streams at elevations between 5,000 and 12,000 feet	No suitable habitat present	No impacts	No mitigation
Playa phacelia *Phacelia inundata*	SoC	--/1	Sagebrush scrub, yellow pine forests, alkali sinks and playas, on alkaline soil 4,500 to 6,000 feet.	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Profuse -flowered mensa mint *Pogogyne floribunda*	SoC	--/1	Vernal pools, seasonal lakes and intermittent drainages at elevations between 3,200 and 5,000 feet	Not observed; limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Prostrate buckwheat *Erigonum procidum*	SoC	C/1	Dry, rocky slopes, and flats within juniper-sagebrush and Jeffery pine woodlands at elevations between 4,000	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
			and 8,500 feet			
Rafinesque's pondweed *Potamogeton diversifolius*	--	--/2	Ponds, streams and reservoirs below 8,000 feet	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Red-root yampah *Perideridia erythrorhiza*	SoC	C/1	Meadows, pastures, and open areas in pine-oak woodlands at elevations less than 5,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Salt heliotrope *Heliotropum curvassavicum*	--	--/3	Many different plant communities at elevations less than 7,000 feet, but is generally associated with saline soil	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Shockley's ivisia *Ivesia shockleyi*	--	--/2	Open gravelly, rocky areas associated with subalpine fir and pine forests, at elevations between 9,000 and 13,000 feet	No suitable habitat present	No impacts	No mitigation
Short-podded thelypody *Thelypodium brachycarpum*	--	--/2	Irrigated pasture, sagebrush shrub, pond and stream edges; adjacent to ponderosa pine forests; alkali soil at elevations between 3,000 and 6,500 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Slender bulrush *Scirpus heterochaetus*	--	--/3	Marshes, swamps and around lake edges, in lower montane conifer forests at elevations around 5,000 feet	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.
Tricolor monkeyflower\] *Mimulus tricolor*	--	--/2	Moist flats on wet clay soil and in vernal pools within woodlands and	Not observed; Limited habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures

TABLE 3.4-8
Summary of Potential Impacts and Proposed Mitigation for Special-Status Species Potentially Occurring Within the Analysis Area

Species	USFWS	ODFW/ ONHP	Habitat Requirements	Potential Occurrence in Analysis Area	Potential Impacts	Proposed Mitigation
			grasslands, at elevations less than 5,000 feet			including restoration would be implemented.
Warner Mountain bedstraw *Gallium serpenticum* var. *warnerense*	--	--/2	Meadows and seeps, pinyon/juniper woodland, conifer forest and rocky talus at elevations between 4,500 and 9,000 feet	Not observed; Suitable habitat present	Possible harm from construction of Facility features	To the extent practicable, the facilities would be located in disturbed areas or in areas with minimal habitat value. Mitigation measures including restoration would be implemented.

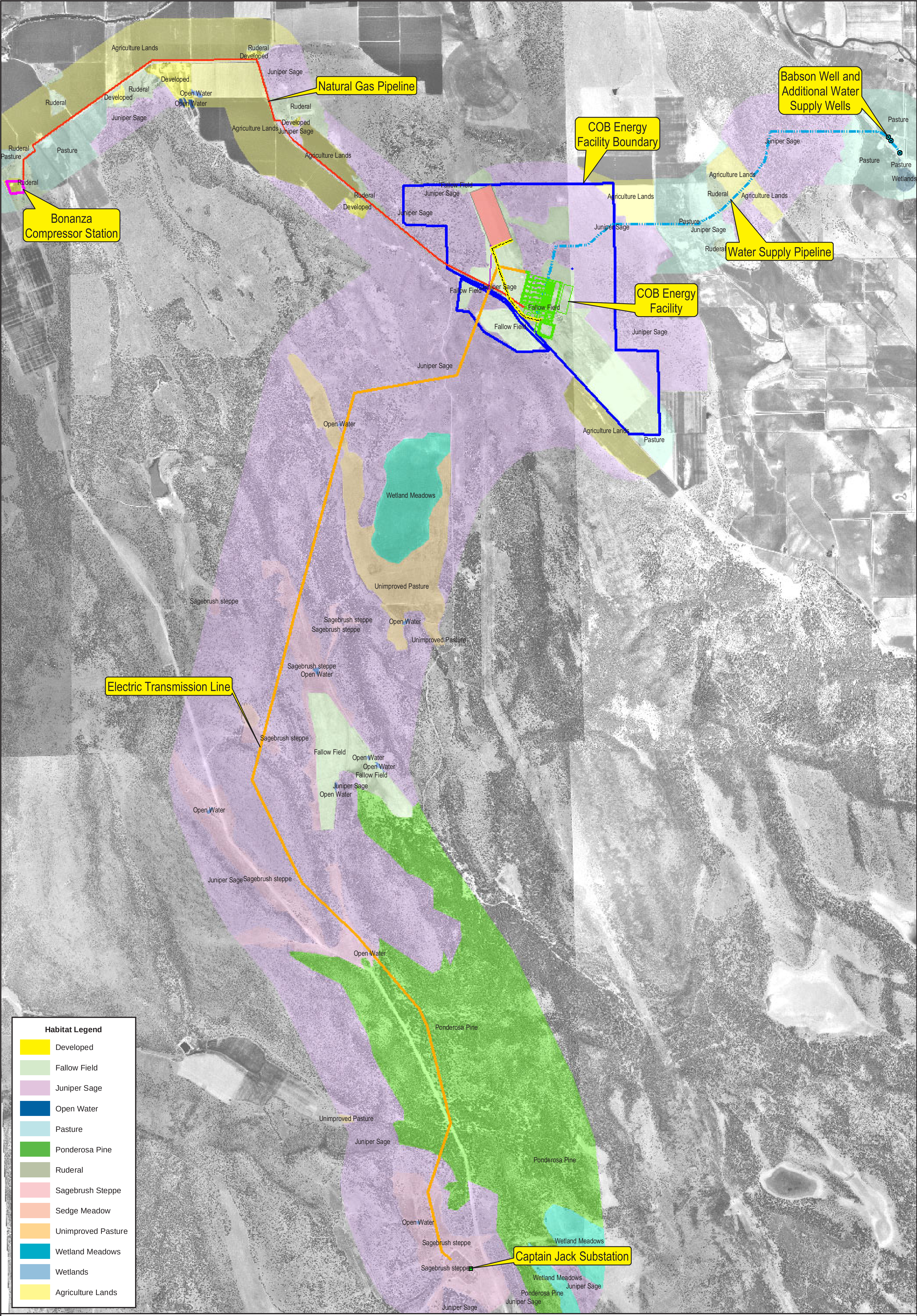
USFWS = United States Fish and Wildlife Service
SoC = Federal Species of Concern

Oregon Department of Fish and Wildlife (ODFW)

C Candidate for state listing as threatened or endangered
V Vulnerable species for which listing as threatened or endangered is not believed to be imminent, and can be avoided through protective measures and monitoring.
U Undetermined status; more information is needed to determine the conservation status of the species
P Peripheral or naturally rare species, species on the edge of their natural range in Oregon, or have naturally low populations within the state

Oregon Natural Heritage Program (ONHP)

1 Taxa that are threatened or endangered throughout their range
2 Taxa that are threatened or endangered in Oregon, but more secure elsewhere
3 Review list, taxa for which more information is needed to determine the conservation status
4 Species that are of conservation concern, but are not currently threatened or endangered



Legend

- Captain Jack Substation
- Babson Well and Additional Water Supply Wells
- Bonanza Compressor Station
- COB Energy Facility
- Electric Transmission Line
- Natural Gas Pipeline
- Water Supply Pipeline
- Irrigation Pipeline
- Irrigated Pasture Area Access Road
- Irrigated Pasture Area

N 1 inch equals 2,762 feet

0 1,050 2,100 4,200 Feet

Figure 3.4-1
Habitat Types
COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.4-1_habitat-types.mxd, Date: October 27, 2003 4:49:52 PM

Figure 3.4-1
11 x 17
Color
Back

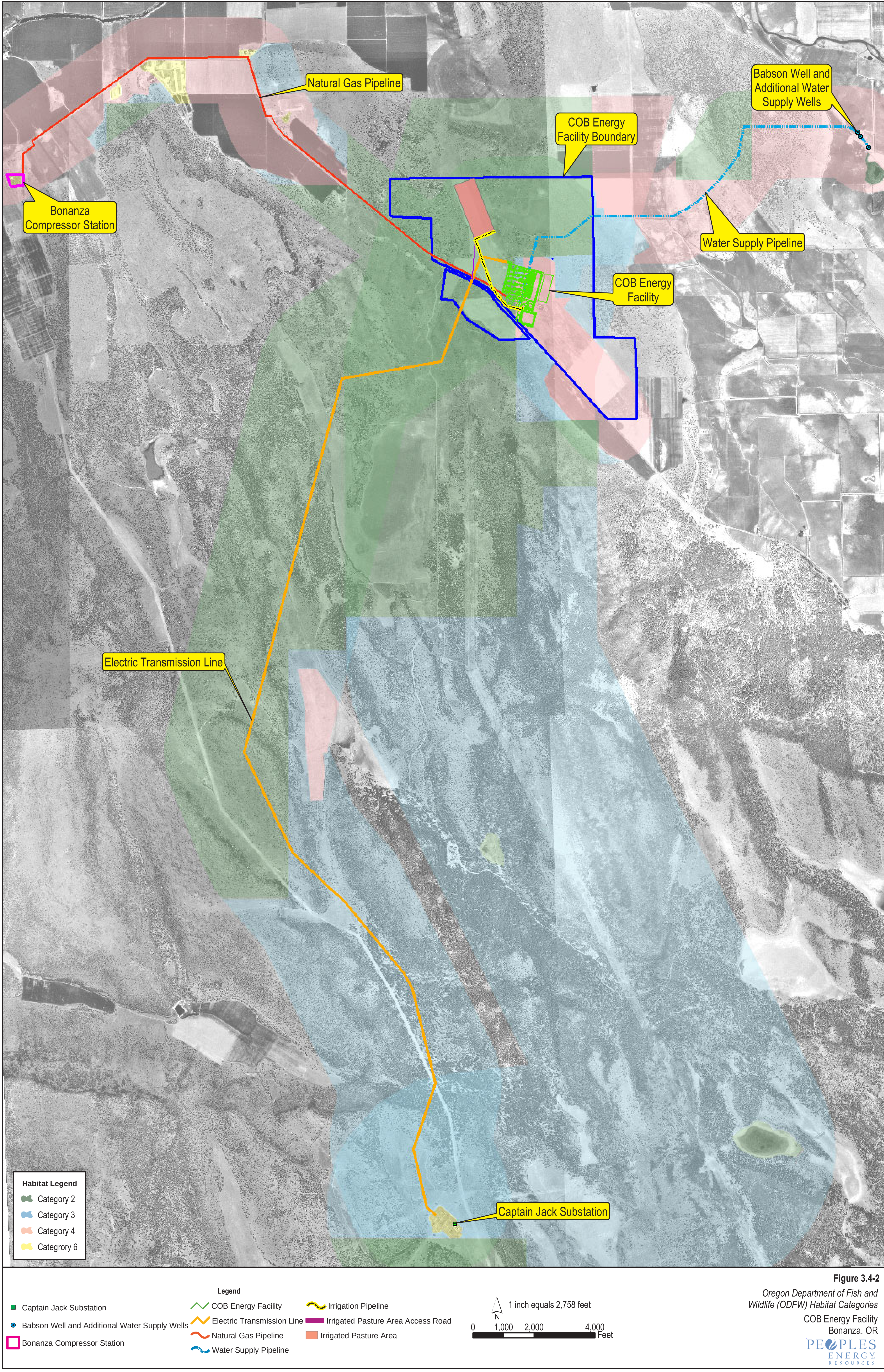


Figure 3.4-2

Oregon Department of Fish and Wildlife (ODFW) Habitat Categories

COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

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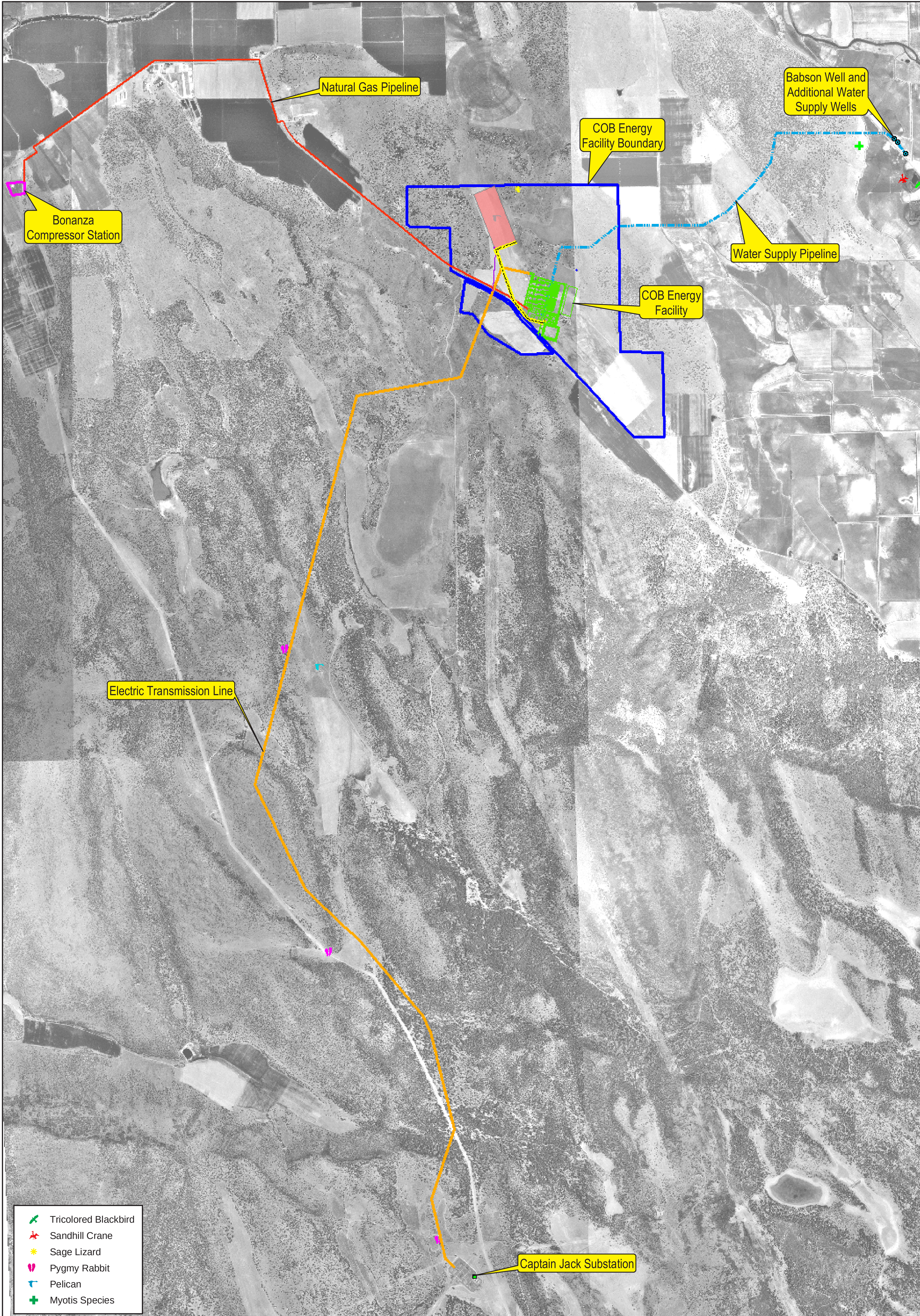
Figure 3.4-2
11 x 17
Color
Back



Legend

- Captain Jack Substation
- Babson Well and Additional Water Supply Wells
- Bonanza Compressor Station
- COB Energy Facility
- Electric Transmission Line
- Natural Gas Pipeline
- Water Supply Pipeline
- Irrigation Pipeline
- Irrigated Pasture Area Access Road
- Irrigated Pasture Area

N

1 inch equals 2,751 feet

0 1,000 2,000 4,000 Feet

Figure 3.4-3

Special-Status Species

COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.4-3_special-status.mxd, Date: October 27, 2003 4:54:19 PM

Figure 3.4-3
11 x 17
Color
Back

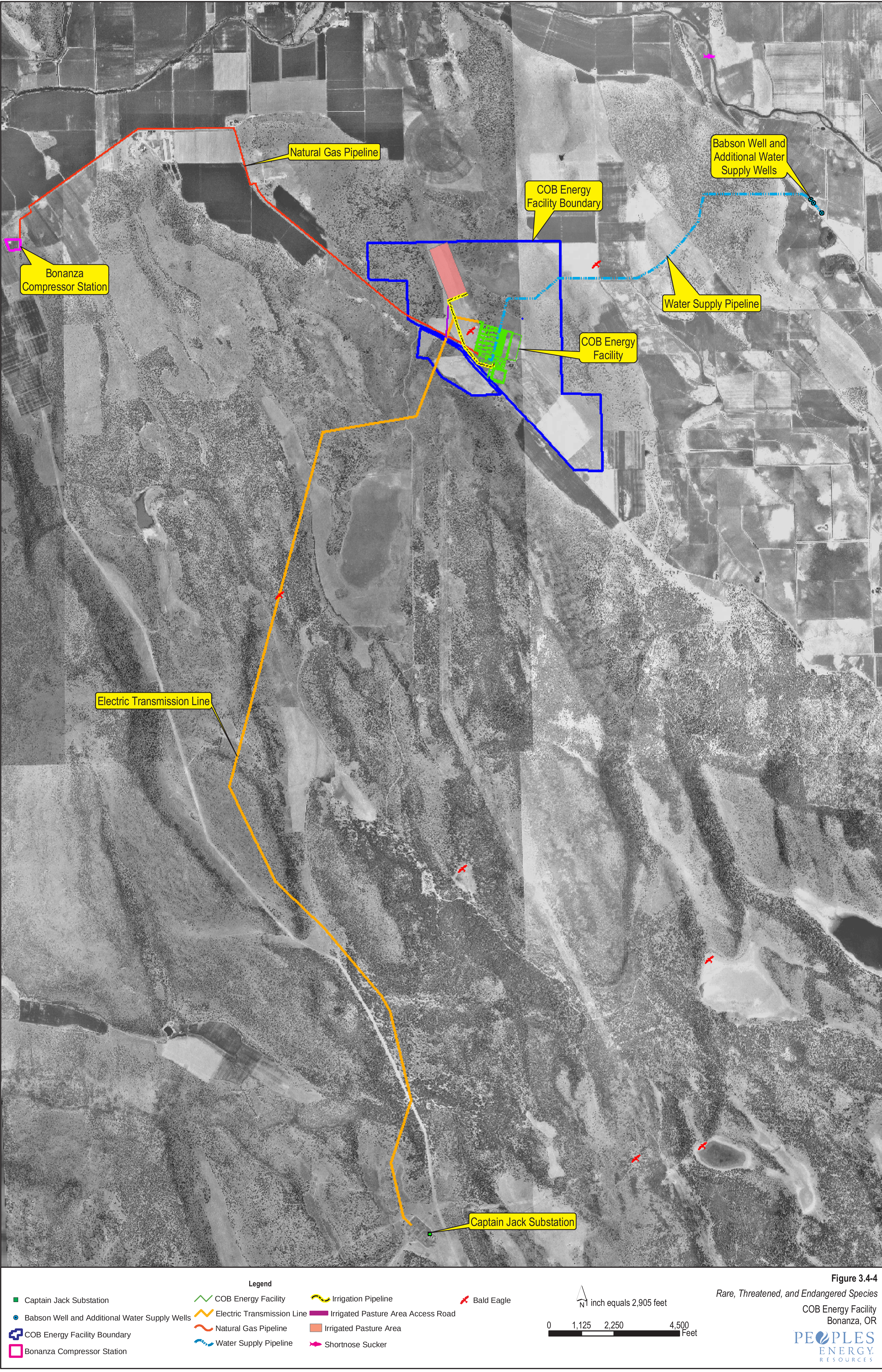
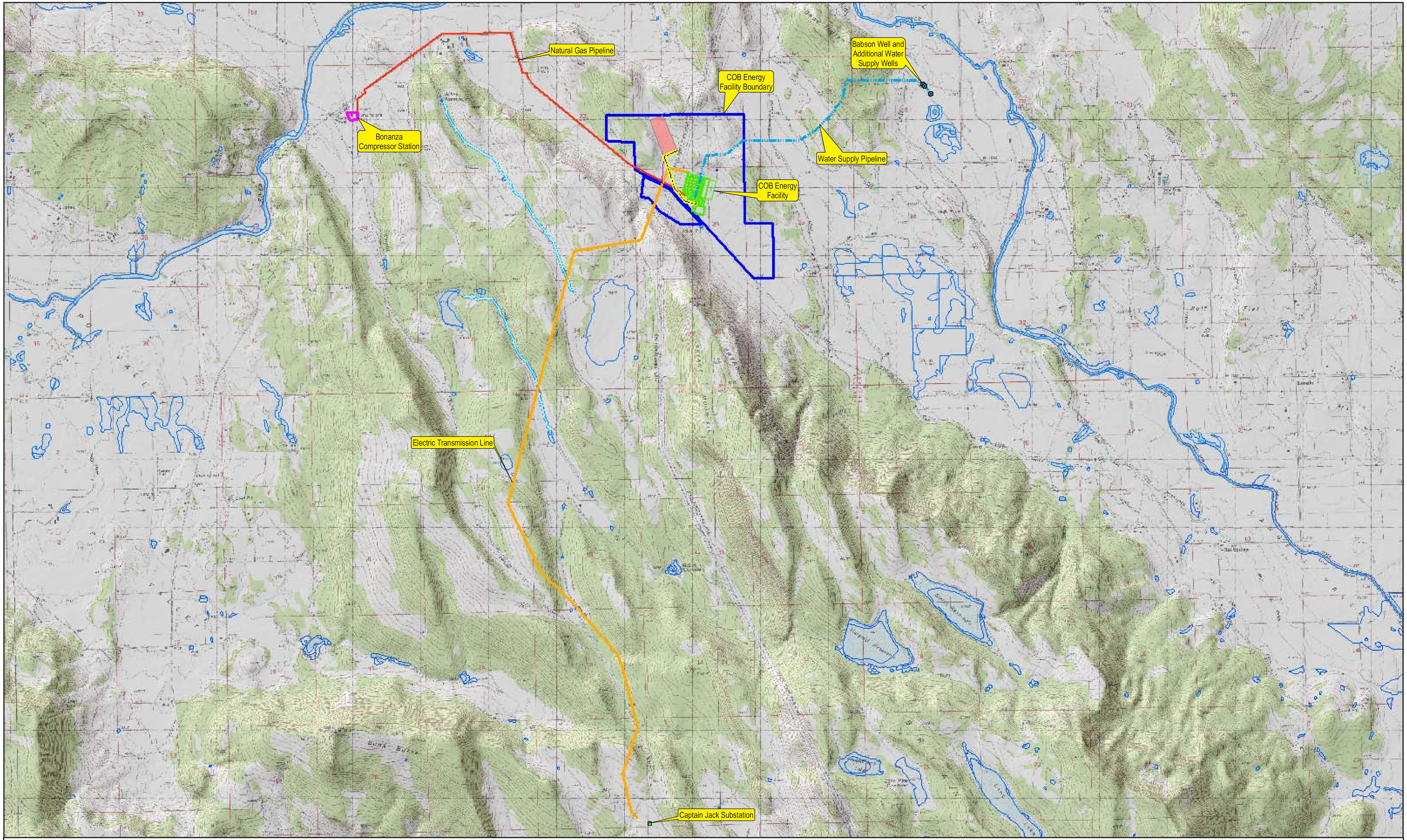


Figure 3.4-4
Rare, Threatened, and Endangered Species
COB Energy Facility
Bonanza, OR
PEOPLES ENERGY RESOURCES

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.4-4_rte.mxd, Date: October 27, 2003 4:55:32 PM

Figure 3.4-4
11 x 17
Color
Back



Legend

- Captain Jack Substation
- Babson Well and Additional Water Supply Wells
- Water Supply Pipeline
- Natural Gas Pipeline
- Irrigation Pipeline
- Irrigated Pasture Area Access Road
- Irrigated Pasture Area
- Field-Observed Wetlands
- Electric Transmission Line
- COB Energy Facility
- Bonanza Compressor Station
- COB Energy Facility Boundary
- National Wetlands Inventory (NWI) Wetlands

Source: National Wetlands Inventory (NWI). Malin, Bonanza, Bryant Mountain and Lorella 1:24,000 Scale Quadrangle Series. Digitized from aerial photo interpretation.

N

1 inch equals 4,211 feet

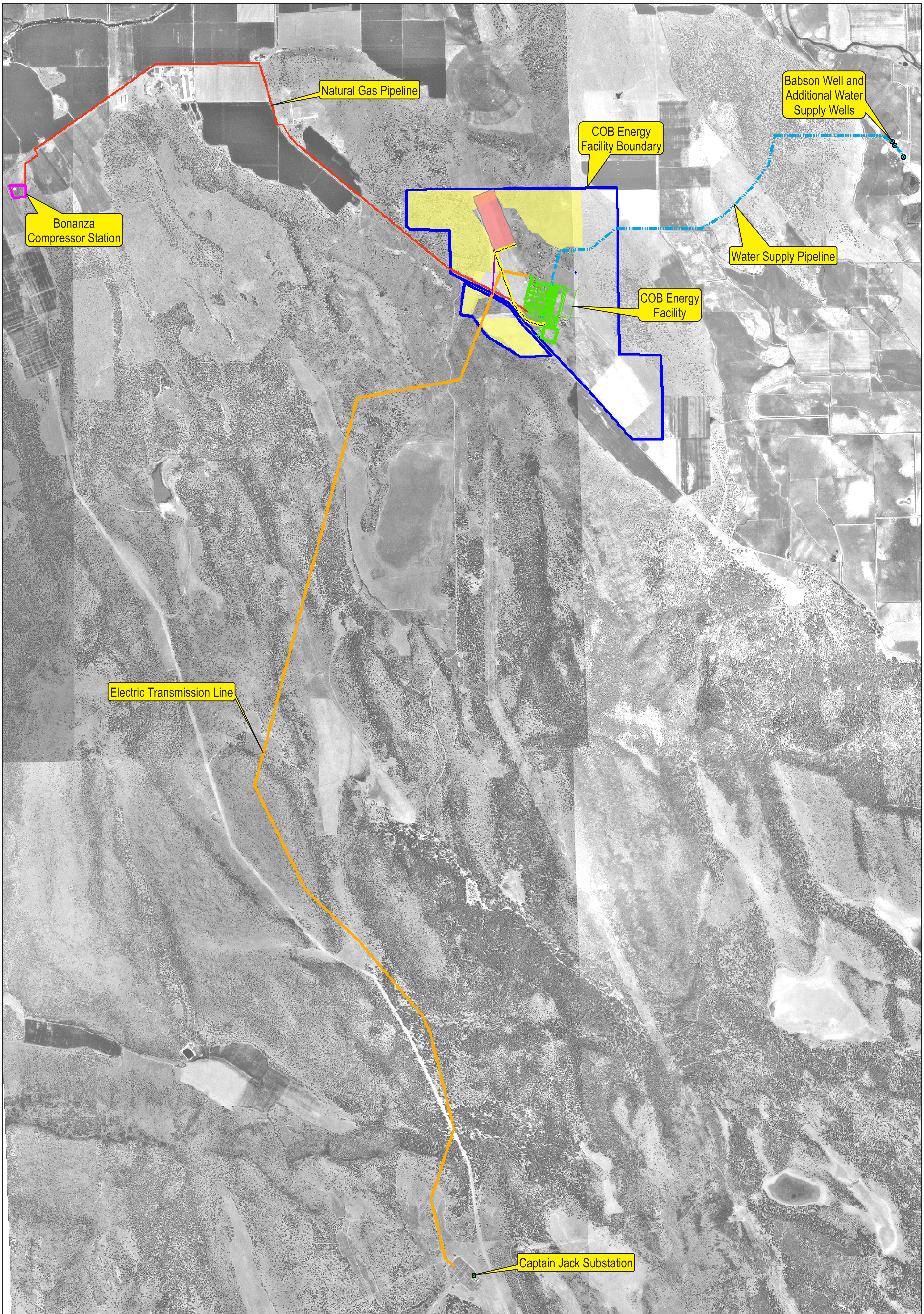
0 2,000 4,000 8,000 Feet

Figure 3.4-5
Wetlands
COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.4-5_wetlands.mxd, Date: October 27, 2003 4:58:23 PM

Figure 3.4-5
11 x 17
Color
Back



Legend

- Captain Jack Substation
- Babson Well and Additional Water Supply Wells
- Bonanza Compressor Station
- Proposed Mitigation Areas
- COB Energy Facility
- Electric Transmission Line
- Natural Gas Pipeline
- Water Supply Pipeline
- Irrigation Pipeline
- Irrigated Pasture Area Access Road
- Irrigated Pasture Area

N

1 inch equals 2,757 feet

0 1,000 2,000 4,000 Feet

Figure 3.4-6

Proposed Mitigation Areas

COB Energy Facility

Bonanza, OR

PEOPLES ENERGY RESOURCES

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Figure 3.4-6
11 x 17
Color
Back

3.5 Fish

Surface waters within the project area support various species of fish, including two federally and state-listed endangered species, shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Deltistes luxatus*), both of which are found in the Lost River watershed in proximity to the project area. Water for the Energy Facility would be taken from a deep aquifer that does not have a connection to surface waters. Because there would be no withdrawals from surface water bodies, construction and operation of the Energy Facility would not affect fisheries resources in the area.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.5.1 Affected Environment

3.5.1.1 Aquatic Habitat

The project area is located within the Klamath Ecological Province (East Cascades Ecoregion), on the eastern side of the Cascade Mountains. The Facility site lies within the Klamath River Basin. Aquatic habitats in the proximity to the analysis area include the Lost River, freshwater marsh, seasonal wetlands, sedge wet meadows, wet meadows, stock ponds, and agricultural canals.

The Lost River watershed is a closed, interior basin covering approximately 3,000 square miles of the Klamath River watershed in southern Oregon and Northern California. The headwaters originate east of the Clear Lake Reservoir in Modoc County, California, and flow approximately 75 miles to the Tulelake Sump. Seasonal flows in the Lost River are controlled by releases from the Clear Lake Dam. The Lost River was the only fish-bearing perennial habitat observed in proximity to the analysis area.

Several intermittent creeks were observed during field surveys. These creeks were dry at the time of the field survey, but had defined bed and bank features. Most of the drainages either lacked vegetation or contained only sparse upland vegetation within the channel. Several irrigation canals have been excavated to facilitate surface drainage and water transport for agricultural crops and pasture lands in the basin areas. These channels appear to be routinely maintained and were largely devoid of vegetation.

Freshwater marsh habitat was characterized by a mosaic of perennial, emergent monocots, and areas of open water. Species such as cattail (*Typha latifolia*) and bulrush (*Scirpus* sp.) are found in the deeper areas where sedges (*Juncus* sp.) and rushes (*Carex* sp.) are found in the seasonally-flooded areas around the perimeter of the marsh. These wetlands occur on the somewhat poorly-drained soil formed in alluvial lacustrine sediments. A hardpan is present between 20 and 40 inches and the water table is typically shallow, ranging from 1.0 to 3.5 feet below ground surface (NRCS, 1985).

Sedge wet meadow habitat is characterized by seasonal inundation, with surface water present during the winter and early spring, but absent by the end of the growing season. This habitat type occurs on soil derived from weathered diatomite, tuff, and basalt (NRCS, 1985). The vegetation is characterized by a dense cover of low-growing monocots such as sedges and rushes. A few forb species such as dock (*Rumex crispus*), mouse-tail (*Myosurus minimus*), and Bach's downingia (*Downingia bacigalupii*) were observed along the outer margins during field surveys, but accounted for only a minimal amount of the total vegetative cover. Aquatic buttercup (*Ranunculus aquatilus*) was present where there was open water.

Wet meadow habitats occurred on poorly-drained clay soil that formed in sediments from weathered tuff and basalt (NRCS, 1985). This habitat is characterized by the presence of surface water during the winter and early spring, and the absence of water during the summer months. Characteristic vegetation includes species such as tufted hairgrass (*Deschampsia cespitosa*), Baltic rush (*Juncus balticus*), and sedges (*Carex* spp.). Some areas have been disked and planted with pasture grasses such as tall fescue, timothy (*Phleum pratense*), and meadow foxtail (*Alopecurus pratensis*).

Stock ponds were observed in areas where berms had been constructed within natural drainages to retain water for livestock. The hydrology in these areas was variable, with some ponds containing several inches of water and other areas dry at the time of the survey. Vegetation in these areas included sedges, rushes, aquatic buttercup, and dock.

Groundwater in the vicinity of the proposed project is contained in a shallow aquifer system and a deep aquifer system. Groundwater quality within the shallow aquifer varies to some degree depending on local soil conditions and degree of connectivity between ground and surface waters. Since July 1991, fecal coliform has been found in several of the town of Bonanza's domestic wells. According to OWRD, studies compiled by Klamath County hypothesize that consecutive drought years forced farmers and ranchers to irrigate more heavily with groundwater. The aquifer drawdown permitted infusions of Lost River water, which carried in the contaminants.

The proposed project, however, would utilize deep zone groundwater. The deep zone groundwater is of high quality, with very low dissolved solids and no parameters suggesting interaction with shallow groundwater and surface water. Two aquifer tests demonstrated a lack of impact to the shallow aquifer and surface water from pumping groundwater out of the deep aquifer (see Section 3.3.1.2 for more details on the aquifer tests).

3.5.1.2 Shortnose Sucker and Lost River Sucker

Shortnose Sucker. The shortnose sucker was listed as Endangered on July 18, 1998. This species is endemic to the upper Klamath Basin of southern Oregon and northern California. Shortnose suckers are found in numerous lakes and rivers throughout the region including Upper Klamath Lake, the Clear Lake Reservoir, Gerber Reservoir, Tulelake, the Klamath River, and the Lost River system. Primarily a lake-dwelling fish, the shortnose sucker spawns between February and May in river habitats with gravelly substrates such as the Sprague, Wouldiamson, and Wood Rivers, as well as Crooked Creek and the Clear Lake watershed. Shoreline areas with a mosaic of open water, emergent vegetation, and woody structures are important for larval development. The shortnose sucker is a bottom feeder whose diet includes detritus, zoo plankton, algae, and aquatic invertebrates.

Historically, shortnose suckers were abundant throughout the Klamath Basin (Federal Register, 1998)). However, dams, diversion structures, irrigation canals, and development of the Klamath Basin has resulted in habitat fragmentation and population isolation. Additional factors leading to the population decline include loss of wetland habitat, hybridization, predation, and competition from exotic fish species and poor water quality. Hyper-eutrophication of lake habitats appears to be a principle factor in poor recruitment of this species (Federal Register, 1998).

The shortnose sucker has been reported in the Lost River above Harpold Reservoir, approximately 4 miles southeast of the Energy Facility site and at Big Springs approximately 2.5 miles north of the Energy Facility site (USFWS, 1993). No fish-bearing streams or lakes were identified in the immediate project area.

Lost River Sucker. The Lost River sucker was listed as Endangered on July 18, 1998 (USFWS, 1993). This species is endemic to the upper Klamath Basin of southern Oregon and northern California. The Lost River sucker is found Upper Klamath Lake, Clear Lake Reservoir, Tulelake, the Klamath River, and the Lost River up to the Anderson-Rose Dam. The Lost River sucker has also been reported in the Lost River above Harpold Reservoir, approximately 4 miles southeast of the Energy Facility site and at Big Springs approximately 2.5 miles north of the Energy Facility site. The Lost River sucker is a lake-dwelling fish that spawns between February and May in tributary rivers and streams with gravelly substrates. Shoreline habitats with open water intermixed with emergent vegetation are important for larval and juvenile development. This species feeds on a variety of aquatic invertebrates, algae, detritus, and zoo plankton found on lake bottoms.

Dams, diversion structures, irrigation canals, and development have resulted in habitat fragmentation and population isolation. Competition and predation by exotic species, wetland drainage, poor water quality, and eutrophication have also contributed to the decline of this species.

The nearest populations of the Lost River sucker are known from the Sprague River and Upper Klamath Lake, both of which are approximately 20 miles to the north and west of the project area, respectively. No fish-bearing lakes or streams are present in the project area.

3.5.2 Environmental Consequences and Mitigation Measures

The elements of the proposed Facility that could affect fisheries resources would be construction or operation practices that diverted surface waters, impaired water quality, or damaged aquatic habitat.

Impact 3.5.1. Construction of new access roads along the electric transmission line would result in less than 0.5 acre of impact to intermittent creeks.

Assessment of Impact. Access roads for the electric transmission line would cross three intermittent creeks. During construction of the access roads, culverts would be placed in the channel at creek crossings to allow uninterrupted seasonal water flows and eliminate potential damage to creek channels from construction and operation maintenance vehicles.

No other impacts to salmonids, other fish, or aquatic habitats are expected as a result of construction, operation, and retirement of the proposed Energy Facility. Less than 0.5 acre of wetland would be impacted by access roads along the electric transmission line. Aquatic resources along the natural gas and water supply pipeline would be avoided by using conventional bore techniques. No water or wastewater would be discharged to seasonal or perennial aquatic habitats, and no surface water would be withdrawn for construction or operation activities. As demonstrated by the aquifer testing, deep system withdrawals would not impact shallow system water levels and there would not be a discharge or process water/wastewater to the shallow groundwater system or surface water. Facility operations would not have an impact on existing groundwater quality or surface water quality.

Recommended Mitigation Measures. Construct access roads and install culverts during summer months when water is not flowing in the creek to avoid the presence of fish and minimize erosion and sedimentation.

In addition to the above mitigation measure, a number of mitigation measures have been incorporated into the proposed project as described below.

- Workers would be given environmental training to inform them of wildlife and habitat issues. This training would include information about sensitive wildlife, plants, and habitat areas as well as the required precautions to avoid and minimize impacts.
  - Maps would be prepared to show sensitive areas that are off-limits during the construction phase.
  - Signs would be posted around the perimeters of any sensitive habitat areas to be avoided.
- Following construction, topography and vegetation would be returned to preconstruction condition or better in areas of temporary disturbance. In areas where natural vegetation is removed, native perennial bunchgrasses and sagebrush would be planted according to a revegetation plan.
- Revegetation seed mixes and habitat enhancement locations would be developed in consultation with ODFW.
- Grading and clearing of vegetation would be limited to the minimum extent necessary for practical and safe working areas.
- In addition, permanently disturbed habitat would be restored, enhanced, and protected in accordance with ODFW habitat mitigation goals and pursuant to a revegetation plan.
- The water supply well system would be isolated from the shallow zone aquifer and surface water features.
- Sidecast material would remain within the construction corridors.
- Silt fencing and other barriers would be employed to limit lateral spread of soil when material must be sidecast in habitat areas within the construction corridor.
- Gates would be installed on the new access roads to restrict unauthorized access.

- Construction vehicles would remain on the roadbed and road shoulder whenever possible.
- Erosion control measures to be employed during Facility construction include:
  - Installing sediment fence or straw bale barriers at downslope side of excavations and disturbed areas
  - Straw mulching and discing at locations adjacent to the road that have been affected
  - Providing temporary sediment traps downstream of intermittent creek crossings
  - Planting designated seed mixes at affected areas adjacent to the road
- Areas that are affected by the construction would be seeded when there is adequate soil moisture. They would be reseeded in the spring if a healthy cover crop does not grow. The sediment fence and check dams would remain in place until the affected areas are well vegetated and the risk of erosion has been eliminated.
- Construction activities would be regulated by an erosion control plan and NPDES General Construction Permit 1200-C, which would require best management practices to minimize impacts from erosion or other impacts to soil.
- Measures to be employed in order to reduce the potential for water and wind erosion and sediment runoff include:
  - Limiting haul trucks to designated roadways
  - Using temporary erosion and sediment control measures, such as silt fences, straw bales, mulch, and slope breakers, and maintaining these features throughout construction and restoration
  - Watering or covering exposed soil, stockpiles, and roads during construction
  - Installing permanent erosion control measures, as necessary, during construction, cleanup, and restoration
  - Stripping and separately storing topsoil for replacement and replanting after installation of pipelines not buried within roads
  - Revegetating construction areas

3.5.3 Cumulative Impacts

The proposed Facility would have no adverse effect on fish and would not contribute any cumulative impacts to this element of the environment.

3.6 Traffic and Circulation

Potential effects of the proposed Facility on traffic and circulation would be increased traffic congestion, damage to state highways or county roads, increased traffic hazards, or impairment of access due to construction activities. As described below, the Facility would have no significant unavoidable adverse impacts on transportation and circulation. Impacts during construction of the Facility would be temporary and localized; no significant impacts would occur during Facility operation.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.6.1 Affected Environment

3.6.1.1 Roadway System and Levels of Service

The existing network of roads surrounding the proposed Facility includes West Langell Valley Road, East Langell Valley Road, Harpold Road, Oregon Route (OR) 70 (ODOT #23), OR 50, and OR 140, as shown in Figure 3.6-1. These local roads currently have low average daily traffic volumes and low average yearly accident rates (1 to 5 annually). Levels of service are generally A or B, which are considered a high level of operation. These five roads have a high-quality asphalt surface. Table 3.6-1 shows the roadway system in the Facility area and its existing conditions (including roadway classifications, traffic volumes, and levels of service) in 2001. Klamath County does not have a peak-hour level-of-service standard for its rural roadways.

Weight and load limits exist on some of the roadways near the Energy Facility site because of bridges, irrigation canals, and river crossings along some of the roads.

3.6.1.2 Truck Traffic

During the peak harvest season, trucks transport grain, hay, alfalfa, and potatoes to the grain silos and other locations south of the Energy Facility site.

3.6.1.3 Railway Facilities

Burlington Northern Santa Fe (BNSF) provides regional rail freight service in the area. The closest rail access to the Energy Facility site is a rail line spur near the town of Malin.

3.6.2 Environmental Consequences and Mitigation Measures

Potential impacts during construction and operation could include increased traffic congestion, damage to state highways or county roads, increased traffic hazards, or impairment of access due to construction activities.

<u>Impact 3.6.1. During construction, roadways in the vicinity of the Energy Facility would experience a decrease in level of service (LOS).</u>

<u>Assessment of Impact</u>. During the 23-month construction period, up to 835 daily trips, including trips generated by construction vehicles and by Facility employees, would be

added to existing traffic levels on area roadways (Table 3.6-2). Of these, up to 420 trips would occur during the evening (PM) peak hour. Primary impacts would be to roads surrounding the proposed Energy Facility site and connecting the site to Klamath Falls, which are likely to be the most traveled. A large proportion of the permanent and temporary workforce would be located in Klamath Falls because of its concentrated population and housing options. Construction equipment would be transported from the BNSF rail line spur near the town of Malin along OR 50 to Harpold Road, then via West Langell Valley Road to the Energy Facility site.

Substantial construction-related impacts on the local roads are not expected because the existing roadway capacity is adequate to accommodate the additional traffic volumes. As shown in Table 3.6-3, levels of service on most area roadways would drop to B or C as a result of the additional construction traffic. However, roadways would continue to maintain an acceptable level of traffic operation, even during the evening peak period. To minimize impacts, Facility-related construction activities would be scheduled so that construction traffic would occur during off-peak hours; a carpool program would be offered to minimize single-occupancy vehicle use by construction workers.

Where traffic disruptions were necessary, detour plans, warning signs, and traffic diversion equipment would be used to improve safety. One lane of travel would be open and maintained with licensed flaggers used to direct traffic.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.6.2. Vehicles weighing more than 80,000 pounds (maximum legal load limit) could cause some visible damage to county roads.

Assessment of Impact. The weight of construction vehicles could result in damage to the asphalt roads that would be used for access to the Facility. To help mitigate this potential impact, roads used for heavy vehicle traffic would be videotaped before and after use to identify any damage to the road. If damage occurs as a result of vehicles carrying heavy loads, the road would be restored to its previous condition.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.6.3. Operation of the Energy Facility would generate additional traffic.

Assessment of Impact. Traffic during operation of the Energy Facility would depend on the alternative selected for process wastewater management. Traffic during operations would be the same with either of the following alternatives: evaporation in an onsite, lined evaporation pond or beneficial use of the water for irrigated pasture. If the storing and hauling to a WWTP for offsite disposal alternative is selected, additional truck trips would be required.

Operation of the Facility would generate less than four truck trips per week (not including truck trips for process wastewater disposal) and approximately 20 PM peak-hour worker trips daily (Tables 3.6-4 and 3.6-5). To assess potential impacts, a traffic analysis was performed and evaluated against standard levels of service. The results of the analysis are shown in Table 3.6.5, which summarizes the LOS for local roadways during the construction period. As shown in Table 3.6-5, traffic during Facility operation would not substantially reduce the LOS on the roadways or create a substantial impact on local traffic.

An additional 5 to 9 truck trips per day would be required if the storing and hauling to a WWTP for offsite disposal alternative is selected. The proposed route for these wastewater trips into and out of the Energy Facility would be along West Langell Valley Road, Harpold Road (north of West Langell Valley Road), Oregon Highway 70 (west of Harpold Road), and Oregon Highway 140 (west of OR 70). Accounting for a two-way trip, this would generate an additional 10 to 18 trips per day along each of the roads. Although, these trips can reasonably be assumed to occur throughout the day, to be conservative it was assumed that all of these trips occur in the PM peak hour. This change is expected to not cause any noticeable impacts and the roadway level of service would not substantially reduce the LOS on the roadways or create a substantial impact on local traffic.

Recommended Mitigation Measures. No measures are recommended.

3.6.3 Cumulative Impacts

The analysis of present traffic on the roads in the vicinity of the proposed project indicates there would not be a significant impact as a result of the project. The minor increase in traffic would result in minor cumulative impacts. In addition, there are no known reasonably foreseeable actions that would increase traffic in the vicinity of the project and lead to additional cumulative impacts.

TABLE 3.6-1
2001 Conditions of Affected Roadways

Roadway	Classification	No. of Lanes	Average Daily Volume[a]	Hourly Design Capacity[b]	PM Peak-Hour Volume[c]	PM Peak-Hour LOS
*West Langell Valley Road (south of Harpold Road)	Rural-Minor Arterial	2	400	2,800	40	A
*Harpold Road (north of West Langell Valley Road)	Rural-Minor Arterial	2	400	2,800	40	A
*Harpold Road (south of West Langell Valley Road)	Rural-Minor Arterial	2	400	2,800	40	A
*East Langell Valley Road	Rural-Minor Arterial	2	400	2,800	40	A
OR 50 (east of Harpold Road)	Major-Collector	2	1,500	2,800	150	A
OR 50 (west of Harpold Road)	Major-Collector	2	1,500	2,800	150	A
OR 70 (east of Harpold Road/Carol Avenue)	Urban-Collector	2	1,900	2,800	190	A
OR 70 (west of Harpold Road)	Urban-Collector	2	870	2,800	90	A
OR 140 (east of OR 70)	Major-Collector	2	3,100	2,800	310	B
OR 140 (west of OR 70)	Major-Collector	2	3,300	2,800	330	B

[a] Estimated number of vehicles per day in both directions.
[b] Maximum number of vehicles per hour in both directions for level of service (LOS) E.
[c] Vehicles per hour in both directions.

Source: *Highway Capacity Manual*, 2000

TABLE 3.6-2
Total Daily Construction-Related Vehicle Trip Generation

Type of Vehicle	Average Daily Vehicle Trips	Average PM Peak	Peak Daily Vehicle Trips	PM Peak on Peak Day
Construction Vehicles	45	25	155	80
Worker Vehicles * *- Average Workforce of 352*	545	275	-	-
- Peak Workforce of 543	-	-	835	420

* This analysis assumes an average vehicle occupancy (AVO) of 1.3.

TABLE 3.6-3
Daily and Peak Hour Traffic Volumes and LOS with Energy Facility Construction Impacts

		Daily			PM Peak				
Roadway	Background Traffic	Number of Construction Worker Trips	Number of Construction Vehicles	Combined Traffic	Construction Worker Trips	Construction Vehicles	Background Traffic	Combined PM Peak	LOS
West Langell Valley Road (south of Harpold Road)	400	835	155	1,390	420	80	40	540	C
Harpold Road (north of West Langell Valley Road)	400	835	155	1,390	420	80	40	540	C
Harpold Road (south of West Langell Valley Road)	400	835	155	1,390	420	80	40	540	C
East Langell Valley Road	400	835	155	1,390	420	80	40	540	C
OR 50 (east of Harpold Road)	1,500	835	155	2,490	420	80	150	650	C
OR 50 (west of Harpold Road)	1,500	835	155	2,490	420	80	150	650	C
OR 70 (east of Harpold Road/Carol Avenue)	1,900	835	155	2,890	420	80	190	690	C
OR 70 (west of Harpold Road)	870	835	155	1,860	420	80	90	590	C
OR 140 (east of OR 70)	3,100	835	155	4,090	420	80	310	810	C
OR 140 (west of OR 70)	3,300	835	155	4,290	420	80	330	830	C
West Langell Valley Road (south of Harpold Road)	400	715	100	1,215	360	50	40	450	B
Harpold Road (north of West Langell Valley Road)	400	715	100	1,215	360	50	40	450	B

TABLE 3.6-4
Estimated Truck Traffic at the Energy Facility During Operation

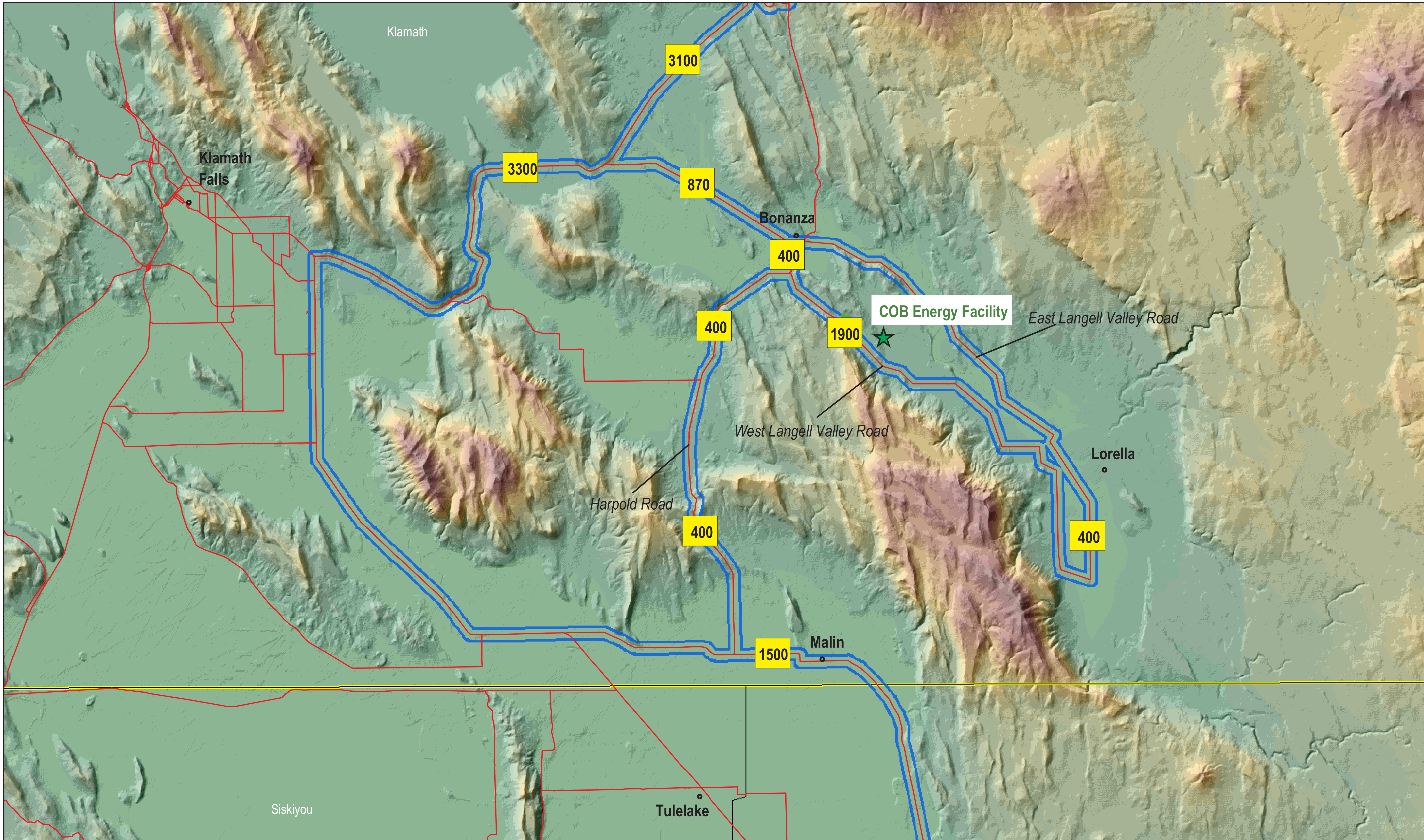
Delivery Type	Number and Occurrence of Trucks
Aqueous ammonia	2 per week
Condensed polisher waste	1 per month
Cleaning chemicals	1 per month
Trash pickup	1 per week
Sanitary waste	1 per year
Wastewater transport*	5 to 9 per day

* Applies only if storage and haul to wastewater treatment plant (WWTP) option is selected.

TABLE 3.6.5
Existing and Future Peak-Hour Traffic Volumes and LOS with and without Energy Facility Impacts

	2000 Existing PM Peak		2004 PM Peak *without* Energy Facility		2004 PM Peak *with* Energy Facility	
	Traffic Volumes	LOS	Traffic Volumes	LOS	Traffic Volumes*	LOS
West Langell Valley Road (south of Harpold Road)	40	A	45	A	65/83	A
Harpold Road (north of West Langell Valley Road)	40	A	45	A	65/83	A
Harpold Road (south of West Langell Valley Road)	40	A	45	A	65/65	A
East Langell Valley Road	40	A	45	A	65/65	A
OR 50 (east of Harpold Road)	150	A	165	A	185/185	A
OR 50 (west of Harpold Road)	150	A	165	A	185/185	A
OR 70 (east of Harpold Road/Carol Avenue)	190	A	210	A	230/230	A
OR 70 (west of Harpold Road)	90	A	100	A	120/138	A
OR 140 (east of OR 70)	310	B	342	B	360/360	B
OR 140 (west of OR 70)	330	B	365	B	385/403	B

*. 65/83: Traffic volume without process wastewater truck trips/traffic volume with process wastewater truck trips.
LOS = level of service
Estimated 1 percent growth factor for 2004.
Source: Oregon Department of Transportation



Legend

Roads 400

Counties

States

Two-Lane Roads

COB Energy Facility

N

1 inch equals 3 miles

0 0.5 1 2 Miles

Figure 3.6-1

Existing 2001 Average

Daily Traffic Count Map

COB Energy Facility

Bonanza, OR

PEOPLES ENERGY

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.6-1_traffic-counts.mxd, Date: October 27, 2003 5:01:54 PM

Figure 3.6-1
11 x 17
Color
Back

3.7 Air Quality

The proposed Energy Facility would use advanced combined-cycle gas turbine technology, clean-burning natural gas, and high-efficiency air emission control technology. Air quality modeling was conducted for the Facility using standard EPA modeling techniques and meteorological data collected at the site. Impacts for all of the criteria pollutants were well below the applicable ambient air quality standards. Therefore, it was concluded that no significant air quality impacts would occur near the Energy Facility.

Cumulative impact analysis indicated that emissions from the Energy Facility, combined with those of other existing sources in the area, would not result in concentrations above the federally mandated National Ambient Air Quality Standards (NAAQS) or Prevention of Significant Deterioration (PSD) increment levels for the criteria pollutants analyzed. In addition, the analysis identified no cumulative impacts to visibility in Class I areas resulting from Energy Facility emissions combined with those of other power generating and related facilities in the area.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.7.1 Affected Environment

3.7.1.1 Climate

The proposed Energy Facility would be located in the south-central part of Oregon, near the town of Bonanza, in an area characterized by dry, warm summers and cold winters. Climatic summary data were obtained from the Western Regional Climate Center Web site (www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?orklam) for a site at Klamath Falls, about 23 miles northwest of the Energy Facility site. During the period of data collection, from 1928 to 2001, the annual average precipitation was approximately 13.7 inches, with monthly mean temperatures ranging from 29.8 degrees Fahrenheit (°F) in January to 68.5°F in July.

A meteorological monitoring station was installed at the Energy Facility site in October 2001 to collect data suitable for use in an atmospheric dispersion modeling analysis. The parameters measured included wind speed, wind direction, and temperature. The sensors were mounted on a 32.8-foot-tall tower designed to meet the requirements for collecting onsite data for permitting and modeling under EPA PSD regulations (40 CFR 52.21).

The dispersion modeling analysis performed for the PSD application was for the period of October 28, 2001 through October 28, 2002. As indicated in Figure 3.7-1, predominant winds for the period of record were from the west-northwest (approximately 19 percent) and southeast (approximately 11 percent).

3.7.1.2 Odor

There are no existing operations associated with the Energy Facility site that generate significant odors.

3.7.1.3 Ambient Air Quality Standards

Ambient Standards for Criteria Pollutants. The Clean Air Act of 1970 empowered EPA to establish air quality standards for six common air pollutants: ozone, carbon monoxide (CO), lead, nitrogen dioxide (NO_2), particulates, and sulfur dioxide (SO_2). These are also referred to as criteria pollutants. The standards include primary standards designed to protect public health and secondary standards to protect public welfare. These NAAQS reflect the relationship between pollutant concentrations and health and welfare effects. ODEQ adopted standards similar to the NAAQS, and included standards for SO_2 that are more stringent than the Federal standards. Table 3.7-1 summarizes the Federal and state primary and secondary standards for the six pollutants, and the averaging time for determining compliance with the standards. It also presents the allowable increments (increases above background) under EPA's PSD program that would be applicable to the Energy Facility.

Prevention of Significant Deterioration. ODEQ has been delegated authority to administer the PSD program for major sources constructed or modified within the state. PSD regulations apply to proposed new or modified sources located in an attainment area that have the potential to emit criteria pollutants at a level which would define the source as "major" (40 CFR Part 51). The Energy Facility is a fossil fuel-fired steam electric plant, which is one of 28 categories of facilities considered major if emissions are greater than 100 tons per year of one or more criteria pollutants.

The PSD review process evaluates the potential impacts of the proposed source on ambient air quality and provides a review of the Best Available Control Technology (BACT). PSD restricts the degree of ambient air quality deterioration that is allowed. Increments for criteria pollutants are based on the PSD classification of the area. All areas in the Pacific Northwest are divided into either Class I or Class II areas. Class I areas are specifically identified federally protected wilderness areas and national parks. The PSD rules ensure that the Class I areas experience the least amount of deterioration. Class II areas are designed to allow for moderate, controlled growth.

The Class I areas within 200 kilometers of the Energy Facility site are shown in Table 3.7-2. The area around the Energy Facility site is designated Class II. Class I and Class II PSD increments are shown with the ambient air quality standards in Table 3.7-1.

Federal, State, and Local Emission Limits. As part of the PSD process, emission limits are established for the facility via a PSD permit issued by ODEQ. Emission limits are set based on the BACT determination. The BACT analysis identifies pollutant-specific alternatives for emission control, and the costs and benefits of each alternative technology. ODEQ determines the most appropriate control technology on a case-by-case basis considering the associated economic, energy, and environmental impacts. The utilization of BACT ensures reduced emissions of criteria pollutants. For example, use of natural gas as a fuel is considered BACT for certain pollutants because of its lower emissions over other fuels, such as fuel oil or coal. Combustion controls also reduce criteria pollutants by optimizing combustion and reducing pollutants emitted in the exhaust stream.

The determination of BACT during the ODEQ review of the PSD permit defines the emission limits for the Energy Facility.

Hazardous Air Pollutant Regulations. The Clean Air Act Amendments of 1990 required EPA to list and promulgate National Emission Standards for Hazardous Air Pollutants (NESHAP) in order to control, reduce, or otherwise limit the emissions of hazardous air pollutants from specific source categories. Stationary combustion gas turbines are on the list of source categories that are subject to emission standards if the total hazardous air pollutant (HAP) emissions could exceed the major source thresholds. The Energy Facility would not be above the HAP major source thresholds and so would not be subject to the stationary combustion gas turbine NESHAP. However, even if the NESHAP did apply, EPA has indicated that the lean premix combustion turbine technology to be utilized in the Energy Facility would meet the HAP standards even without consideration of the additional, planned add-on controls. The oxidation catalysts proposed for use at the Energy Facility would provide substantial additional hazardous air pollutant control beyond what EPA is expected to require under the NESHAP.

3.7.1.4 Existing Air Quality

The proposed Energy Facility would be located in an area designated as attainment for all criteria air pollutants. The city of Klamath Falls, located approximately 34 miles to the northwest of the Energy Facility, is currently classified as a nonattainment area for PM_{10} and CO. However, the Oregon Environmental Quality Commission recently passed new rules to have the area reclassified as attainment for PM_{10} and CO. Nonetheless, the Energy Facility performed modeling demonstrating that its emissions would not cause any substantial impacts within the city of Klamath Falls.

There are several major sources of air emissions currently operating within 50 miles of the Energy Facility. A natural gas pipeline compressor station, consisting of two gas-fired turbines, is owned and operated by PG&E Gas Transmission Northwest (Bonanza Station 14) and is located 3.3 miles south of the proposed Energy Facility. These units emit the same pollutants as the combustion turbines and heat recovery steam generators (HRSGs) at COB, although in a smaller quantity. This source is under the jurisdiction of ODEQ's Eastern Regional Office, and is operating under a Title V (of the CAA) operating permit. Data for emissions from this source were obtained from ODEQ for use in the competing source dispersion analysis.

Klamath Cogeneration Project (KCP) is located approximately 22 miles west of the Energy Facility site and consists of two combustion turbines and HRSGs. The Collins Products, LLC, mill is adjacent to the KCP and consists of a variety of wood products sources, with PM_{10} as the primary pollutant. A permit application was recently submitted requesting authority to build the Klamath Generation Facility (KGF) adjacent to the KCP. The KGF would consist of two combustion turbines and HRSGs. It is not known if or when that facility would receive permits or be constructed.

3.7.2 Environmental Consequences and Mitigation Measures

<u>Impact 3.7.1 Construction of the Energy Facility, natural gas pipeline, water supply pipeline, and electric transmission line would result in air emissions of fugitive dust and combustion exhaust.</u>

Emissions during the approximately 23-month construction process would consist of fugitive dust and combustion exhaust emissions from construction equipment and vehicles.

Fugitive dust emissions would result from dust stirred up during site preparation, onsite travel on paved and unpaved surfaces, and during aggregate and soil loading and unloading operations. Wind erosion of disturbed areas could also contribute to fugitive dust.

Combustion emissions would result from diesel-fired construction equipment, various diesel-fueled trucks, diesel-powered equipment (e.g., welding machines, electric generators, air compressors, water pumps), locomotives delivering equipment, and vehicle emissions from workers commuting to the construction site. Emissions could also occur during paving and painting of Energy Facility buildings and equipment.

These emissions would be of a temporary nature, and would be mitigated by use of best management practices to control fugitive dust and other incidental emissions. Controls may include the following actions:

- Use water spray as necessary to prevent visible dust emissions.
- Minimize dust emissions during transport of fill material or soil by wetting down or by ensuring adequate freeboard on trucks.
- Promptly clean up spills of transported material on public roads by frequent use of a street sweeper machine.
- Cover loads of hot asphalt to minimize odors.
- Keep all construction machinery engines in good mechanical condition to minimize exhaust emissions.

These standard measures would avoid significant, construction-related air quality impacts.

Recommended Mitigation Measures. No mitigation measures are recommended beyond those included in the proposed project.

Impact 3.7.2. Operation of the Energy Facility would result in the emission of criteria pollutants.

Combustion turbines and duct burners associated with the HRSGs at the proposed Energy Facility would use natural gas as the only fuel. Combustion of natural gas results in emissions of PM_{10}, NO_X, SO_2, CO, and volatile organic compounds (VOCs). The features listed below, which are incorporated into the Energy Facility design, would be employed to reduce air emissions:

- Combined-cycle technology that would provide energy conversion from natural gas to electricity with efficiencies that exceed 50 percent
- Combined effect of dry low NO_x combustion technology on the combustion gas turbines and Selective Catalytic Reduction (SCR) technology incorporated into the HRSGs that would reduce total NO_x emissions to 2.5 ppmvd
- Oxidation catalyst controls incorporated into the HRSGs that would reduce CO emissions to 2.0 ppmvd and VOCs to 7 lbs/hr from each stack

The Energy Facility would include four combustion turbines, four HRSGs equipped with supplemental duct firing, and other equipment. Supplemental duct firing with low NO_x

burners would be used for additional peaking demand, particularly during the summer months.

Combustion turbines and duct burners associated with the HRSGs would be equipped with dry, low-NO_x (DLN) burners. The NO_x emissions from the combustion turbines and duct burners associated with HRSGs would be further controlled using SCR. Use of SCR, while reducing NO_x emissions, results in ammonia (NH_3) emissions, which are commonly referred to as ammonia slip.

CO emissions from the combustion turbines and duct burners associated with HRSGs would be controlled using an oxidation catalyst. Use of an oxidation catalyst for controlling CO emissions also results in control of VOC emissions.

Table 3.7-3 summarizes the maximum annual emission rates of the criteria pollutants from the combustion turbines, HRSGs, and the fire pump. As a worst-case estimate, the proposed annual emission rates of the various criteria pollutants were based on the maximum short-term emission rates under various operating scenarios times 8,760 hours of operation per year (6,600 hours per year for the duct burners). The maximum hours of operation for the diesel fire pump would be 1 hour per day, 1 day per week, with an annual maximum of 52 hours per year.

An air quality impact assessment was conducted to evaluate compliance of the Energy Facility with applicable regulatory requirements. The assessment was done through an air quality modeling analysis and was described in detail in the PSD permit application (COB Energy Facility, LLC, August 2002), and revised in December 2002 and July 2003.

The air quality modeling was conducted using standard EPA modeling techniques. The EPA-approved Industrial Source Complex Short Term (ISCST3) dispersion model was used with wind data from the onsite meteorological station to model the ambient concentrations of pollutants within roughly 10 miles of the proposed Energy Facility. The EPA-approved CALPUFF model was used to predict pollutant concentrations at long-range receptors more than about 10 miles from the Energy Facility. Results were compared with EPA criteria, including state and Federal ambient air quality standards, Class II significant impact levels, PSD Class I and Class II increments, and proposed EPA Class I significance levels.

Table 3.7-4 summarizes the results of the criteria pollutant air quality analysis. With the addition of conservative background concentrations for 1-hour CO and for 24-hour and annual PM_{10}, impacts for all of the criteria pollutants were well below the applicable ambient air quality standards, and PSD Class II increments or air quality significant impact levels. Therefore, it was concluded that the Energy Facility would cause no significant air quality impacts.

<u>Recommended Mitigation Measures</u>. No mitigation measures are recommended beyond those included in the proposed project.

<u>Impact 3.7.3. Operation of the Energy Facility would result in emissions of greenhouse gases.</u>

Emissions of carbon dioxide (CO_2) for the Energy Facility were estimated as a part of the demonstration of compliance with OAR 345-024-0560, as presented in the SCA. It is estimated that up to 2.7 million tons per year of CO_2 could be emitted from the proposed

Energy Facility. Carbon dioxide emissions greater than 0.675 pounds per kilowatt-hour of net electric power output would be offset as required by OAR 345-024-0550. The excess emissions, 15.349 million tons over 30 years, would be offset by payment of more than $13.6 million to The Climate Trust. The Climate Trust would use these funds to finance CO_2 mitigation projects.

Recommended Mitigation Measures. No mitigation measures are recommended beyond those included in the proposed Energy Facility design.

Impact 3.7.4. Operation of the proposed Energy Facility would result in emissions of hazardous air pollutants.

Table 3.7-5 summarizes HAP emissions from the Energy Facility. Benzene, toluene, xylenes, polycyclic aromatic hydrocarbons (PAH), formaldehyde, and other organic compounds associated with the combustion of natural gas would be released into the atmosphere from the stacks associated with combustion turbines.

The oxidation catalyst used to reduce CO emissions would be effective in controlling volatile organic HAP emissions such as formaldehyde. For this project, it was assumed that the oxidation catalyst would provide 55 percent destruction of volatile organic HAPs, although EPA has indicated that the destruction efficiency could be significantly higher. The NO_x emissions from the combustion turbines and HRSG duct burners would be continuously monitored, allowing continuous feedback to the ammonia supply system. This would allow the levels of ammonia used in the SCR to be adjusted, thus minimizing ammonia slip.

Recommended Mitigation Measures. No mitigation measures are recommended beyond those included in the proposed project.

Impact 3.7.5. Operation of the Energy Facility could Impact Air Quality-Related Values in federally managed Class I areas in the region.

PSD regulations require an assessment of the project's impact to Air Quality Related Values (AQRVs) in Class I areas. AQRVs include regional visibility or haze, the effects of primary and secondary pollutants on sensitive plants, the effects of pollutant deposition on soil and water bodies, and effects associated with secondary aerosol formation. These requirements provide special protection for Class I areas. Table 3.7-1 lists the Class I areas near the Energy Facility site.

The EPA-approved CALPUFF modeling system was used for modeling the long-range transport of pollutants from the generation plant. CALPUFF is EPA's proposed model for predicting long-range transport and dispersion accounting for downwind chemical reactions within the emitted plume. Features of the CALPUFF modeling system include secondary aerosol formation, gaseous and particle deposition, wet and dry deposition processes, complex three-dimensional wind regimes, and the effects of humidity on regional visibility. The modeling procedures used follow the recommendations of the Interagency Agency Workgroup on Air Quality Modeling and the Federal Land Managers Air Quality Related Values Workgroup (Federal Air Quality Land Manager's Workgroup, 2000).

Class I Area Increment Consumption. PSD regulations require the Energy Facility to model air pollutant concentrations at the Class I areas, and compare the modeled concentrations to the allowable PSD Class I increments. Long-range modeling of impacts to the distant Class I areas was done using the CALPUFF modeling system in accordance with Federal guidance and state and Federal review. Table 3.7-6 provides the results of the Class I PSD increment analysis. The modeled maximum concentrations at all Class I areas were well below the allowable Class I increments for all criteria pollutants. The modeled maximum concentrations at all Class I areas were also below the proposed EPA Class I significance levels.

Nitrogen and Sulfur Deposition at Class I Areas. The CALPUFF modeling system was used to estimate the Energy Facility's potential contribution to total nitrogen and sulfur deposition in the Class I areas. Soil, vegetation, and aquatic resources in Class I areas are potentially influenced by nitrogen and sulfur deposition. Federal Guidance indicates that net increases in the annual deposition exceeding 5 kilograms per hectare per year (kg/ha/yr) for nitrogen or 3 kg/ha/yr for sulfur would constitute a significant impact.

Total annual nitrogen and sulfur deposition fluxes were calculated by summing the contributions of the gases directly emitted with the secondary aerosol products formed as predicted by CALPUFF's chemistry and deposition algorithms. The annual deposition fluxes were estimated based on emission rates that assumed that duct firing would occur 6,600 hours per year.

No significant impacts on sulfur and nitrogen deposition rates are predicted to occur as the result of emissions from the proposed Energy Facility. Deposition results for nitrogen and sulfur are summarized in Table 3.7-7 for each Class I area. Incremental deposition rates attributable to the proposed Energy Facility are less than the screening criteria levels currently recommended by Region 6 staff (Mr. Bob Bachman) of the USDA Forest Service for all Class I areas except Gearhart Wilderness Area, which was predicted to slightly exceed the nitrogen deposition screening criterion. These screening criteria are 0.005 kg/hectare per year for nitrogen and 0.003 kg/hectare per year for sulfur at each Class I area, which represent 0.1 percent of the maximum load of 5 kg/hectare per year for nitrogen and 3 kg/hectare per year for sulfur identified in the *Guidelines for Evaluating Air Pollution Impacts on Class I Wilderness Areas in the Pacific Northwest* (USDA Forest Service, May 1992). Based on these deposition modeling results, the proposed Energy Facility has demonstrated that it would not have a significant impact on sulfur and nitrogen deposition rates in the Class I areas.

Regional Haze Assessment. PSD regulations require the Energy Facility to model impacts on regional haze at the nearest Class I areas. Regional haze is generally quantified by measuring the visual range, and converting it to a light extinction coefficient (B_{ext}). A high B_{ext} corresponds to high concentrations of light scattering and light-absorbing compounds. The regional haze assessment was done by modeling the increase in the light extinction coefficient (B_{ext}) at Class I areas and comparing the modeled increases to the background B_{ext} values for existing clean days (typically the 90th percentile clearest day). The CALPUFF regional haze analysis results calculate the maximum predicted change in 24-hour extinction coefficient for each Class I area. Changes to extinction were based on seasonal background data for good visibility days and were adjusted with hourly humidity using the techniques described above. The extinction budgets for the higher episodes in most Class I areas are influenced by nitrates, PM_{10}, and, to a lesser extent, sulfates.

Table 3.7-8 lists the modeling results for the Class I areas that were modeled to determine the maximum increase that is predicted to occur in B_{ext} as the result of the Energy Facility functioning under worst case operating conditions. ODEQ and the Federal Land Managers (FLMs) assess whether the Energy Facility could be expected to significantly impair visibility in a Class I area on a case-by-case basis, taking into account geographic extent, intensity, duration, frequency and time of visibility impairment and how these factors correlate with (1) times of visitor use of the Class I area, and (2) the frequency and timing of natural conditions that reduce visibility. The FLMs use screening levels of 5 percent and 10 percent change in light extinction for single source and cumulative source analyses, respectively. Any source whose impacts, by themselves, are modeled to result in B_{ext} of less than 5 percent (as compared to the cleanest background values) will, as a general matter, be considered to result in no significant impairment. The FLM guidance suggests that the source-specific factors should be considered if a facility models its sole source impacts and determines that under worst-case operating conditions a B_{ext} of greater than 5 percent (as compared to the cleanest background values) could occur on 1 or more days.

Measured data for background B_{ext} values at each Class I area were provided by the FLMs. The modeled changes to light extinction attributable to the Energy Facility were less than the 5 percent screening value for all seasons and Class I areas. According to this criterion, changes to visual conditions in the Class I areas would not be perceptible even when the Energy Facility's combustion gas turbines, HRSG duct-burners, and fire pump were emitting at their short-term peak rates.

Recommended Mitigation Measures. No mitigation measures are recommended beyond those included in the proposed project.

Impact 3.7.6. Operation of the Energy Facility could result in odor emissions.

The proposed Energy Facility would not cause significant odors during normal operation. Natural gas delivered to the Energy Facility would not be odorized. However, if it were odorized, it would be contained within the natural gas pipeline and Energy Facility piping system up to the point of use in the combustion gas turbines and HRSG duct burners, where it would be combusted. The M/R Station would contain equipment handling natural gas pressure reduction. This enclosed structure would contain natural gas detection systems as a method for identifying inadvertent leaks within the building. Other natural gas leak detection equipment would be located in other areas within the Energy Facility site where natural gas leaks could collect so the Energy Facility operators could take action to contain the leak and vent the collected natural gas.

Ammonia used in the SCR system for NO_x control would be the only other potential source of odor, and would occur only in the event of an accidental spill or release. Aqueous ammonia would be used for the SCR, because it would release ammonia gas at a slower rate after a spill than anhydrous ammonia, during which containment operations could be implemented. Unreacted ammonia emissions from the HRSG stacks would be at such low concentrations that they would not cause any perceptible odors offsite.

Recommended Mitigation Measures. No mitigation measures are recommended beyond those included in the proposed project.

3.7.3 Cumulative Impacts

Analyses completed for the project indicate that there would be no significant cumulative adverse impacts to air quality from the proposed Energy Facility.

3.7.3.1 Class II Impacts

Criteria pollutant cumulative impacts to air quality in the Class II areas were analyzed in the PSD application for NO_x, PM_{10}, and 1-hour CO. Dispersion modeling was used to demonstrate that impacts from the proposed project combined with significant sources in the area and other background sources were below the ambient air quality standards and PSD increments. NO_2 concentrations were less than half the ambient air quality standard using a background from Portland, Oregon. Background air quality in the area of the Energy Facility site is notably less than the background air quality used in the analysis. Consequently, an increase in sources similar to a level similar to those in the Portland, Oregon, area could be easily tolerated in the area without threatening ambient air quality.

Twenty-four hour PM_{10} concentrations were two-thirds of the ambient air quality standard and annual concentrations less than half the standard, including background values representative of the Klamath Falls area. A notable increase in emissions from other sources could occur and still show that cumulative impacts were below the ambient air quality standards for PM_{10}. Impacts for 1-hour CO combined with a representative background value were slightly more than one-third of the ambient air quality standard. Substantial growth in CO emissions could occur and result in ambient air quality below the standards. Impacts for SO_2 and 8-hour CO for the proposed Energy Facility alone were below the significant impact level defined by EPA and ODEQ and were not analyzed with other sources. Addition of background values and other sources are not expected to impact the 8-hour ambient air quality standard for CO. Emissions of SO_2 from the proposed Energy Facility are quite low, background emissions are quite low, and concentrations are not a concern in the region. Cumulative impacts are not a concern for SO_2 in this area.

3.7.3.2 Other Potential Projects

Section 2.4 discusses other potential projects in the area. Air emissions from these potential future sources are easily incorporated into the background allowances discussed above and no significant cumulative impacts for criteria pollutants from existing or future sources are anticipated.

3.7.3.3 Class I Impacts

In addition, cumulative impacts to Class I areas were analyzed for the EIS by evaluating the potential degradation to visibility resulting from the emissions from the proposed Energy Facility combined with those of other power generating and related facilities currently existing in the area or currently undergoing evaluation by EFSC. These are the major sources of emission with potential to affect distant Class I areas. Other potential sources such as car emissions were not included because they are not expected to have cumulative impacts on distant Class I areas.

Sources and Emissions Modeled

As in the PSD application, the CALPUFF modeling system was used for this analysis, which is the preferred EPA model for analyzing long-range transport of air emissions. In addition to the Energy Facility emission sources, the Class I cumulative effects analysis evaluated emissions from the nearby PG&E Station 14 in Bonanza and the KCP. To be conservative, the projected emissions from the KGF were modeled as well. Applications were submitted in September 2002 to ODEQ and EFSC requesting authorization to construct the KGF. It is unclear when, or if, that authority will be granted and when, or if, the KGF will be built. Typically, unpermitted sources are not included in such cumulative effects analyses. However, in order to best document the worst-case, long-term impacts to the surrounding Class I areas, the KGF was included in this cumulative effects analysis. The sources and emissions modeled in the cumulative effects analysis are summarized in Table 3.7-9.

Visibility Impacts

The visibility cumulative effects analysis was conducted according to guidance provided in the *Interagency Workgroup on Air Quality Modeling Phase 2 Summary Report and Recommendations for Modeling Long-Range Transport Impacts* (EPA-454/R-98-019) (IWAQM2) and the *Federal Land Managers Air Quality Related Values Work Group Phase I Report* (FLAG) (USFS, NPS, USFWS, 2000). The FLAG document indicates that a change in extinction of less than 10 percent, in a Class I area, from the proposed source plus other nearby sources, should be considered an insignificant impact. Therefore, the same criterion was used for this analysis to indicate whether there would be the potential for an adverse cumulative impact. Table 3.7-10 provides a summary of the percent extinctions in each of 11 Class I areas analyzed. In no Class I area would this value exceed 10 percent. It is concluded that there would be no adverse cumulative impact to any Class I area within 200 kilometers (124 miles) of the proposed Energy Facility site. EPA, ODEQ, and the FLMs assume that if no significant impacts are documented at a location within a 200-kilometer radius, the Energy Facility would not significantly impact any Class I areas.

Deposition Impacts

In the PSD analysis, deposition impacts for the project in the Class I areas were compared to screening criteria recommended by the USDA Forest Service. These criteria represent 0.1 percent of the maximum load identified in *Guidelines for Evaluating Air Pollution Impacts on Class I Wilderness Areas in the Pacific Northwest* (USDA Forest Service, May 1992) as the no injury threshold criteria. The full maximum load identified in this document is appropriate for consideration of cumulative impacts. Cumulative emissions of gaseous pollutants NO_x and SO_2, which are the precursors to deposition compounds of concern, are not 1,000 times greater than the emissions analyzed in the PSD application. Therefore, cumulative impacts to deposition are not anticipated.

TABLE 3.7-1
Ambient Air Quality Standards and Prevention of Significant Deterioration Increments

Pollutant	National Primary	National Secondary	State of Oregon	Class I PSD Increments	Class II PSD Increments
Inhalable Particulate Matter (PM_{10})					
Annual Arithmetic Mean	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$	4 $\mu g/m^3$	17 $\mu g/m^3$
24-hour Average	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$	8 $\mu g/m^3$	30 $\mu g/m^3$
Sulfur Dioxide (SO_2)					
Annual Arithmetic Mean	0.03 ppm	NA	0.02 ppm	2 $\mu g/m^3$	20 $\mu g/m^3$
24-hour Average	0.14 ppm	NA	0.10 ppm	5 $\mu g/m^3$	91 $\mu g/m^3$
3-hour Average	NA	0.5 ppm	0.50	25 $\mu g/m^3$	512 $\mu g/m^3$
Carbon Monoxide (CO)					
8-hour Average	9 ppm	NA	9 ppm	NA	NA
1-hour Average	35 ppm	NA	35 ppm	NA	NA
Ozone (O_3)					
1-hour Average	0.12 ppm	0.12 ppm	0.12 ppm	NA	NA
8-hour Average	0.08 ppm	0.08 ppm	NA	NA	NA
Nitrogen Dioxide (NO_2)					
Annual Average	0.05 ppm	0.05 ppm	0.05 ppm	2.5 $\mu g/m^3$	25 $\mu g/m^3$
Lead (Pb)					
Quarterly Average	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	NA	NA

Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year unless otherwise noted.

$\mu g/m^3$ = micrograms per cubic meter
ppm = parts per million
NA = not applicable

TABLE 3.7-2
Regional Class I Areas

Class I Area	Distance from Energy Facility Site (kilometers)	State
Three Sisters Wilderness	189	Oregon
Crater Lake National Park	87	Oregon
Diamond Peak Wilderness	156	Oregon
Mountain Lakes Wilderness	58	Oregon
Gearhart Wilderness	52	Oregon
Lava Beds National Monument	41	California
South Warner Wilderness	125	California
Thousand Lakes Wilderness	159	California
Marble Mountain Wilderness	152	California
Lassen Volcanic National Park	176	California
Caribou Wilderness	180	California

TABLE 3.7-3
Maximum Short-Term and Annual Criteria Pollutant Emission Rates

Pollutant	Maximum Short-Term Emission Rate from Fire Pump (lb/hr)	Maximum Short-Term Emission Rate Per Combustion Turbine and HRSG (lb/hr)	Maximum Annual Emission Rate for Energy Facility (tons/yr)
NO_X (as NO_2)	9.06	22.8	354
CO	1.95	19.0	465
SO_2	0.60	1.0	16
VOC	0.74	7.1	96
PM	0.64	14.0	242
PM_{10}	0.64	14.0	242

NO_2 = nitrogen dioxide
NO_x = nitrogen oxide
PM_{10} = particulates less than 10 microns in diameter
SO_2 = sulfur dioxide

TABLE 3.7-4
Modeled Ambient Concentrations for Criteria Pollutants

Pollutant	Averaging Period	Maximum Predicted Concentration ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	Ambient Air Quality Standard[2] ($\mu g/m^3$)	PSD Class II Increment[3] ($\mu g/m^3$)
NO_2	Annual	6.30[1]	1	33.9	40.2	100	25
CO	1-Hour	3,078[1]	2,000	9,620	12,698	40,000	NA
CO	8-Hour	263	500	NA	NA	10,000	NA
PM_{10}	24-Hour	13.11[1]	1	80	93.11	150	30
PM_{10}	Annual	1.55[1]	0.2	18.1	19.65	50	17

[1]Project-only impacts for this pollutant and averaging period exceeded the significant impact level. Maximum predicted concentration includes competing sources.

[2]Compliance assessed by comparing to Total Concentration.

[3]Compliance assessed by comparing to Maximum Predicted Concentration.

$\mu g/m^3$ = micrograms per cubic meter
CO = carbon monoxide
NA = not applicable (because the maximum predicted concentration is below the significant impact level)
NO_2 = nitrogen dioxide; note that modeled value was multiplied by 0.75 to convert from NO_x to NO_2
PM_{10} = particulate matter less than 10 microns in diameter
PSD = Prevention of Significant Deterioration

TABLE 3.7-5
Summary of Hazardous Air Pollutant Emissions

Pollutant	Annual Emission Rate for Combustion Turbines and Duct Burners* (tons/yr)	Annual Emission Rate for Fire Pump (lb/hr)	Annual Emissions (tons/yr)
Benzene	0.17	5.0 E-05	0.17
Formaldehyde	2.96	6.3 E-05	2.98
Hexane	6.85	--	7.33
Naphthalene	0.02		0.02
Toluene	1.73	2.2 E-05	1.73
Acetaldehyde	0.53	4.1 E-05	0.53
Acrolein	0.08	--	0.08
Ethylbenzene	0.42	--	0.42
PAH	0.03	9.0 E-06	0.03
Xylenes (total)	0.85	1.5 E-05	0.85
Dichlorobenzene	0.005	--	0.005
Arsenic	0.002		0.002
Cadmium	0.009		0.010
Chromium	0.012		0.012
Cobalt	0.001		0.001
Manganese	0.003		0.003
Mercury	0.002		0.002
Nickel	0.018		0.018

* Hazardous air pollutant (HAP) emission rates assume oxidation catalyst destruction efficiency of 55 percent for volatile organic HAPs.

TABLE 3.7-6
Modeled Class I Ambient Air Quality Results (Energy Facility Alone)

Area	PM_{10} Annual (μg/m^3)	PM_{10} 24-Hour (μg/m^3)	NO_X Annual (μg/m^3)
Three Sisters Wilderness	0.0006	0.014	0.0001
Crater Lake National Park	0.0028	0.14	0.0019
Diamond Peak Wilderness	0.0008	0.022	0.0002
Mountain Lakes Wilderness	0.0057	0.16	0.005
Gearhart Wilderness	0.011	0.12	0.011
Lava Beds National Monument	0.0032	0.065	0.0011
South Warner Wilderness	0.002	0.027	0.0012
Thousand Lakes Wilderness	0.0014	0.039	0.0007
Marble Mountain Wilderness	0.0013	0.037	0.0007
Lassen Volcanic National Park	0.001	0.033	0.0004
Caribou Wilderness	0.0009	0.015	0.0004
EPA Proposed Class I Significance Level	**0.2**	**0.3**	**0.1**
Class I Increment	**4**	**8**	**2.5**

μg/m^3 = micrograms per cubic meter
EPA = U.S. Environmental Protection Agency
NO_X = nitrogen oxide
PM_{10} = particulates less than 10 microns in diameter

TABLE 3.7-7
Summary of Total Nitrogen and Sulfur Deposition Results (Energy Facility Alone)

Area	Total N kg/(hectare*yr)	Total S kg/(hectare*yr)
Three Sisters Wilderness	0.0003	0.00006
Crater Lake National Park	0.0008	0.0001
Diamond Peak Wilderness	0.0003	0.00006
Mountain Lakes Wilderness	0.002	0.0002
Gearhart Wilderness	0.0058	0.001
Lava Beds National Monument	0.0009	0.0002
South Warner Wilderness	0.0008	0.0001
Thousand Lakes Wilderness	0.0005	0.00007
Marble Mountain Wilderness	0.0004	0.00007
Lassen Volcanic National Park	0.0004	0.00006
Caribou Wilderness	0.0004	0.00005

kg/(hectare*yr) = kilograms per hectare per year
N = nitrogen
S = sulfur

TABLE 3.7-8
Visibility Analysis Results—Maximum Percent Change in Extinction (Energy Facility Alone)

Area	Day	Year	Receptor Coordinate X (km)*	Receptor Coordinate Y (km)*	B_{ext} Modeled (1/Mm)	B_{ext} Background (1/Mm)	Extinction Change (%)
Three Sisters Wilderness	344	1998	201.0	202.656	0.111	17.242	0.64
Crater Lake National Park	344	1998	204.848	93.0	0.659	17.236	3.82
Diamond Peak Wilderness	344	1998	201.0	169.326	0.155	17.242	0.9
Mountain Lakes Wilderness	350	1998	201.51	44.5	0.811	17.056	4.76
Gearhart Wilderness	10	1999	296.0	70.56	0.447	16.876	2.65
Lava Beds National Monument	171	1998	251.6	-14.211	0.187	15.958	1.17
South Warner Wilderness	13	1999	355.073	-54.5	0.203	16.672	1.22
Thousand Lakes Wilderness	8	1999	246.135	-136.258	0.239	16.786	1.42
Marble Mountain Wilderness	357	1998	125.1	-58.817	0.338	16.99	1.99
Lassen Volcanic National Park	8	1999	248.601	-157.379	0.189	16.786	1.12
Caribou Wilderness	339	1998	277.47	-155.593	0.149	16.546	0.9

* Lambert conformal coordinate system with a reference north latitude of 46 degrees and a reference west longitude of 121 degrees and standard parallels of 42.5 and 48 degrees north latitude and standard meridian of 121 degrees west longitude.

B_{ext} = light extinction coefficient
km = kilometers
1/Mm = inverse megameters

TABLE 3.7-9
Sources Included in Cumulative Impacts Analysis

Facility	Source	NO_x (lb/hr)	SO_2 (lb/hr)	PM_{10} (lb/hr)
COB Energy Facility	HRSG 1-4[1]	22.3	1	14
	Gas Heaters 1-4[1]	0.18	0.001	0.014
	Fire Water Pump	0.38	0.025	0.0265
PGE Transmission NW Corporation	Turbine 14[1]	33.2	0.3	0.7
	Turbine 14[2]	45.6	0.3	0.8
Klamath Cogeneration Project[3]	2 HRSG[2]	33	3.3	2
Klamath Generation Facility[3,4]	CT 1-2[2]	7.2	2.3	4.2
	Generator	0.00925	0.045	0.00604
	Fire pump	0.175	0.095	0.0123

[1] Emissions shown are for each of four units.
[2] Emissions shown are for each of two units.
[3] Emissions modeled derived from individual facility air permit applications.
[4] Klamath Generation Facility is permitted, but not yet operating.

-- = No emissions of pollutant from this source.

TABLE 3.7-10
Cumulative Visibility Analysis Results—Maximum Percent Extinction Change

Area	Day	Year	Receptor Coordinate X (km)*	Receptor Coordinate Y (km)*	B_{ext} Modeled (1/Mm)	B_{ext} Background (1/Mm)	Extinction Change (%)
Three Sisters Wilderness	344	1998	184.263	231.959	0.215	17.242	1.24
Crater Lake National Park	344	1998	204.848	93.0	1.094	17.236	6.35
Diamond Peak Wilderness	344	1998	189.0	166.071	0.301	17.242	1.742
Mountain Lakes Wilderness	3	1999	201.881	35.437	1.263	17.074	7.40
Gearhart Wilderness	6	1999	306.0	58.215	0.782	16.876	4.64
Lava Beds National Monument	234	1998	244.238	-18.1	0.240	15.904	1.51
South Warner Wilderness	13	1999	355.073	-54.5	0.341	16.672	2.05
Thousand Lakes Wilderness	8	1999	243.239	-137.576	0.424	16.786	2.53
Marble Mountain Wilderness	357	1998	121.013	-51.4	0.708	16.99	4.17
Lassen Volcanic National Park	339	1998	272.17	-152.876	0.388	16.618	2.34
Caribou Wilderness	339	1998	275.052	-155.605	0.361	16.546	2.18

* Lambert conformal coordinate system with a reference north latitude of 46 degrees and a reference west longitude of 121 degrees and standard parallels of 42.5 and 48 degrees north latitude and standard meridian of 121 degrees west longitude.

B_{ext} = light extinction coefficient
km = kilometers
1/Mm = inverse megameters

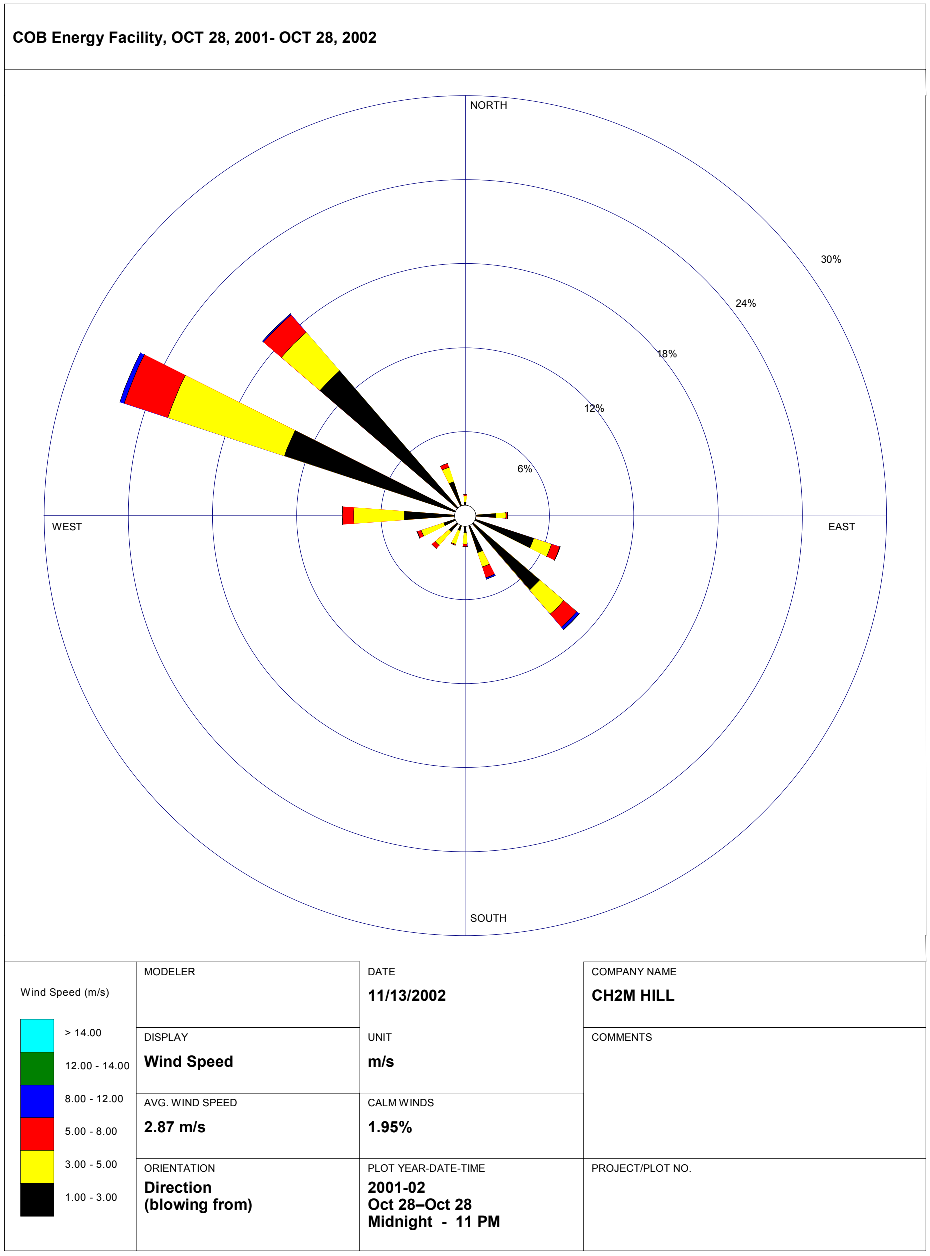


FIGURE 3.7-1
Annual Windrose of the Meteorological Data Set

3.8 Visual Quality and Aesthetics

The project area for visual quality and aesthetics covers a 30-mile radius from the Energy Facility stacks and from the southernmost tower of the electric transmission line. This is a predominantly undeveloped area where the primary land uses are forests and farming. A number of scenic and aesthetic resources, described below, surround the proposed Energy Facility. The elements of the Energy Facility that could affect the visual and aesthetic quality of the environment would be four stacks and 38 transmission towers. The stacks would be painted tan to blend in with their surroundings. The Energy Facility would use nonglare, low-impact lighting with shielded or cutoff fixtures, and the lighting would be directed downward. The proposed Energy Facility would not degrade or obstruct any scenic or aesthetic resources designated in pertinent Federal, state, and local plans.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.8.1 Affected Environment

The landscape of the project area is largely undeveloped, with farms being the primary development. Within the 30-mile project area, natural resources such as national forests and existing and proposed wilderness trails, and a scenic highway surround the proposed Energy Facility. Table 3.8-1 shows the resources that have been designated as scenic or aesthetic in Federal land management, local land use, and other plans. To provide a comprehensive and conservative assessment of scenic and aesthetic values, this analysis is based on the assumption that if a location is listed as a scenic or aesthetic resource in an applicable plan, it is a significant scenic or aesthetic resource. The analysis then considers whether the proposed project would have any significant visual impact on these significant scenic areas.

The following sections describe the resources in the proposed project area.

3.8.1.1 OC&E Woods Line State Trail

The OC&E Woods Line State Trail is a state park and recreational trail near the towns of Olene and Dairy. This state park does not have a special scenic designation (Beauchmin, 2002). The Energy Facility would be located approximately 8 miles from the trail at its nearest point.

3.8.1.2 Volcanic Legacy Scenic Byway and Modoc Volcanic Scenic Byway

The Volcanic Legacy Scenic Byway and Modoc Volcanic Scenic Byway have been designated as National Scenic Byways by the U.S. Secretary of Transportation. This designation is based on a roadway's archeological, cultural, historic, natural, recreational, and scenic qualities. To receive this designation, a road must possess multiple intrinsic qualities that are nationally significant and contain one-of-a-kind features that do not exist elsewhere. Views from these two volcanic scenic byways are typically of the natural foreground features, such as volcanic formations and wildlife refuges.

3.8.1.3 State Routes 161 and 139

State Routes 161 and 139 are eligible for designation as scenic highways but have not yet been officially designated as such. Nevertheless, they are labeled as scenic highways on several road maps generally available to the public.

3.8.1.4 Miller Creek Area of Critical Environmental Concern

Miller Creek is a special area managed by BLM as an area of critical environmental concern (ACEC) with the objective of maintaining, protecting, or restoring natural ecological processes and wildlife and scenic resources. According to BLM's Klamath Falls Resource Area Resource Management Plan EIS (BLM, 1994), the Miller Creek ACEC is a scenic, natural ecosystem that is a unique feature of Gerber Plateau. Miller Creek would be managed as Visual Resources Management Class II that allows for low levels of visible change. Activities may be seen but should not attract attention from the casual observer (BLM, 1995).

3.8.1.5 Lava Beds National Monument

Although Lava Beds National Monument is not a designated scenic resource, it is a national monument with high scenic value. The purpose of the monument is to preserve and protect the significant natural and cultural resources of the area.

3.8.1.6 Lower Klamath Lake National Wildlife Refuge (NWR) and Tulelake NWR Wildlife Overlooks

These two wildlife overlooks are located approximately 15 and 11 miles from the Energy Facility site. The NWR has not designated these overlooks as scenic resources, but as wildlife viewing areas.

3.8.1.7 Bloody Point, Petroglyphs, and Battle of Scorpion Point Vista Points

Modoc County has designated these three historic sites—Bloody Point, Petroglyphs, and Battle of Scorpion Point—as vista points. They are 9, 16, and 19 miles, respectively, from the closest proposed transmission tower.

3.8.2 Environmental Consequences and Mitigation Measures

The elements of the proposed Facility that could affect the visual and aesthetic quality of the environment would be four stacks and 38 transmission towers.

The four stacks would range in height from 150 to 200 feet, and would be painted a neutral tan to blend into the horizon, making them difficult to discern from a distance.

The 38 transmission towers would range in height from 100 to 165 feet, and would be constructed south of the Energy Facility for about 7.2 miles. Most of the transmission towers would be 105 to 110 feet tall.

As described below, the Energy Facility would have no significant unavoidable adverse impacts on scenic or aesthetic resources.

Impact 3.8.1. Visual impacts to scenic and aesthetic resources would be minimal.

Assessment of Impact. Visual impacts to scenic and aesthetic resources could potentially result from the stacks and transmission towers for the electric transmission line.

Three sets of visual analyses were performed to determine visual impacts to scenic and aesthetic resources within the 30-mile project area. These analyses were based on lines of sight from the scenic and aesthetic resources to the stacks and transmission lines. Figures 3.8-1 and 3.8-2 show the lines of sight to the stacks and transmission towers, respectively.

The line-of-sight analysis determined that the stacks and transmission towers would be partially visible under clear weather conditions from the following scenic areas: OC&E Woods Line State Trail, Volcanic Legacy Scenic Byway, and BLM Miller Creek ACEC.

At least one transmission tower, but not the stacks, would be visible from the following scenic areas: Bloody Point, Petroglyphs, and Battle of Scorpion Point (historic sites with vista points); State Routes 161 and 139; Lower Klamath NWR Wildlife Overlook; and Tulelake NWR Wildlife Overlook.

From a small portion of the Modoc Volcanic Scenic Byway, at least one transmission tower would be visible, but not the stacks.

The following sections describe in more detail the potential impacts by scenic or aesthetic resource.

OC&E Woods Line State Trail. According to the line-of-sight analysis, the stacks and transmission towers would be visible from portions of the OC&E Woods Line State Trail, a state park and recreational trail, near the towns of Olene and Dairy. The landscape analysis systems established by the U.S. Forest Service and other agencies classify an object located approximately 8 miles distant (like the Energy Facility from the trail) as being in a scene's far background. These landscape assessment systems generally define a landscape scene's background zone as starting 3 to 4 miles in the distance, and characterize this zone as the area in which texture has disappeared and color has flattened, and in which landform ridgelines and horizon lines are the dominant visual characteristic (USDA Forest Service, 1995).

This conclusion is consistent with the findings of various studies of the perceived effects of electric transmission lines, which determine that for residential viewers, electric transmission lines are most likely to be noticed and perceived to have negative effects when they are relatively close to viewers' homes (no more than 2 miles away) and that transmission towers located 1 mile or less from homes are the ones most likely to be perceived in negative terms (Economics Consultants Northwest, 1987; Beauregard Conseil, 1990 and 1995; Entre les Lignes, 1993). In a study of evaluations of simulated views of transmission towers located in parkland settings in Australia, transmission towers were found to be perceived to have a negative effect on scenic quality at a distance of only up to 0.5 kilometer (about one-third of a mile) (Bishop, Hull, and Leahy, 1985). Seen from a distance of approximately 8 miles, the stacks and transmission towers would blend into the viewshed and would not substantially alter the visual character or views of the landscape.

Users of bicycle and hiking trails typically focus on their immediate surroundings unless there are established scenic viewpoints at which to stop. The OC&E Woods Line State Trail does not have a scenic designation, nor does it have any scenic viewpoints along this portion of the trail. Consequently, the Facility would not have a significant visual impact on users of the OC&E Woods Line State Trail.

Volcanic Legacy Scenic Byway and Modoc Volcanic Scenic Byway. According to the line-of-sight analysis and as shown in Figures 3.8-1 and 3.8-2, the stacks and transmission towers could be visible from the Volcanic Legacy Scenic Byway (U.S. 97 in Oregon) for a brief period of less than 1 mile while passing through Klamath Falls, and could be seen at a minimum distance of 20 miles. From the Modoc Volcanic Scenic Byway (in California), the transmission towers could be visible from a minimum of 10 miles near Tulelake. Given the location in the far background, the transmission towers would be very tiny, if visible at all, in the overall view and would blend in with the panorama; hence, they would not have an adverse effect on the character or quality of views from these roadways. For example, the Captain Jack Substation could not be seen from the Lava Beds National Monument with a high-powered spotting scope.

State Routes 161 and 139. At least one transmission tower would be visible from portions of State Routes 161 and 139, both approximately 9 miles from the closest transmission tower. From this distance, the Facility components would blend in with the distant landscape and would be difficult to discern against the surrounding hills. In addition, these views would likely be blocked by vegetation in the foreground and by Buck Butte and other hills south and west of the Facility site. Therefore, the transmission towers would not substantially alter the visual character or views of the landscape.

Miller Creek ACEC. The lower part of Miller Creek ACEC, located approximately 10 miles from the Facility, would have at least a partial line of sight to the stacks and transmission towers. Seen from a distance of 10 miles, the stacks and transmission towers would blend into the overall view and would not substantially alter the visual character or views of the landscape.

Lava Beds National Monument. The stacks would not be visible from the closest edge of the monument. It would also be unlikely that any proposed transmission towers would be visible from high points within the Monument, given that the Captain Jack Substation and the transmission towers connecting transmission lines to the substation were not visible from overlooks at varying elevations within the park during a field visit in June 2002. Even with a high-powered spotting scope, the substation and its transmission towers could not be located (Eisert, 2002). The Facility's location in the far background would mean that a transmission tower that could be within the line of sight from the monument's higher elevations would be barely detectable, if detectable at all. Because the transmission tower would be small in the overall view, these features would have little or no impact on the character or quality of views from the monument.

Lower Klamath Lake NWR and Tulelake NWR Wildlife Overlooks. Seen from a distance of 11 to 15 miles, the transmission towers would blend into the viewshed and would not substantially alter the visual character or views of the landscape. Any views would likely be blocked by vegetation in the foreground and by Buck Butte and other hills south of the Facility and north of Malin.

Bloody Point, Petroglyphs, and Battle of Scorpion Point Vista Points. The line-of-sight analysis indicates that at least one transmission tower could be visible from these vista points. The stacks would not be visible. Seen from these distances (between 9 and 19 miles), the towers would blend into the viewshed and would not substantially alter the visual character or views of the landscape. It is also likely that these views would be blocked by Buck Butte and other hills south of the Facility and north of Malin.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended to mitigate impacts, because impacts to designated scenic areas would not occur. Visual impacts to other areas would not be significant.

Impact 3.8.2. Impacts from Facility lighting would be minimal.

Assessment of Impact. The Energy Facility would use nonglare, low-impact lighting with shielded or cutoff fixtures. This system would minimize the lighting impact on the immediate vicinity while maintaining low to zero intensity above a horizontal axis. Outdoor lighting would be directed downward and at the Facility site and equipment, and would not be directed offsite. Lighting would be kept to the minimum required for operator safety requirements and maintenance work. Security lighting would utilize motion detection equipment rather than constant floodlights. The exhaust stacks and transmission towers would not require lighting or aircraft warning beacons.

At night, outside lighting at the Facility would be visible in the sky in the vicinity of the site. The closest recreational, scenic, or protected area to the site is the OC&E Woods Line State Trail, approximately 8 miles from the Facility. This is a day-use cycling and hiking trail; therefore, trail users would not be impacted by night lighting. Other scenic resources that would have views to the Energy Facility would be BLM's Miller Creek ACEC and the Volcanic Legacy Scenic Byway. The Miller Creek ACEC, a day-use area, would be 10 miles away and would not be impacted. Downcast lighting at the Facility would be so far distant (21 miles away) from the scenic byway that it would be imperceptible. Therefore, no significant impacts would occur.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

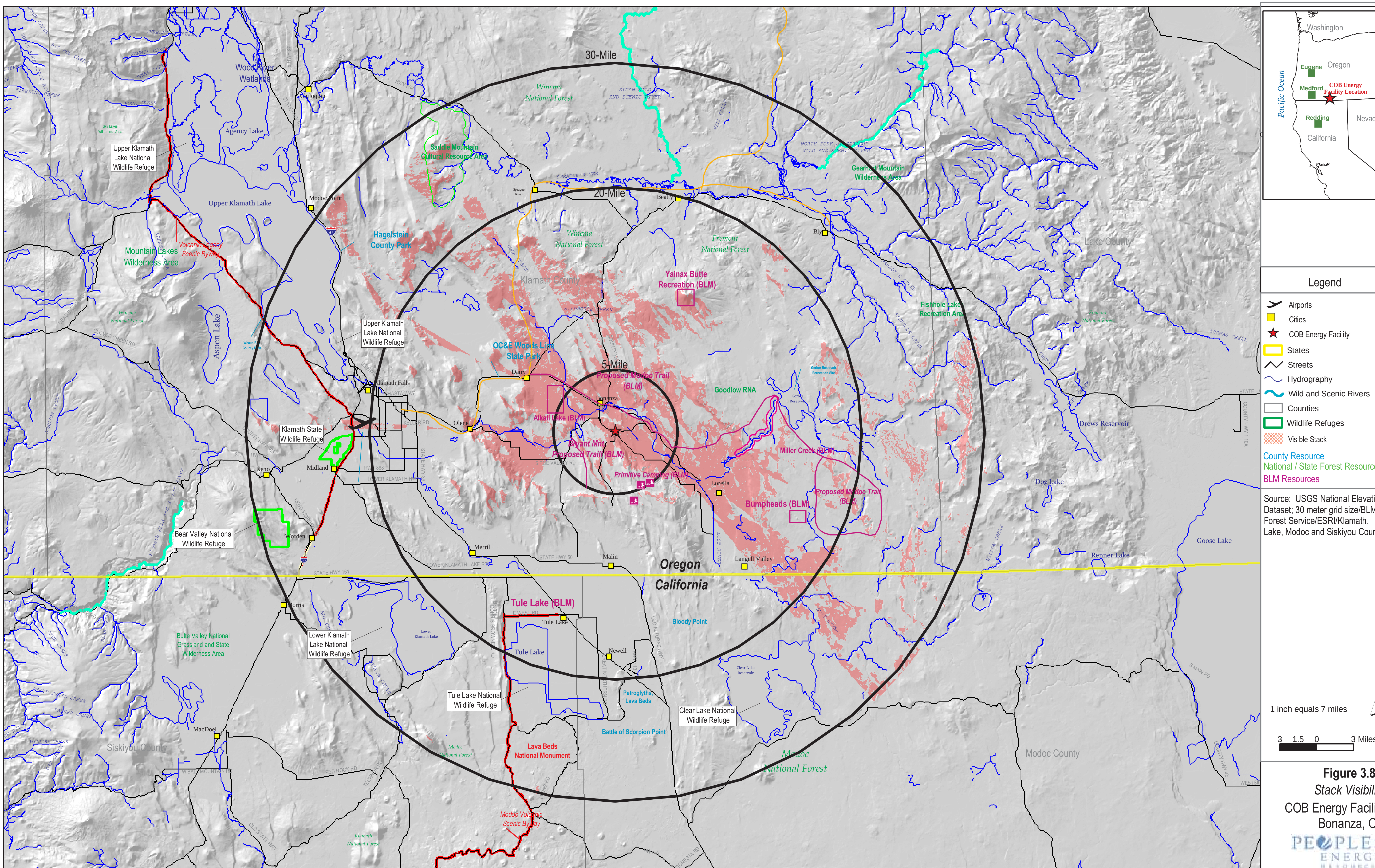
3.8.3 Cumulative Impacts

The project study area was established by EFSC as a radius of 30 miles around the project site. However, for purposes of cumulative impacts, the visual resource impact area is determined by scenic locations from which the proposed Facility can be viewed. These locations are described in Section 3.8.2. The proposed Facility would not have any adverse effect on aesthetic or scenic resources. Consequently, the project would not contribute to past or current actions resulting in cumulative impacts on this element of the environment. If additional electric transmission lines were constructed in proximity to the proposed Facility's transmission lines, they could have a cumulative negative effect on aesthetic resources by creating a cluttered appearance that detracted from the natural environment.

TABLE 3.8-1
Resources Identified as Scenic or Aesthetic

Resource	Jurisdiction	Applicable Plan Designation	Approximate Distance from Energy Facility (miles)	Approximate Distance from Southernmost Transmission Towers (miles)	Line of Sight to Stacks or Transmission Towers? (N = no, Y = yes)
Lava Beds National Monument	National Park Service	No scenic designation	22	17	N, Y
Sycan National Wild and Scenic River	USFS/Fremont and Winema NF	Wild and Scenic River	21	21	N, N
North Fork Sprague River (Wild and Scenic River)	USFS/Fremont and Winema NF	Wild and Scenic River, Scenic and Recreational Area	27	27	N, N
OC&E Woods Line State Trail	OPRD	Rails to Trails route, no scenic designation	9	8	Y, Y
Bloody Point	Modoc County	Historic Site with vista point	14	9	N, Y
Petroglyphs	Modoc County	Historic Site with vista point	22	16	N, Y
Battle of Scorpion Point	Modoc County	Historic Site with vista point	24	19	N, Y
Volcanic Legacy Scenic Byway (US 97 in Oregon)	ODOT/Klamath County	National Scenic Byway	21	20	Y, Y
US 97	Caltrans	Eligible Scenic Highway	21	20	N, N
SR 161	Caltrans	Eligible Scenic Highway	14	9	N, Y
SR139	Caltrans	Eligible Scenic Highway	14	9	N, Y
Modoc Volcanic Scenic Byway	USFS, Modoc County	National Scenic Byway	15	10	N, Y
Bear Valley National Wildlife Refuge Observation Area	USFWS	Wildlife observation, no scenic designation	28	25	N, N
Lower Klamath National Wildlife Refuge Wildlife Overlook	USFWS	Wildlife observation, no scenic designation	19	15	N, Y
Tulelake National Wildlife Refuge Wildlife Overlook	USFWS	Wildlife observation, no scenic designation	17	11	N, Y
Klamath Wildlife Refuge	ODFW	State Wildlife Refuge, no scenic designation	22	20	N, N
Miller Creek ACEC	BLM, Klamath Falls	BLM Area of Critical Environmental Concern with scenic value	10	10	Y, Y
Bumpheads Special Area	BLM, Klamath Falls	BLM Special Botanical/ Habitat Area with scenic value	15	15	N, N

BLM = Bureau of Land Management
NF = National Forest
ODFW = Oregon Department of Fish and Wildlife
ODOT = Oregon Department of Transportation
OPRD = Oregon Parks and Recreation Department
OSU = Oregon State University
USFS = U.S. Forest Service
USFWS = U.S. Fish and Wildlife Service



Legend

- Airports
- Cities
- COB Energy Facility
- States
- Streets
- Hydrography
- Wild and Scenic Rivers
- Counties
- Wildlife Refuges
- Visible Stack

County Resource
National / State Forest Resource
BLM Resources

Source: USGS National Elevation Dataset; 30 meter grid size/BLM/ Forest Service/ESRI/Klamath, Lake, Modoc and Siskiyou Counties

1 inch equals 7 miles

N

3 1.5 0 3 Miles

Figure 3.8-1
Stack Visibility
COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: P:\PERC\167426\Gis\EIS\mxds\EIS_8-7-03\3.8-2_tower_Visibility.mxd, Date: 08 15, 2003 10:29:17 AM

Figure 3.8-1
11 x 17
Color
Back

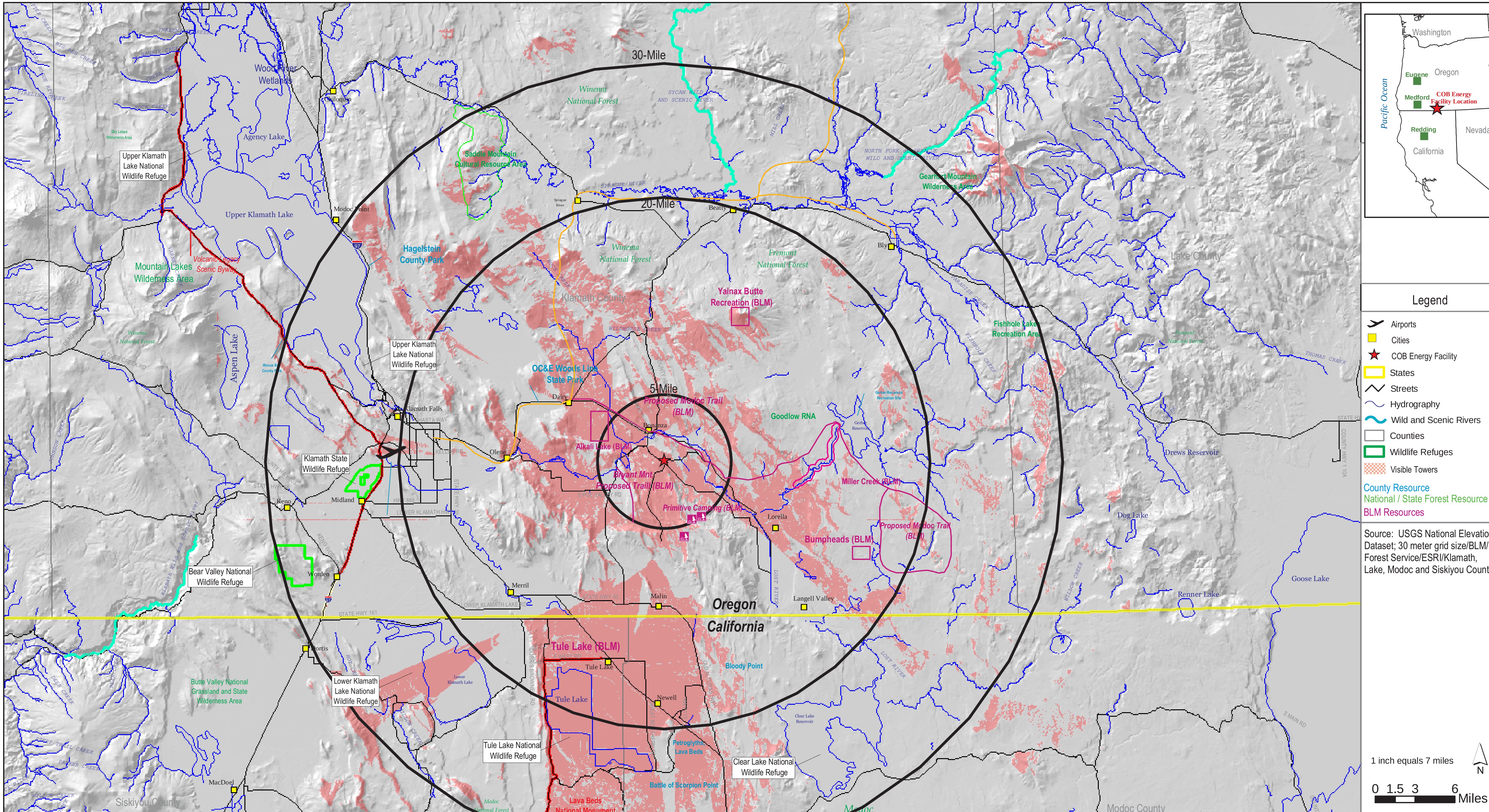


Figure 3.8-2
Tower Visibility
COB Energy Facility
Bonanza, OR

File Path: P:\PERC\167426\Gis\EIS\mxds\EIS_8-7-03\3.8-2_tower_Visibility.mxd, Date: 08 15, 2003 10:29:17 AM

Figure 3.8-2
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3.9 Cultural Resources

Cultural resources, also called heritage resources or historic properties, include resources significant in American history, architecture, archaeology, engineering, and traditional culture. Historic properties can include archaeological sites, examples of historic architecture and engineering, or resources of heritage significance to Native Americans and other cultural groups. Historic properties may be districts, sites, buildings, structures, or objects.

The significance of historic and cultural properties lies both in their heritage and their scientific value. Historic sites and historic architecture and engineering are embodiments of a technological and historical heritage. Archaeological sites are the raw material from which scientists reconstruct specific events and general trends of prehistory, and therefore have scientific value. Traditional cultural properties embody significant patterns of culture.

Cultural resource investigations have been conducted in cooperation with The Klamath Tribes. A Cultural Resources Management Plan (CRMP) would be prepared in consultation with the Tribes that describes monitoring activities during construction of the Facility and the actions to be taken if an unanticipated cultural resource site discovered during construction or operation would be managed and protected.

Three cultural sites have been identified in the area of the proposed Energy Facility, but would be avoided during construction, operation, and retirement of the Energy Facility. No impacts would occur.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively, and the *Cultural Resources Technical Report* (COB Energy Facility, LLC, January 2003). The *Cultural Resources Technical Report* was prepared to discuss field survey results and describe site locations. The technical report also included an oral history and ethnographic study. Because of the sensitive nature of this report, a separate submittal would be provided to EFSC and the Oregon State Historic Preservation Office (SHPO) but would not be made available to the general public.

3.9.1 Affected Environment

3.9.1.1 Prehistoric Background

Archaeological evidence suggests that humans have occupied south-central Oregon for at least the past 11,000 years. The remains of now-extinct Pleistocene megafauna in association with cultural materials have been reported in a few locations, including lower Klamath Lake about 15 miles southwest of the Facility. Published radiocarbon dates indicate that most of the Pleistocene megafauna became extinct in North America about 11,000 years ago (Minor, et al., 1979). Additional evidence for early human occupation of the area is provided by reports of a single Clovis-type fluted point found on the surface at two locations in the Lost River area (Howe, 1979).

Currently, chronological divisions of human prehistory in Oregon are divided into two stages, Paleo-Indian (11,5000 B.P. and 10,000 B.P) and Archaic. The Archaic stage is usually divided into Early (10,000 B.P. to 6000 B.P), Middle (6000 B.P. to 2000 B.P.), and Late Archaic

(2000 B.P. to contact with Euroamericans around 1850 A.D.) periods (Beckham and Minor, 1992; Gilsen, 1989).

Paleo-Indian Stage. Not far from the Energy Facility is a site with a Western Stemmed complex component documented. The West Lost River site (35KL972) contained diagnostic projectile points and obsidian artifacts with thick hydration rinds suggesting occupation between about 10,000 and 5,500 years ago. The extremely sparse tool kit and debitage analysis suggest the occupants were highly mobile hunter-gatherers (Wilson, et al., 1996:1-19).

Archaic Stage. Excavations in the 1960s at the Nightfire Island site (CA-Sis-4) and other nearby sites located at Lower Klamath Lake produced extensive evidence of multiple pre-historic occupations as much as 6,000 years old (Sampson 1985:104-105). The site contains deep, stratified cultural deposits that represent over 6,000 years of human occupation of the Klamath Basin. Sampson (1985) suggests that from ca. 7250-4950 B.P. (5300-3000 B.C.), the site was used primarily for the procurement of waterfowl (mostly coots) from the adjacent marsh. After a drop in lake level by 4950 B.P. (3000 B.C.), the site appears to have become a winter village (at a time of greater emphasis on hunting). Between 4450 and 3950 B.P. (2500 and 2000 B.C.), lake levels returned to their former condition and the archaeological record shows increased quantities of grinding equipment, bird bones (mostly coots) and the first evidence for fishing. After an abandonment period between 3250 and 2550 B.P. (1300 and 600 B.C.), Sampson inferred an occupation of the site associated with increased emphasis on fishing. High densities of fish remains were deposited at the site by 1650 B.P. (A.D. 300) and by 650 B.P. (A.D. 1300), the site was dominated by fishing activities and apparently no longer functioned as a village.

3.9.1.2 Ethnographic Background

The region was traditionally inhabited by the Modoc Indians who, in historical times, comprised three subgroups. The Modoc territory was located south of Klamath Falls, Oregon, and extended south into California to Mount Shasta. The eastern boundary of the territory extended to an area just west of Goose Lake. The Langell Valley south of the Lost River was inhabited by the Kokiwa or "people of the far out country" group of Modoc Indians. The Modoc were similar culturally to their neighbors the Klamath Indians, who occupied the territory to the north.

The Modoc followed a subsistence round that was dependent on the availability and abundance of local resources. In the spring, the Modoc left their winter villages and moved to other locations along rivers and near lakes where fish (suckers) could be easily caught during the spring runs. As the fish runs decreased, the Modoc would move into favored root gathering grounds to collect epos, camas, arrowroot, and sego lilies. The Modoc hunted deer, antelope, and mountain sheep well into late summer. Berries were also collected in late summer when they ripened at the higher elevations. In late fall the Modoc returned to their winter villages with caches of dried fish and meat. They rebuilt their earth lodges and gathered firewood in preparation for the winter months. During the winter months the people relied on their caches of fish, meat, and vegetal foods. Ice fishing and deer hunting continued through the winter but to a lesser degree.

Modoc territory was divided into three geographic areas and the residents of each were known by a distinctive name. The *Gumbatwas ("people of the west")* were the Modoc who lived west of a line following a ridge between Lower Klamath Lake and Lost River Valley, to the northwestern corner of Tulelake, then through the lake to its southeastern corner, then southeastward to the southern tribal boundary. Modoc living east of this line, except for the lower valley of Lost River, were *Kokiwas* ("people of the far out country"), referring to their remoteness from the more concentrated population centers of the lower Lost River Valley and the Lower Klamath Lake region. Many Kokiwas villages were located on the far reaches of Lost River, east of Lost River Gap (now Olene Gap), with a heavy concentration in Langell Valley. The Modoc of Lost River Valley from the gap to Tulelake were *Paskanwas* ("river people"). These divisions were strictly geographical, not ethnic or political (Ray, 1963:202-203).

The permanent villages of the Modoc generally consisted of three to seven earth-covered lodges and associated structures. Sometimes villages might have as many as ten to fifteen lodges. More commonly, when a local population expanded a new village was established in a nearby location, as occurred again and again in Langell Valley (Ray, 1963:204). Ray (1963:204-211) provided a list of known Modoc villages occupied through the mid-1800s.

Villages in the Kokiwas area identified by Ray include #33 (*Pé owas*), a small permanent village on Lost River near the mouth of the East Branch of the Lost River, and #34 (*Ulgá na*), a permanent village on the Lost River near the present town of Langell Valley, one of many such villages lining the river both north and south of this site. A great many housepits were still visible in these locations in the early 1900s (Ray, 1963:210). In addition, Ray (1963:Map 2) depicted a ritual center as being a location somewhere on the west side of the Lost River just north of *Pé owas* and a good deal south of *Ulgá na*. This ritual center was located well to the south of the Facility area. Howe (1968:155) noted that favored places for villages seemed to be where there were riffles in the river or where a spring fed into a stream. Such conditions existed at the Hot Springs in Langell Valley.

The Modoc lived in the lower Klamath Basin until the time of historical contact. In the fall of 1872, tensions between white settlers and the Modoc mounted and the Modoc Indian War of 1872-1873 broke out. Following the war, surviving Modoc tribal members were placed on a small reservation in Oklahoma (Klamath County Historical Society, 1984).

3.9.1.3 Historical Background

In the early to mid-1800s, southern Klamath County was visited by a number of early travelers and explorers. In 1864, a Treaty was signed by the U.S. Government, the Klamath and Modoc Tribes, and the Yahooskin Paiute, resulting in the creation of the Klamath Indian Reservation north of Klamath Falls. In 1882, farmers begin irrigating in the Klamath Basin. In 1906, construction began on the A Canal using horse teams. In 1908, President Roosevelt established the Lower Klamath National Wildlife Refuge, the nation's first waterfowl refuge. In 1911, the Clear Lake National Wildlife Refuge was established and construction began on the Lost River Diversion Dam and Lost River Diversion Channel. In 1917, 175 homesteaders filed for 42 tracts of land and Klamath Falls began to grow rapidly (while other towns such as Merrill, Malin, and Midland grew more slowly or lost residents). During the 1920s, construction began on the Link River Dam at the mouth of Upper Klamath Lake, the Lower Lost River Diversion Dam (Anderson-Rose Dam), the J Canal to serve the

Tulelake area, and the Miller Diversion Dam, Gerber Dam, and North Canal in Langell Valley. Following World War I and World War II, homesteaders came to the area to farm.

3.9.1.4 Investigation Results

Previous Investigations. In early 2002, a site records and cultural resource investigation literature search was conducted by CH2M HILL at the State Historic Preservation Office in Salem. Recorded cultural resources within one-half-mile or less radius of the proposed electric transmission line include: OR-KL-7,OR-KL-122; 35-KL-817, 35-KL-818, 35-KL-1328, 35-KL-2173, 35-KL–2174, and 35-KL-2175. In addition to previous work by CH2M HILL for the proposed Lorella Pumped Storage project (Cox, 1994), two other important surveys were conducted in the immediate vicinity of the proposed electric transmission line by Ross (1995) and Mutch (2000). Recorded cultural resources within one-half-mile or less radius of the proposed Energy Facility site include: 35-KL-1330, 35-KL-1331, and 35-KL-1332. Recorded cultural resources within one-half-mile or less radius of the proposed natural gas pipeline include: 35-KL-971 and –972.

Current Investigations. The entire footprint of the Energy Facility was examined in the field for evidence of surface or buried cultural resources. When cultural materials were discovered, they were temporarily pin-flagged until observable artifacts associated with the site were identified and their spatial extent determined. The cultural features and archaeological sites were formally recorded on State of Oregon Archaeological Inventory forms. Tribal crew members contributed to the descriptions of the cultural features where they had specific knowledge that helped to interpret site function or traditional usage. While cultural features were being photographed and measured, tribal representatives working with the archaeologists were able to make pertinent observations about the condition and integrity of the features. The field survey identified 21 isolated artifacts and nine sites.

Three of the nine cultural sites identified in the analysis area are likely to be eligible for listing on the National Register of Historic Places (NRHP). (The NRHP does not list any cultural sites in the analysis area.) Direct consultations were conducted with The Klamath Tribes regarding the survey and discovered resources. The Confederated Tribes of the Siletz were contacted regarding cultural interests near the proposed Energy Facility. The Siletz Tribe indicated that the Tribe has no specific cultural concerns regarding the Facility (McClintock, 2002). Sites likely to be eligible for NRHP listing are described below.

Archaeological Site 35-KL-2175. Archaeological site 35-KL-2175 is a large, dispersed lithic scatter containing waste flakes (the by-product of stone tool manufacture), tools, and a depression feature. The site is likely to be eligible for listing on the NRHP under criterion "d" for its ability to yield information important to the understanding of American prehistory.

Archaeological Site PAS-3. Archaeological site PAS-3 is also a dispersed lithic scatter containing waste flakes and tools. This site would be eligible for listing on the NRHP under the same criterion as archaeological site 35-KL-2175. It would also qualify as an archaeological site under the Oregon statutes.

Cultural Site PAS-4. Cultural site PAS-4 is a series of four, partially buried stone features that are of cultural and religious value to The Klamath Tribes.

In addition the field surveys, an oral history and ethnographic study was conducted of the project area. Klamath tribal members were interviewed regarding their knowledge of past and present tribal uses of the project area. Although the area was generally identified as containing hunting and vision quest sites in the past, and to some degree more recently, the area is not considered likely to have Traditional Cultural Properties as defined by criteria in the National Historic Preservation Act and National Register Bulletin 38.

3.9.2 Environmental Consequences and Mitigation Measures

As described below, the proposed Energy Facility would have no significant unavoidable adverse impacts on cultural, archaeological, or historical resources.

<u>Impact 3.9.1. None of three known cultural sites would be affected by construction and operation of the proposed Energy Facility.</u>

<u>Assessment of Impact</u>. The electric transmission line and the water supply pipeline have been moved from their original locations to avoid any impacts to 35-KL-2175 and PAS-3, respectively. Cultural site PAS-4 also would not be impacted by Facility activities.

Archaeological and cultural sites would be temporarily flagged in the field and on project construction maps during construction. A CRMP would be developed in coordination with the Klamath Tribe. The CRMP would include specific protocols and procedures for protection of known cultural sites, including the presence of archaeological construction monitors during construction to prevent accidental impacts to the known cultural sites. The CRMP would also address the long-term management of the known resources.

<u>Recommended Mitigation Measures</u>. No measures beyond those included in the proposed project are recommended.

<u>Impact 3.9.2. Unknown cultural resources could be adversely affected by the proposed Energy Facility.</u>

<u>Assessment of Impact</u>. Based on the three sites identified during the field surveys, currently unknown properties of cultural significance to Native Americans or other cultural resources could be disturbed during construction of the proposed Energy Facility. Excavation might uncover subsurface resources or reveal resources covered by vegetation during the field surveys.

In addition to the protocols for protecting known cultural sites, the CRMP would include a section on Accidental Discovery of Cultural Resources. Specific protocols and procedures for protection of cultural sites identified during construction would include the presence of archaeological monitors to prevent accidental impacts to any resources discovered during construction.

<u>Recommended Mitigation Measures</u>. No measures beyond those included in the proposed project are recommended.

3.9.3 Cumulative Impacts

The proposed Facility would not have any adverse effect on cultural resources, and consequently would not contribute to cumulative impacts on this element of the environment. Past activities such as cattle grazing, agricultural pursuits, and road construction may have impacted cultural sites. However, for most of these activities no cultural resource investigations were undertaken. Consequently, the extent of potential impacts is unknown. Current farming practices in the vicinity of the project may also be impacting cultural resources, but the extent, if any, is unknown. There are no reasonably foreseeable projects in the vicinity of the proposed Energy Facility that would lead to cumulative impacts on cultural resources.

3.10 Land Use Plans and Policies

The proposed Energy Facility, including the Energy Facility site, electric transmission line, natural gas pipeline, and water supply well system and pipeline, would comply with the Klamath County Land Development Code (LDC) and the Klamath County Comprehensive Plan (KCCP). Because of its acreage needs, the Facility would require exceptions to Goals 3 and 4 of the KCCP. Development of the Facility would result in the permanent disturbance during the 30-year operating life of the Energy Facility of 108.7 acres of land from its current use. Of this total, 51.5 acres are zoned for exclusive farmland use and 52.0 for forestry; approximately 50.7 acres of the total is subject to a Significant Resource Overlay designed to protect wildlife. The proposed project has committed to restoring 91 acres of fallow field to habitat conditions and improving another 145 acres of habitat.

The information and conclusions presented in this section are based on Exhibit K (including attachments) in the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.10.1 Affected Environment

3.10.1.1 Land Use Characteristics of the Energy Facility Site and Vicinity

The Facility consists of the Energy Facility site and related or supporting facilities, including a water supply pipeline, a natural gas pipeline, access roads, an electric transmission line, and a 31-acre irrigated pasture area with irrigation pipeline. The Energy Facility is located in a rural area where elevations range from 4,000 to 8,400 feet. The majority of the lowland areas have been converted to agricultural use. The agricultural lands include cultivated crops, irrigated pasture, unimproved pasture, and fallow fields. There are a few developed areas with residential, agricultural, and industrial uses such as farm homes, dairies, the PG&E Gas Transmission Northwest (GTN) compressor station, and the Captain Jack Substation. Table 3.10-1 summarizes the current land uses for the Facility.

The project proponent has approximately 2,700 acres under option, of which approximately 200 acres are for easement purposes and approximately 2,500 acres constitute land that would be purchased in fee title for siting the Facility.

Energy Facility Site. The Energy Facility site is located 3 miles south of Bonanza, Oregon, on the east side of West Langell Valley Road No. 520 in Klamath County. Access to the site would be from Langell Valley Road No. 520 (see Figures 2-1, Site Map, and 2-2, Facility Map). The proposed Energy Facility site would occupy approximately 50.6 acres. These areas are currently used for cattle grazing and dryland farming. Due to heavy grazing, the soil is in poor condition and not suitable to raise crops.

Electric Transmission Line. The proposed Facility would include construction of an approximate 7.2-mile electric transmission line running south from the Energy Facility to an interconnection at BPA's Captain Jack Substation. Land uses along the proposed electric transmission line route include existing electric transmission lines, fallow agricultural fields used for cattle grazing, selective historical timber harvesting of ponderosa pine woodland, open rangeland/woodlands managed by Federal and private landowners, and the PG&E GTN interstate gas pipeline system.

The ponderosa pine woodland has been selectively logged in the past; old skid roads are present in the area, but there is no evidence of recent logging activity or clearcutting. The ponderosa pine woodland is isolated in a lowland area and is surrounded by rangeland areas characterized by western juniper. Jeld Wen, the owner of most of the land that contains the ponderosa pine, indicates this stand is marginal and is estimated to be ponderosa pine Site Class IV (Ditman, 2002). The scale is I to V, with I being the best. For Class IV, dominant ponderosa pine trees would grow to be 80 to 120 feet tall in 100 years (Dilworth, 1966; Woodward, 1997).

Natural Gas Pipeline. A new gas pipeline would be required to supply natural gas to the Energy Facility. It would connect to an existing PG&E GTN gas transmission system line through a 4.1-mile-long, 20-inch-diameter natural gas pipeline constructed from the Bonanza Compressor Station. The construction easement would be immediately adjacent to and along the Klamath County ROW for Harpold County Road No. 1097 and West Langell Valley Road No. 520.

Land uses along the proposed natural gas pipeline route include irrigated pasture, a dairy, industrial land (the compressor station), farming practices related to cattle feed (alfalfa hay and grain silage), rangeland/woodlands where residences are located, and dryland farming and cattle grazing on a fallow field (the last section of the natural gas pipeline before it connects with the Energy Facility). The rangeland/woodlands in this vicinity are characterized by western juniper and do not contain merchantable timber.

Water Supply Well System and Pipeline. The source of water for construction and operation of the Energy Facility would be groundwater from a deep aquifer. Water from the water supply well system would be pumped through a 2.8-mile, 6-inch-diameter water supply pipeline to the Energy Facility site. An access road required for construction of the water supply pipeline would be removed and revegetated following completion of the pipeline.

The water supply pipeline would be constructed within a 60-foot-wide temporary construction area on land under ownership options by the project proponent, except for portions of the route that cross Klamath County roads. The route of the water supply pipeline crosses two Klamath County roads: East Langell Valley Road and Teare County Road 1161. In addition, the water supply pipeline would cross an irrigation ditch operated by the Langell Valley Irrigation District in three locations.

Land uses observed along the proposed water supply pipeline route include irrigated pasture, a dairy, an alfalfa hay field, open rangeland/woodlands managed by private landowners, and dryland farming and cattle grazing on a fallow field (the last section of the water supply pipeline before it connects with the raw water storage tank on the Energy Facility site). The rangeland/woodlands are characterized by western juniper and do not contain merchantable timber.

Irrigated Pasture Beneficial Use Area. Process wastewater from the Energy Facility would be managed to provide beneficial use by irrigating 31 acres of pasture. Process wastewater would be stored in two 5-MG tanks (one 5-MG tank for each 580-MW power block) prior to pumping over to and irrigating the pasture area. The pasture area would be reduced in half if one 580-MW power block is constructed and later expanded to 31 acres if the second 580-

power block is constructed. This irrigated area would produce forage crops for cattle, deer, and antelope.

3.10.1.2 Local Comprehensive Plan Land Use Designation and Zoning

The Energy Facility would be sited solely in Klamath County. Figure 3.10-1 depicts the Facility location, and shows the KCCP designations and land use zones of the Facility and adjacent properties. Table 3.10-2 identifies the zoning designations applicable to the Energy Facility. The following provides a brief description of the zoning designations:

- **Exclusive Farm Use–Cropland ("EFU-C")**. The EFU-C designation is applied to agricultural areas characterized by row crop, hay, and livestock production in which there is no predominant parcel size.
- **EFU–Cropland/Grazing ("EFU-CG")**. The EFU-CG designation is applied to areas of existing and potential use for mixed cropland and grazing. As relevant to the Facility, the same criteria in LDC Article 54 (EFU) apply to both EFU designations.
- **Forestry ("F")**. The F zone is generally applied to lands composed of existing and potential commercial forest resources and is governed by the criteria in LDC Article 55.
- **Forestry Range ("FR") regulated as EFU ("FR-EFU")**. The FR zone is applied to lands of mixed farm and forestry uses. However, the FR zone does not contain any independent land-use criteria. Rather, the individual properties zoned FR are regulated either under the EFU standards or under the F standards, depending on the property's tax status, soil classification, and predominant use. Notwithstanding the potential applicability of local EFU standards, the Klamath County Comprehensive Plan lists and describes the FR zone as forestry land use designation under Goal 4 (Forestry), and not as an agricultural land use designation under Goal 3 (Agriculture).
- **FR regulated as F ("FR-F")**. See FR-EFU above.
- **Light Industrial ("IL")**. The IL zone is intended to establish and maintain places where manufacturing, storage, and wholesale distribution can be undertaken in close proximity to one another without encroaching upon the character of the adjacent land uses.
- **Significant Resource Overlay ("SRO")**. The criteria of the SRO zone, LDC Article 57, are relevant for portions of the Facility. The resources mapped within the SRO include high-density deer winter range and medium-density deer winter range (Figure 3.10-1). The SRO permits development in a manner that does not adversely impact identified resource values.

Energy Facility Site. The Energy Facility site would occupy approximately 50.6 acres zoned Exclusive Farm Use—Cropland (EFU-C). The vast majority of the Facility would be on non-high-value soil. Of the total acreage, approximately 3.7 acres would be high-value farmland soil. The SRO designated for Big Game Winter Range would apply to 13.9 acres of the Energy Facility site.

Electric Transmission Line. The electric transmission line would originate on the EFU-C zoned Energy Facility site; thereafter, it would cross land zoned FR and F. The 154-foot-wide easement for the electric transmission line, including the transmission towers and those portions of the access road within the easement, would occupy a total of approximately 134.0 acres. New access roads to serve the transmission line would require approximately 43.0 acres and existing access roads would cover an additional 8.8 acres outside of the 154-foot-wide easement.

Approximately 17.0 acres of the electric transmission line easement are EFU-zoned land, of which 2.4 acres are high-value-soil farmland. Operation of the transmission line would not preclude grazing activities within the 154-foot-wide easement on EFU-zoned land, and with the exception of the areas occupied by the access road and tower footings, the area would be available for continued agricultural and wildlife uses. As a result, the electric transmission line would preclude only 5.3 acres of EFU-zoned land from agricultural use.

The electric transmission line 154-foot wide easement would occupy approximately 117.0 acres of F-zoned land (87.1 acres of FR and 29.9 acres of F). For safety reasons, the vegetation-control practices within the 154-foot-wide easement would preclude potential commercial timber activities on this F- and FR-zoned land. However, the actual impact to commercial forest operations would be less. Only an approximate 24.6 acres of the 117.0 acres are considered merchantable and are managed, in part, for commercial timber values (forest range). In addition, the transmission line access roads outside of the 154-foot-wide easement would occupy and preclude 4.4 acres of F-zoned land from potential commercial forest operation.

The SRO (Big Game Winter Range) designation would apply to a 82.0-acre portion of the electric transmission line 154-foot-wide easement.

Natural Gas Pipeline. With the exception of portions of the natural gas pipeline extending from the PG&E GTN compressor station to the public right-of-way, and from the public right-of-way to the Energy Facility site, the entire natural gas pipeline would be sited along existing public rights-of-way. The natural gas pipeline would originate at the plant site on EFU-zoned land, and then would cross FR-zoned and other EFU-zoned land to reach the compressor station located on IL land. The interconnection with the natural gas compressor station and lead to the road right-of-way is located in the IL zone. All but 0.8 mile of the 4.1-mile-long pipeline would be on EFU-zoned land (or IL land).

The SRO would apply to a portion of the buried natural gas pipeline, but not to the compressor station interconnect, and high-value soil would be present on the pipeline route, but not at the compressor station interconnect. Upon full soil and vegetation restoration, no soil or agricultural practices would be permanently disturbed. The small area where the pipeline crosses FR-zoned land (and which is not currently managed for commercial timber values) may not be planted in commercial timber for pipeline safety reasons.

Water Supply Well System and Pipeline. The existing Babson well, the two additional water supply wells, and the water supply pipeline would be located on EFU-zoned land. The water supply pipeline and construction easement would temporarily impact approximately 19.4 acres of EFU-zoned land. Upon completion of restoration and revegetation, there would be no permanent impacts to agricultural lands. The SRO would apply to a 7.9-acre portion of this water pipeline alternative but would not apply to the water supply well system site.

Irrigated Pasture Area. Process wastewater would be land applied to a 31-acre site designated as EFU-zoned, fallow agricultural land, and ODFW Category 2. The wastewater would be used during the growing season to irrigate pasture for cattle grazing, but the area would also be accessible to wildlife. This acreage is not included in the overall project impacts because it consists of existing fallow fields that are not currently irrigated. Irrigating the pasture area would enhance, not impact, forage for deer and antelope and cover for game birds. Approximately 5.7 acres would be temporarily impacted by an access road and pipeline to the irrigated fields. Permanent impacts would consist of a 0.5-acre access road designated as Category 2 habitat.

Infiltration Basin. A 4.7-acre stormwater infiltration basin would be constructed adjacent to the Energy Facility. This basin would lie entirely in Category 4-designated habitat and would be included in the overall assessment of Energy Facility impacts.

3.10.1.3 Plans and Policies

No Federal land use management plan is applicable to the Facility.

Klamath County is the only local government with land use jurisdiction over the Energy Facility. The County has an acknowledged comprehensive plan and zoning code. The Energy Facility would be considered a conditional use. The Energy Facility would comply with applicable local and state land use regulations, with two exceptions—Goals 3 and 4 of the Klamath County Comprehensive Plan. These exceptions are discussed below.

- **Goal 3**: Both high-value and non-high-value soil would be located within the Facility (Figure 3.10-3). On EFU-zoned lands, the Facility would exceed Goal 3's 12-acre limitation for a power generation facility on land having high-value soil (OAR 660-033-0130(17)) and the 20-acre limitation for a power generation facility on land having non-high-value soil (OAR 660-033-0130(22)). An exception to Goal 3 would be required; justification for this exception is documented in Exhibit K of the SCA, as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.
- **Goal 4**: On F-zoned lands, the electric transmission line and the natural gas pipeline would collectively exceed the 10-acre limitation for a power generation facility on commercial forest land (OAR 660-006-0025(4)(j)). An exception to Goal 4 would be required; justification for this exception is documented in Exhibit K of the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

Pursuant to the LDC and ORS 215.296, the Facility would not force a substantial change in or substantially increase the cost of accepted farm practices. The Facility also would not seriously interfere with accepted forest practices on adjacent lands devoted to forest uses, would not force a substantial change in accepted forest practices on surrounding forest land, and would generally protect the viability of the agricultural economy in the area.

3.10.1.4 Consistency with Local Comprehensive Plan Land Use Designation and Zoning

The Facility would be categorized under the Klamath County code as "commercial utility facilities for the purpose of generating power for public use by sale." As such, the Facility could be permitted as a conditional use in the EFU, FR, F, IL, and SRO zones. The Facility would meet criteria for conditional use under each zone.

3.10.1.5 Conformance with Plans and Policies

The Facility is consistent with the relevant policies of the KCCP. Further, the Facility would advance Goal 9, County Economy, because it would strengthen and diversify the economic base of the County. A description of the Facility's consistency with the applicable KCCP policies follows.

- **Goal 1, Citizen Involvement: "To encourage an effective citizen participation process that would meaningfully involve phases of the County Comprehensive Planning process."**

The Facility would be consistent with this goal. EFSC site certificate rules that apply to the proposed Energy Facility provide sufficient notice and comment periods to satisfy Goal 1. The National Environmental Policy Act also requires public participation. The Facility has complied with EFSC and NEPA public-notice requirements to date, and would continue to do so. Chapter 1 of this EIS contains information on the public involvement activities conducted for the proposed Facility.

- **Goal 2, Land Use Planning: "To establish a land use planning process for the County as a basis for all decisions and actions related to use of land and to ensure an adequate factual base for such decisions and actions."**

Neither Goal 2 nor any of its specific policies would apply to the Facility, because the project proponent is proceeding under a specific, statutorily created land-use option, ORS 469.504(1)(b)(B).

- **Goal 3, Agricultural Lands: "To encourage and allow agricultural operations consistent with the well-being of individual owners and operators, and to preserve the viability of real property ownership."**

As described in Section 3.10.1.3, an exception to this goal would be required.

- **Goal 4, Forest Lands: "To encourage conservation of forest lands in Klamath County for forest uses."**

As described in Section 3.10.1.3, an exception to this goal would be required.

- **Goal 5, Open Spaces and Scenic, Historic, and Natural Resources: "To preserve open space and protect natural and scenic resources in Klamath County."**

As described in Sections 3.4, 3.5, 3.8, and 3.9, the Facility would avoid impacts to vegetation, fish and wildlife habitat, scenic views, and cultural areas, historic sites, and archaeological resources identified in the project area. The site certification process through which the proposed Energy Facility must proceed for approval, provides an opportunity for appropriate state and Federal agency review and comment.

- **Goal 6, Air, Water, and Land Resources: "To maintain and improve the quality of the air, water and land resources of Klamath County."**

As described in Sections 3.3, 3.7, and 3.10, the Facility would not adversely affect the water, air, or land resources of the state. Furthermore, the project proponent would obtain the necessary air-quality and water-quality permits and land-use approvals from ODEQ, the Water Resources Department, and EFSC through the siting process and through ODEQ's air-quality permitting process.

- **Goal 7, Areas Subject to Natural Disasters and Hazards: "To protect life and property from natural disasters and hazards."**

This goal is intended to ensure that developments that could be damaged by natural disasters, with the potential for injury to persons or property, are approved only when appropriate safeguards are in place. The Facility would satisfy this goal.

- **Goal 8, Recreational Needs: "To recognize the recreation needs of the citizens of the County and visitors."**

The Facility would be consistent with this goal. No existing recreational resources would be located within 5 miles of the Facility site, and development would not adversely impact any existing recreation trails. BLM has proposed the Modoc Trail and Bryant Mountain trails and primitive campsites, which are within 5 miles of the proposed Facility but would not be likely to conflict with the Facility.

- **Goal 9, County Economy: "To diversify and improve the economy of Klamath County as set forth herein, intending results that nurture a productive and growing economy so as to add to the well-being of all people who participate in Klamath County. All plans, designs, processes, ordinances, and goals shall give strong consideration to this goal, to amplify the healthiest economic impacts of Klamath County."**

The Facility would diversify and strengthen the economic base of the County by adding an energy facility use to a predominantly agricultural area. The Facility would provide a substantial number of construction jobs, ranging from 147 to 543 during the construction period, with an average of 352. Operation of the Energy Facility would require 25 to 30 full-time employees. The 30 permanent jobs would provide a combined annual salary of $2.75 million that would contribute to the local economy.

For agricultural and forest producers that provide easements to the Facility, the Facility would provide an additional source of income that would help such producers weather lean economic times. The project proponent's capital investment in the Facility, estimated at over $700 million, would provide tax revenues to the County over the Facility's lifetime; indirect and direct fiscal benefits to the County are calculated to be over $575 million within 32 years following mobilization. Unlike other developments, energy facilities impose very little demand upon public services. Consequently, increased tax revenues to the County would not likely have any substantial offsetting costs for public services. Finally, the Facility would help ensure that reliable power would be available for commercial and industrial customers in the Pacific Northwest in order to maintain and expand the region's economic productivity.

- **Goal 10, Housing: "To provide for the housing needs of the County."**

No specific housing policies would apply to the Facility, and the Facility would not interfere with the County's ability to provide needed housing for its citizens. As described in

Section 3.11, the region contains adequate housing for full-time Facility employees during construction and operation. The Facility would not be located on any lands designated for future residential use.

- **Goal 11, Public Facilities and Services: "To plan and develop a timely, orderly and proven efficient arrangement of public facilities and services as a framework for urban and rural development."**

The Facility would be consistent with this goal. Existing public services in the project area would remain adequate with the addition of the Facility (Section 3.12).

- **Goal 12, Transportation: "To provide and encourage a safe, convenient and economic transportation system."**

The Energy Facility site would have direct access to West Langell Valley Road, which provides convenient access to OR 70. Highway 97 would be approximately 34 miles west of the Energy Facility site. The Facility would also be close to the Klamath Falls Municipal Airport (40 miles) for air service. The Facility would require the construction of private access roads to the Energy Facility site and along the electric transmission line easement. The Facility would not otherwise require the permanent construction of new roads or other transportation facilities, nor would it create any long-term conflicts with or burdens on such facilities in the County. As discussed in Section 3.6, the existing transportation system would be adequate, with mitigation when necessary, for construction and operation of the Facility.

- **Goal 13, Energy Conservation: "To conserve energy."**

The Facility would be a state-of-the-art power generation facility that would utilize natural gas and process steam to generate power. This process is a highly efficient and clean way to produce energy for use by existing and future development in the County and throughout the western United States.

- **Goal 14, Urbanization: "[To establish urban growth boundaries] to identify and separate urbanizable land from rural land."**

No specific policies under this goal would apply to the Facility. However, in general, the Facility would be consistent with this goal. No suitable or available urban industrial land exists for the Facility in proximity to the existing natural gas, groundwater, and electric transmission line facilities. Energy facility uses such as the use proposed are permitted on agricultural land by state statute. The site is relatively remote, and the Facility would not alter or change the character of the surrounding area from rural to urban, because energy facilities in rural areas do not attract growth.

3.10.2 Environmental Consequences and Mitigation Measures

<u>Impact 3.10.1.</u> The proposed Facility would permanently disturb a total of 108.7 acres of land during the 30-year operating life of the Energy Facility, including an approximate 45.5 acres of land within the Klamath County Big Game Winter Range SRO. However, as mitigation, 91 acres of fallow field would be restored and 145 acres of habitat would be improved.

Assessment of Impact. The SRO zone would apply to portions of the Facility, including the Energy Facility site, electric transmission line, water supply pipeline, and natural gas pipeline. Under the Klamath County Code, the Deer Winter Range SRO that overlaps with the Facility is "considered to be significant[,] and conflicting uses to the resource shall be limited in order to protect the resource from irreparable harm" (LDC § 57.020).

The Klamath County Code considers facilities such as the Energy Facility to be an "extensive impact facility" and a "conflicting use" with the Big Game Winter Range. The LDC requires a conditional use permit for construction of extensive impact facilities in the SRO.

It should be noted that Klamath County mapped the SRO at a gross scale and created winter range boundaries based on property lines rather than habitat characterizations or habitat-based delineations. Of the approximately 45.5 acres of SRO permanently impacted by the Facility, approximately 13.9 acres are located at the Energy Facility site, which consists of fallow agricultural fields and provides minimal habitat and forage value for wintering deer. If the 13.9 acres were to be rated based on biological criteria rather than inclusion on the County maps, they likely would not be included in the SRO. The remaining area of permanent disturbance to the SRO would be 31.6 acres along the electric transmission line.

The electric transmission line 154-foot-wide easement would occupy 82.0 acres of SRO land; however, approximately 50.4 acres would remain available for ongoing wildlife uses. Approximately 13.9 acres of the Energy Facility site would be SRO land that would be unavailable to wildlife uses during operation. Even though the Energy Facility site is a deer resource, that habitat provides degraded forage, as described in Section 3.4 of this EIS and Exhibit P of the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively. Exhibit P also includes an explanation of the restoration and revegetation activities the proposed project would undertake to ensure that the Facility would not destroy the significance of the deer winter range.

As mitigated, the Facility would not result in a substantial adverse impact on an identified resource value. Indeed, the project proponent is complying with ODFW's policy of allowing no net loss of habitat quantity or quality and requiring a net benefit to habitat quantity or quality. The project proponent would restore 91 acres of currently fallow agricultural land to high quality deer habitat. Further, an additional 145 acres within the Facility-owned property would be enhanced and restored to improve habitat values.

No feasible alternative location exists for the Energy Facility site. There is no nonresource site of sufficient size that would provide feasible access to the three necessary resources for the Facility: (1) the Bonanza Compressor Station, (2) deep-water aquifer/Babson well, and (3) the Captain Jack substation. The project proponent has considered alternative routes for the water supply pipeline and transmission line, and the proposed routes are the most direct routes available that cause the least amount of disruption to cultural and natural resources.

The Facility is being sited to minimize adverse impacts. The Energy Facility components are situated, where feasible, to coincide with degraded forage areas and areas with poor soil quality. Further the Facility components are sized based on technical feasibility and safety considerations. In addition, although the Energy Facility site provides winter range habitat, that habitat is generally degraded, and the Energy Facility site is configured to permit onsite and contiguous mitigation opportunities that would improve the overall quality of habitat available for deer winter range use. The project proponent would be restoring or improving approximately 236 acres for higher-quality deer winter range habitat.

The water supply pipeline would be buried and the ground rehabilitated and revegetated. The area would remain available for wildlife use.

The natural gas pipeline would be buried along existing road rights-of-way. The construction area would be rehabilitated and available for wildlife use.

The electric transmission line is the most direct route reasonably available, and, in any event, vegetation control and maintenance within the easement would not impact continued wildlife use. Further, the transmission tower footings would occupy minimal land area, and the project proponent is locating these footings in areas that would minimize impacts on forage resources. The project proponent has also sited the access roads in order to minimize disruption. Indeed, the project proponent is utilizing and improving existing access roads where possible, and their use would not be frequent enough to disrupt or pose a hazard to wildlife.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.10.2. Operations at the Energy Facility site would have limited impact on agricultural activities.

Assessment of Impact. There would be no permanent impacts to agricultural (crop production and cultivation) practices and crop management techniques by operation of the Facility, except for the Energy Facility site. The Energy Facility site is zoned for agriculture and attempts have been made in the past at raising crops; however, the site has been heavily grazed and soil and vegetation productivity are low.

Recommended Mitigation Measures. No mitigation measures are recommended.

Impact 3.10.3. Construction of the Energy Facility would temporarily impact agricultural activities.

Assessment of Impact. Temporary construction impacts to agricultural activities (crop production and cultivation) would occur to approximately 23.5 acres of the total 43.8 acres of temporary disturbance along the natural gas pipeline and approximately 1.4 acres of the total 19.4 acres of temporary construction disturbance along the water supply pipeline. No temporary impacts would occur to agricultural activities near the Energy Facility site, evaporation pond, or electric transmission line.

The project proponent would use BMPs to construct the Facility to avoid and minimize potential impacts to agriculture activities. The following types of impacts could occur to agricultural lands and practices during construction, although the use of BMPs would reduce the likelihood of these impacts:

- Removal of standing crops within construction areas to create a safe work area
- Mixing of topsoil with subsoil and excess rock
- Soil compaction from the operation of heavy equipment on agricultural soil

- Damage to drainage tile systems from trenching or heavy equipment
- Damage to irrigation systems from trenching, heavy equipment, and other activities
- Damage to excessively wet soil, including rutting and excessive soil compaction
- Distribution of noxious weeds to uncontaminated sites, causing new infestations
- Movement of soil-borne pathogens to previously uninfected areas
- Isolation of a field, delaying its spraying, fertilizing, tillage or harvest
- Blocked or impeded access to fields due to road closures or detours
- Soil erosion
- Creation of dust

Recommended Mitigation Measures. The project proponent prepared an Agricultural and Forestry Practices Impact Mitigation Plan, SCA Attachment K-5, submitted to EFSC for review and approval. The following measures are recommended to minimize construction impacts on agricultural practices:

- Consult with landowners and farmers to address field access, revegetation, timing, and other sensitive cropping issues.
- Consult with landowners to identify the locations of drainage and irrigation systems.
- Flag tile and irrigation lines prior to construction.
- Maintain the flow of irrigation water during construction or coordinate a temporary shutoff with affected parties.
- Coordinate with farm operators to provide access for farm equipment to fields isolated by construction activities.
- Bury the natural gas pipeline and water supply pipeline with 4 feet of topcover; the pipelines would be installed under drain tiles unless the drain tiles are located deep enough to allow the pipelines to be installed above the drain tile with at least 4 feet of topcover over the pipelines and, where feasible, a 12-inch clearance between the tile and the pipelines. Where feasible and practicable, install the pipelines with greater than 4 feet of topcover where specifically requested by the landowner to allow for certain site-specific conditions or practices. Install plastic warning ribbon approximately 12 inches above the buried pipelines to provide a greater level of safety for potential future excavation activities.
- Follow an erosion and sediment control plan as part of NPDES General Construction Permit 1200-C; control the discharge from trench dewatering to avoid damaging adjacent agricultural land, crops, or drainage systems.
- Control dust emissions generated during construction, as necessary, by the control of vehicle speed, by wetting the construction area or by other means; coordinate with farm operators to provide adequate dust control in areas where specialty crops are susceptible to damage from dust contamination.
- Identify potential noxious weed and soil-borne pathogen threats before construction and develop appropriate plans for their containment.

- Require contractors to thoroughly clean construction equipment prior to moving into a new construction area or relocating from one construction area to another.
- Consult with the appropriate agencies to determine the location of noxious weeds.
- Make reasonable efforts to obtain straw bales for erosion control and straw for mulch that are free of noxious and nuisance weed contamination.
- Use Oregon-certified seed or equivalent for revegetation.
- Construct linear facilities adjacent to public rights-of-way and along property lines, and avoid bisecting fields.
- Where possible, strip and segregate topsoil from subsoil over the trench, from the trench spoil storage area, and from areas subject to grading in agricultural lands. Store topsoil immediately adjacent to the stripped area to the extent practical and replace the segregated topsoil after the trench is backfilled and the subsoil is restored to grade.
- Take suitable precautions to minimize the potential for oversize rock to be introduced into the topsoil and to become interspersed with soil that is placed back in the trench, and remove excess surface rock from agricultural soil following construction activities.
- Locate temporary access roads used for construction purposes in coordination with the landowner and any tenants. Where feasible, identify existing farm lanes as preferred temporary access roads for construction, and design and construct temporary roads with proper drainage and to minimize soil erosion.
- Restrict the operation of vehicles and heavy equipment, take other appropriate action, on excessively wet soil on the portion of the construction work area in agricultural land where the topsoil is not stripped and segregated so that deep rutting does not result in the mixing of topsoil and subsoil.

The following measures are recommended to mitigate and minimize temporary construction impacts on agricultural practices:

- Restore and return to agricultural use the areas temporarily impacted by construction.
- Restrict deep root, invasive crops that can cause damage to the buried pipelines limited to a 10-foot-wide area (centered over the centerline) directly over the pipelines.
- Restore drainage patterns to prevent ponding of water.
- Implement additional restoration efforts if visual crop deficiencies occur on the construction area.
- Inspect the construction areas for noxious weed infestations following construction and treat any new infestations resulting from construction activities.
- Use appropriate tillage on compacted agricultural land to relieve soil compaction and follow tillage with revegetation of affected areas.
- Repair or replace damaged irrigation lines or drainage tiles.

Impact 3.10.4. Construction of the Energy Facility could have temporary impacts to dairy operation.

Assessment of Impact. Impacts to dairy management would be limited to temporary impacts associated with the construction of the proposed natural gas pipeline. These impacts would occur during a period of less than 4 months. Temporary disruption of dairy operations could be caused by the deferral of crop production, impacts to soil productivity, or the interruption of drainage, irrigation, or transportation services. These areas would be fully restored and returned to use after construction. Agreements for compensation and coordination of construction have been made with the dairy.

Recommended Mitigation Measures. The following measures are recommended to minimize impacts to the dairy operation, in addition to those recommended to minimize construction impacts on agriculture uses:

- Coordinate construction and operation of the natural gas pipeline with the dairy to address field access, revegetation, construction timing, and other sensitive dairy management issues.
- Do not allow the use of herbicides along the natural gas pipeline route near the dairy as part of the weed control and revegetation activities during and following construction, because the dairy is currently in the process of obtaining Organic Certification for its milk operation.

In addition to the mitigation measures described under Agriculture, one additional measure would be employed to mitigate construction impacts on the dairy operation: following construction, dairy operation would resume on the construction area, including the permanent easements.

Impact 3.10.5. The Energy Facility site would have permanent and temporary impacts to pasture land.

Assessment of Impact. Approximately 50.6 acres of fallow field (with some limited pasture) would be permanently impacted by the Energy Facility site. Access roads and transmission towers for the electric transmission line would permanently impact approximately 0.6 acre of pasture and approximately 1.4 acres of fallow field. The water supply well system would permanently impact approximately 0.3 acre of pasture.

BMPs would be used during construction of the Facility to minimize and mitigate potential impacts to pasture activities. Potential impacts to pasture practices include temporary disruption of livestock feeding or water areas, and removal of fences where construction easements extend into pastures. Collectively, the natural gas pipeline, water supply pipeline, and electric transmission line would temporarily impact approximately 7.7 acres of pasture, approximately 25.3 acres of agricultural field, and approximately 6.4 acres of fallow field. Also, approximately 71.0 acres of fallow field (with some limited pasture) would be used for temporary construction parking and laydown areas at the Energy Facility site.

Recommended Mitigation Measures. Landowners and tenants would be consulted to develop livestock management practices to be implemented during construction. Such practices would minimize impacts to pasture activities. The following measures would be employed to mitigate potential impacts on pasture practices:

- Provide access across the construction areas at convenient intervals to allow livestock to cross.
- Construct temporary fences and gates across the construction area, as necessary.
- Repair or replace fences damaged by construction.

Impact 3.10.6. Construction impacts would occur to rangeland/woodlands along the natural gas pipeline, water supply pipeline, and electric transmission line, and permanent impacts would occur to rangeland/woodlands along the electric transmission line.

Assessment of Impact. Temporary construction impacts to rangeland/woodlands (juniper-sage habitat and sage-steppe habitat) would occur on approximately 9.0 acres along the natural gas pipeline, approximately 10.2 acres along the water supply pipeline, and approximately 47.4 acres along the electric transmission line.

Permanent impacts to rangeland/woodlands would occur to approximately 42.0 acres (31.6 acres juniper-sage habitat and 10.4 acres sage-steppe habitat) along the electric transmission line. Western juniper woodlands exist within the permanent disturbance, and removal of this invasive juniper would benefit the rangeland/woodlands. There would be no permanent impacts on rangeland/woodlands resulting from the natural gas pipeline and water supply pipeline.

The project proponent would use BMPs to construct the Facility to avoid and minimize potential impacts to rangeland/woodlands. Potential impacts could include temporary disruption of livestock feeding or water areas and removal of fences where construction easements would extend into rangeland. The use of BMPs would reduce the likelihood that these impacts would occur.

Recommended Mitigation Measures. The following measures would be employed to minimize impacts on rangeland/woodlands:

- Consult with landowners and tenants to minimize conflicts with range operations.
- Provide access at convenient intervals to allow livestock to cross the construction area.
- Construct temporary fences and gates across the construction area as necessary to maintain livestock usage.
- Confine construction activities to permanent easement area.
- Designate equipment travel routes.
- Design and construct new access roads with proper drainage and to minimize soil erosion.
- As feasible, minimize work on excessively wet soil so that soil productivity is preserved or can be restored.
- Follow an erosion and sediment control plan as part of the NPDES General Construction Permit 1200-C.

- Control dust emissions generated during construction, as necessary, by the control of vehicle speed, by wetting the construction area, or by other means.
- Identify potential noxious weeds and incorporate measures to control their spread and establishment in the construction and revegetation plans.
- Clean construction equipment prior to relocating equipment from one area to other areas.
- Consult with agencies to determine the location of noxious weeds.
- Make reasonable efforts to obtain straw bales for erosion control and straw for mulch that are free of noxious and nuisance weed contamination.
- Use Oregon-certified seed or equivalent for revegetation.

The following measures would be employed to mitigate impacts on rangeland/woodlands:

- Revegetate temporary disturbance areas as soon as practical after construction.
- Repair damages to rangeland that result from construction and operation of the Facility.
- Disk or rip compacted soil to relieve soil compaction in temporary construction areas, and leave the areas in a condition ready for restoration.
- Treat new weed infestations resulting from construction activities.
- Repair or replace fences damaged by construction.
- Restore temporary access roads to preconstruction condition or better, unless otherwise specified in the landowner easement agreement.

<u>Impact 3.10.7. Permanent impacts would occur to forest ranges along the electric transmission line.</u>

<u>Assessment of Impact</u>. Permanent forest impacts would be limited to approximately 12.4 acres of privately and federally owned commercial timberland within the southern third of the easement for the electric transmission line. This acreage would include the permanent improvements (footings, access roads, and vehicle turnaround areas). This commercial timberland is an isolated stand of ponderosa pine surrounded by juniper woodland. As stated above, this stand is of marginal value. Construction activities would not interfere with forest operations on adjacent land because the timber value is marginal and the stand is limited is size.

The permanent impacts would occur where timber would be cleared for staging, material laydown, temporary access, elimination of hazard trees, and to create a safe work area; and where the height of vegetation would be controlled during operation of the electric transmission line. Clearing and controlling vegetation height would be required for safe and uninterrupted operation of the electric transmission line.

The project proponent would use BMPs to construct the Facility to avoid and minimize potential impacts to forest land. The following lists the types of potential impacts that might occur, although the use of BMPs would reduce the likelihood that these situations would occur:

- Precommercial and premature harvesting of timber and deferring tree growth and productivity where vegetation height would be controlled
- Increased distribution and establishment of noxious weeds along vehicle access routes and at disturbed soil areas
- Increased windthrow hazard to trees next to the permanent easement
- Increased soil erosion during construction and during the interval between construction and the reestablishment of a vegetative cover on the construction area
- Increased dust from access roads
- Increased soil compaction from roads and the operation of heavy equipment on forest soil
- Interference with livestock grazing practices on forestland
- Increased exposure to sunlight (sidelighting) along cleared easement
- Damaged trees from herbicide spray drift during vegetation maintenance in the permanent easement

<u>Recommended Mitigation Measures</u>. The following measures would be employed to minimize temporary and permanent impacts on forest practices, as follows:

- Consult with forest landowners to minimize conflicts with forest operations.
- Confine construction activities to the electric transmission line easement.
- Designate equipment travel routes and limit equipment operation outside those routes.
- Design and construct access roads with proper drainage and to minimize soil erosion.
- Take appropriate action to minimize rutting on excessively wet soil.
- Follow an erosion and sediment control plan as part of NPDES General Construction Permit 1200-C.
- Control dust emissions generated during construction, as necessary, by the control of vehicle speed, by wetting the construction area, or by other means.
- Require contractors to thoroughly clean construction equipment prior to relocating equipment from one area to other areas or before initially moving into a construction area.
- Consult with the appropriate agencies to determine the location of noxious weeds in the vicinity and take appropriate action to minimize the spread of noxious weeds.
- Make reasonable efforts to obtain straw bales for erosion control and straw for mulch that are free of noxious and nuisance weed contamination.

- When available, use Oregon-certified seed or equivalent for revegetation.
- Inspect for noxious weed infestations following construction.
- Inspect the restoration of temporarily-impacted timberlands.
- Provide access at convenient intervals to allow livestock to cross the construction area.
- Construct temporary fences and gates across the construction area as necessary to maintain livestock usage.

Potential impact mitigation measures for forest practices are listed below:

- Implement timberland restoration measures, as necessary, in cooperation with affected landowners.
- Repair damages to forestland that result from construction and operation of the electric transmission line.
- Disk or rip compacted forest soil to relieve soil compaction in temporary construction areas, and leave the areas in a condition ready for reforestation.
- Treat new weed infestations resulting from construction activities.
- Repair or replace fences damaged by construction.

3.10.3 Cumulative Impacts

During its 30-year operating life, the proposed Energy Facility would result in the permanent disturbance of 108.7 acres of land. Of this total, 56.7 acres are zoned for exclusive farmland use and 52.0 acres for forestry and forestry-range; approximately 50.7 acres of the total is subject to an SRO designed to protect wildlife. In conjunction with other development in the Klamath Basin, this conversion could contribute to increasing urbanization and intensification of land uses over time. However, because of its location, the unique attributes of energy facilities in general, and its dependency on local natural resources, the Facility is not expected to be a catalyst for such change, either in the immediate vicinity or within the region.

Cumulative impacts related to land use include the following:

- Conversion of agricultural and grazing land to industrial use
- Conversion of wildlife habitat to uses that would exclude wildlife

The resource impact area is generally the area encompassed by the land between and bordering West Langell Valley Road and East Langell Valley Road, plus the land bordering the proposed pipelines and transmission line. The proposed Energy Facility would convert agricultural land to industrial use for the operating life of the project. There are no known past, current, and potential future actions that would lead to cumulative impacts of conversion of the agricultural lands.

Impacts on wildlife habitat have occurred in the past and are likely to occur in the future from agricultural practices, grazing, and other disturbances. The construction and operation of the proposed Energy Facility would also contribute to these cumulative impacts.

However, the project proponent has committed to mitigation for impacts on wildlife habitat by converting 91 acres of fallow agricultural land to wildlife habitat and improving an additional 145 acres of degraded habitat.

TABLE 3.10-1
Current Land Use for the Energy Facility—Temporary and Permanent Disturbance

	Agriculture		Pasture		Rangeland		Fallow Field		Forested Range		Developed		Totals	
Description	**Temp.**	**Perm.**	**Temp.**	**Perm.**	**Temp.**	**Perm.**	**Temp.**	**Perm.**	**Temp.**	**Perm.**	**Temp.**	**Perm.**	**Temp.**	**Perm.**
Energy Facility site	0.0	0.0	0.0	0.0	5.4	0.0	116.2	50.6	0.0	0.0	0.0	0.0	121.6	50.6
Water supply well system	0.0	0.0	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.3
Natural gas pipeline	23.9	0.0	0.8	0.0	12.0	0.0	3.5	0.0	0.0	0.0	3.6	0.0	43.8	0.0
Water supply pipeline	1.4	0.0	6.3	0.0	10.9	0.0	0.8	0.0	0.0	0.0	0.0	0.0	19.4	0.0
Electric transmission line	0.0	0.0	0.0	0.0	49.8	44.1	1.1	0.8	14.0	12.4	0.0	0.0	64.9	57.3
Irrigation pipeline and access road	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.5	0.0	0.0	0.0	0.0	5.7	0.5
Total	25.3	0.0	8.4	0.3	78.1	44.1	127.3	51.9	14.0	12.4	3.6	0.0	256.7	108.7

Notes:
Developed land includes county roads.
Rangeland includes juniper-sagebrush, sage-steppe, and ruderal vegetation types.

TABLE 3.10-2
Zoning for the Energy Facility—Permanent Disturbance

	EFU Zone*		Forestry Zone*		Industrial Zone		Total	SRO	
Description	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**Acres**	**%**
Energy Facility site	50.6	100	0.0	0	0.0	0	50.6	18.6	37
Water supply well system	0.3	100	0.0	0	0.0	0	0.3	0.0	0
Natural gas pipeline	0.0	0	0.0	0	0.7	0	0.7	0.0	0
Water supply pipeline	0.0	0	0.0	0	0.0	0	0.0	0.0	0
Electric transmission line	5.3	9	52.0	91	0.0	0	57.3	31.6	55
Irrigated pasture access road	0.5	100	0.0	0.0	0.0	0	0.5	0.5	100
Total	56.7	57	52.0	53	0.0	0	108.7	50.7	52

TABLE 3.10-2
Zoning for the Energy Facility—Permanent Disturbance

	EFU Zone*		Forestry Zone*		Industrial Zone		Total	SRO	
Description	Acres	%	Acres	%	Acres	%	Acres	Acres	%

* Includes lands zoned Forestry (F) and Forestry Range (FR)-F.

SRO = Significant Resource Overlay

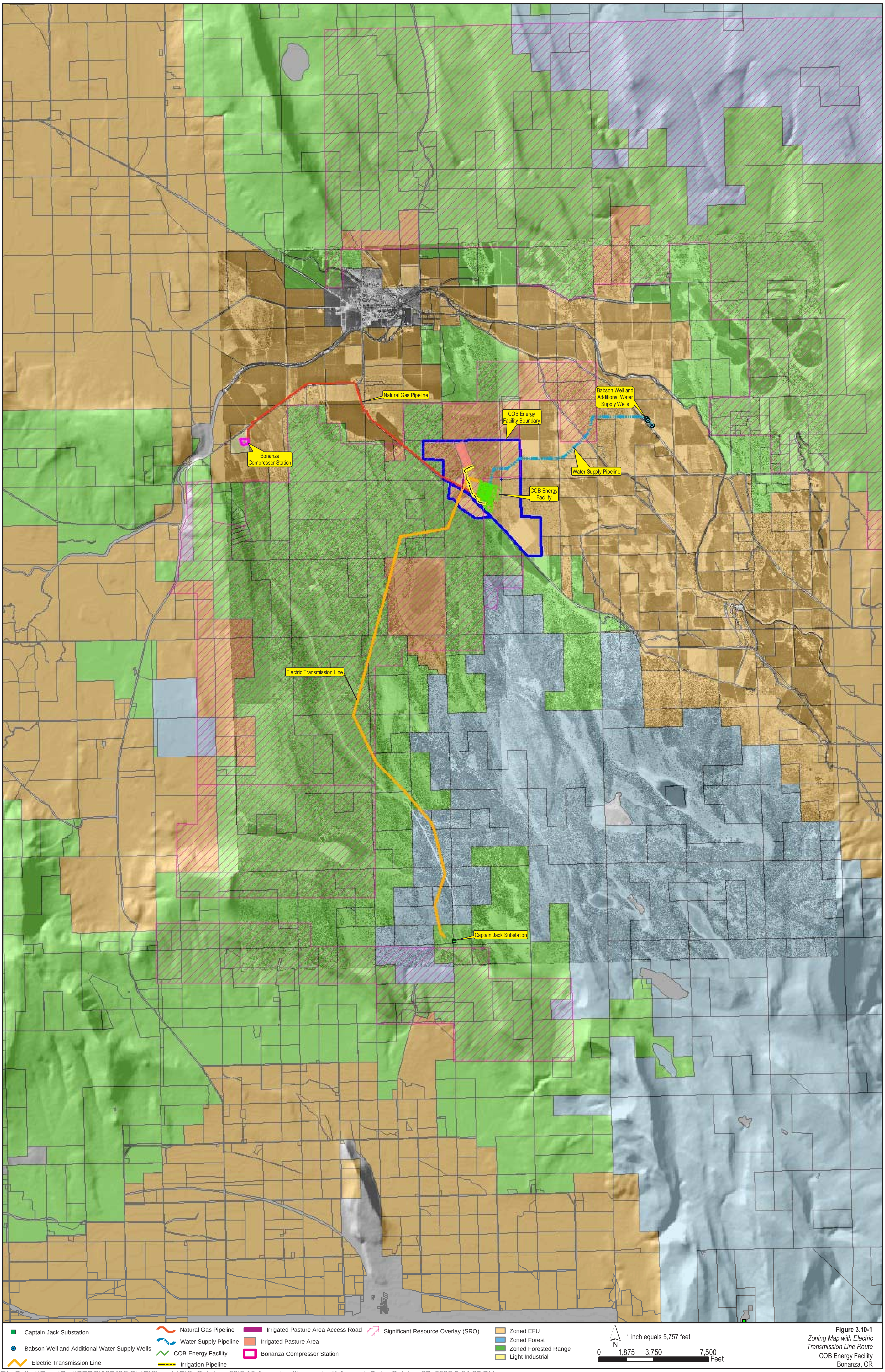

Figure 3.10-1
Zoning Map with Electric Transmission Line Route
COB Energy Facility
Bonanza, OR

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Figure 3.10-1
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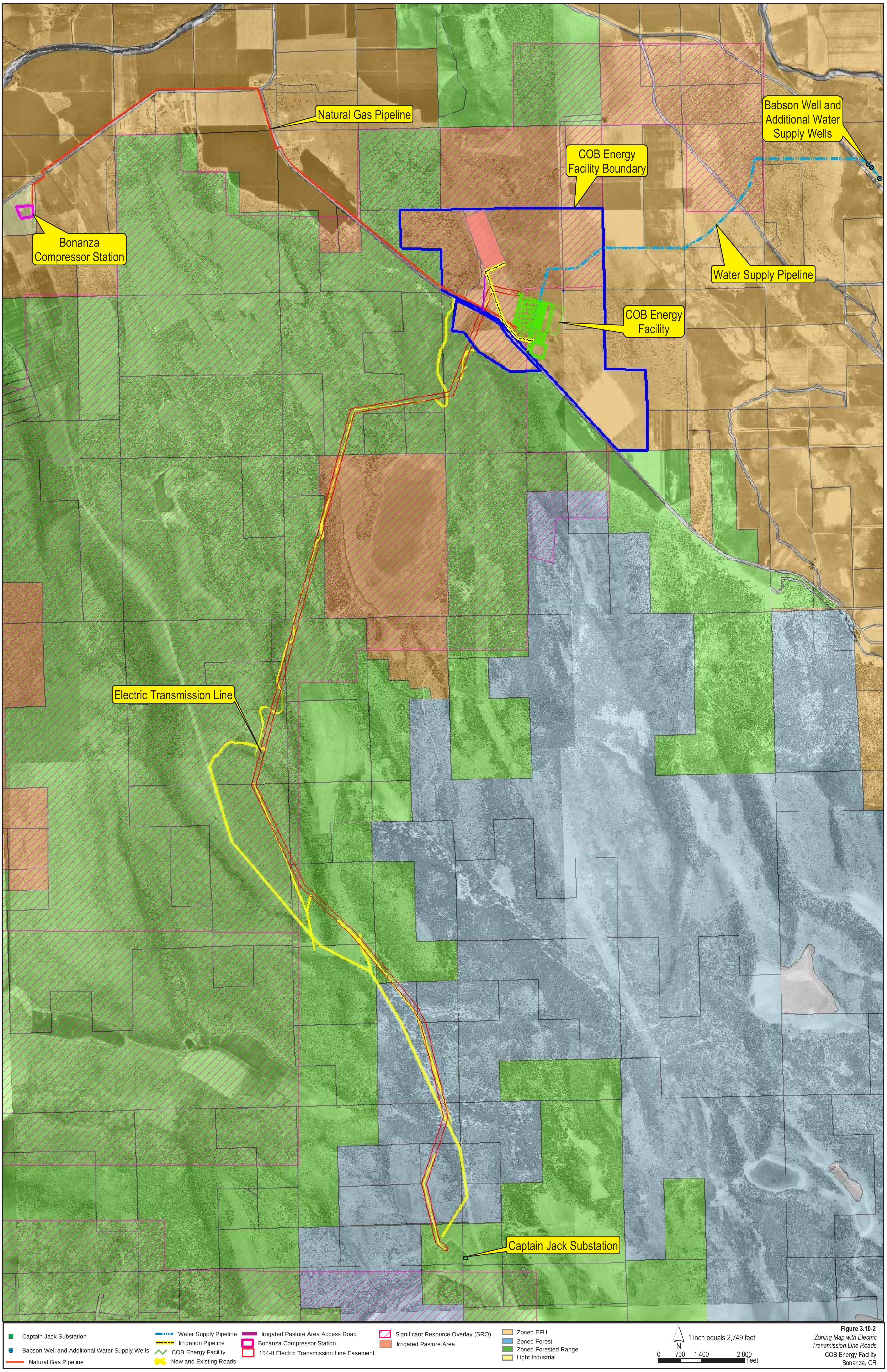

Figure 3.10-2
Zoning Map with Electric Transmission Line Roads
COB Energy Facility
Bonanza, OR

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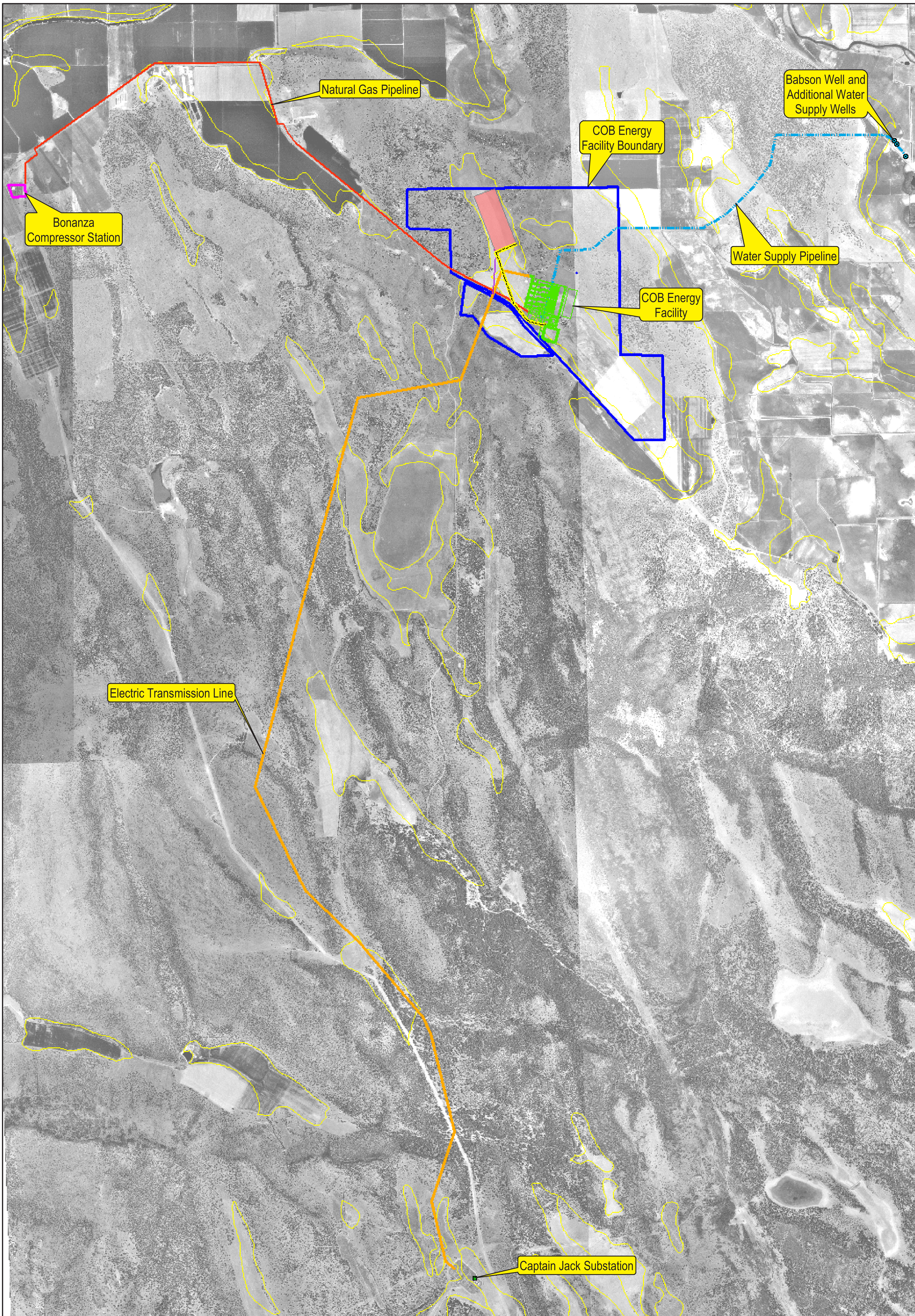

Legend

- Captain Jack Substation
- Babson Well and Additional Water Supply Wells
- COB Energy Facility Boundary
- Bonanza Compressor Station
- COB Energy Facility
- Electric Transmission Line
- Natural Gas Pipeline
- Water Supply Pipeline
- High-Value Soil (HVS)
- Irrigated Pasture Area Access Road
- Irrigation Pipeline
- Irrigated Pasture Area

N

1 inch equals 2,757 feet

0 1,000 2,000 4,000 Feet

Figure 3.10-3

High-Value Soil

COB Energy Facility
Bonanza, OR

PEOPLES ENERGY RESOURCES

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.10-3_hvs.mxd, Date: October 27, 2003 3:58:12 PM

Figure 3.10-3
11 x 17
Color
Back

3.11 Socioeconomics

Population has been growing in Klamath County at less than 1 percent per year over the last decade, which was approximately one-half of the state's growth rate. Communities within a 30-minute drive are Bonanza, Klamath Falls, and Malin, with populations of 415, 19,462, and 638, respectively. In early 2002, the unemployment rate in Klamath County was approximately 13 percent, primarily because of declines in the construction and mining sectors. In 2000, housing vacancy rates were around 3 percent for owner-occupied housing and 9 percent for rental housing.

Construction of the Energy Facility over a 23-month period would require an average of 352 workers and a peak of 543 workers. Operation of the Facility would require approximately 30 workers. Given the current unemployment rate, the majority of workers during construction and operation would likely be hired from the local community. If workers were needed from outside the area, sufficient housing opportunities would be available for them. There would be no significant unavoidable adverse impact.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.11.1 Affected Environment

A relatively large area around the proposed Energy Facility and supporting facilities was identified as the project area to assess potential socioeconomic impacts. The project area encompasses portions of Klamath County, Modoc County, and Siskiyou County, and includes the communities of Bonanza, Klamath Falls, Merrill, Malin, Dorris, and Tulelake.

3.11.1.1 Population

In 2000, the Klamath County population was 63,755. The population of the four project area communities in Klamath County was 415 in Bonanza, 19,462 in Klamath Falls, 897 in Merrill, and 638 in Malin. The Modoc County population was 9,449 in 2000. Siskiyou County's population was 44,301 in 2000, and its two communities, Dorris and Tulelake, had populations of 886 and 1,020, respectively. The population of Klamath County is growing slowly, increasing less than 1 percent annually over the last decade.

3.11.1.2 Employment

Unemployment rates in the project area are high compared to the state and the nation, as shown in Tables 3.11-1 and 3.11-2. Klamath County had a 13.2 percent unemployment rate in February 2002, according to the Oregon Labor Market Information Service (OLMIS), affiliated with the Oregon Employment Department (OED). In 2000, there were 650 fewer nonmanufacturing jobs in the County than in 1999 (OED, 2002a). Most of the decrease in nonmanufacturing employment is attributed to layoffs in the construction and mining sectors (OED, 2002a). Table 3.11-3 shows that the average payroll per worker in Klamath and Lake counties is 25 percent lower than the state average and 32 percent lower than the national average.

3.11.1.3 Housing

According to 2002 census figures, Klamath County has 28,883 housing units, Modoc County has 4,807 units, and Siskiyou County has 21,947 units (Census, 2002a). There are no incorporated cities or towns in the portion of Modoc County that is in the project area. Dorris and Tulelake, in Siskiyou County, have 396 and 459 housing units, respectively. Table 3-11.1 shows that most of the population and housing opportunities in the project area are in Klamath County, primarily in Klamath Falls. The population of Klamath Falls, including the unincorporated communities of Lorella and Dairy, is 19,462, representing 31 percent of the County's population. There are 8,722 housing units, representing more than 30 percent of the housing in the County. This compares to Merrill, Malin, and Bonanza, which have 1.3, 0.8, and 0.5 percent of the housing units in Klamath County, respectively (Census, 2002a, 2002b).

In Klamath Falls, vacancy rates are 3.5 percent for owner-occupied housing units and 9 percent for rental units. There is some variation in vacancy rates among the cities in the project area depicted in Table 3.11-1, but the vacancy rates throughout Klamath County—3 percent for owner-occupied housing units and 8.5 percent for rental units—are similar to the rates in Klamath Falls.

Temporary housing alternatives (motels, hotels, and recreational vehicle [RV] parks) also exist in the project area. Accurate counts were not readily available for selected portions of the project area in northern Siskiyou County and Modoc County in California. At least 1,617 units are available for overnight accommodation throughout Klamath County. A total of 1,231 of those units are located in the project area. An additional 122 units plus two lodges (Crystalwood and Horseshoe Ranch) are located just beyond the 30-mile radius of the project area. RV park facilities are less common near the center of the project area, and none are listed in Klamath Falls. The 17 facilities listed as offering RV accommodation are located predominantly at the outer edge of, or beyond, the project area (Nuebert, 2002).

3.11.2 Environmental Consequences and Mitigation Measures

Construction of the Energy Facility would take place over a 23-month period, and would employ an average of 352 workers. If local labor was not available, the maximum monthly influx of laborers would be 543 (assuming construction labor comes from outside), representing a Klamath County population gain of 0.88 percent. Local residents would be hired to fill as many of the 30 permanent, full-time Facility operations positions as practicable.

As described below, the Energy Facility would have no significant unavoidable adverse impacts on population, employment, and housing.

<u>Impact 3.11.1. Project would result in a limited short-term and long-term population increase.</u>

<u>Assessment of Impact</u>. Limited in-migration is expected to occur as a result of construction of the proposed project. The decrease in nonfarm payroll in Klamath County, which has been led by loss of 650 jobs in the construction and mining sectors from 1999 to 2000 (OED, 2002b), is expected to provide an opportunity to hire local construction workers. Local hiring would decrease any potential short-term increases and any potential short-term

impacts related to temporary construction workforce demands. Nonetheless, workers would still be recruited from the regional labor pool and some would be attracted from outside the region. Construction workers that would relocate to the area for development of the proposed Energy Facility would not be likely to bring their families, because most construction workers would remain in the area for a short duration.

Local residents would be hired to fill as many of the 30 full-time, permanent operations positions as practicable. The unemployment rate in Klamath, Modoc, and Siskiyou counties (see Table 3.11-1) would make local hires possible, as would the competitive wages that would be offered for operations positions at the proposed Energy Facility. Because new employees hired to operate the Energy Facility would be, for the most part, existing residents of local communities, the project would result in minimal direct population increases.

Recommended Mitigation Measures. None are recommended.

Impact 3.11.2. Project would result in an increase in short-term and long-term employment opportunities in the area.

Assessment of Impact. As noted previously, construction of the proposed Energy Facility would result in the peak employment of 543 workers and an average employment of 352 workers. The jobs provided by construction of the proposed Energy Facility would help offset (on a temporary basis) the decrease in nonfarm payroll in Klamath County experienced within the last few years.

Operation of the proposed Energy Facility would also provide up to 30 permanent jobs. Like construction employment, many of these positions would likely be filled by local residents. Given the 8.2 percent unemployment rate reported for the region in 2000 (Table 3.11-2), the jobs provided by the Energy Facility would be beneficial to project area communities.

Recommended Mitigation Measures. None are recommended.

Impact 3.11.3. Proposed Energy Facility would have a short-term impact on housing.

Assessment of Impact. Construction labor needs would increase demand for housing. However, local hiring would decrease potential short-term impacts related to temporary construction workforce demands. The location of the Facility outside cities and communities, and at similar commuting distances to Klamath Falls, Merrill, and Malin, would also minimize potential impacts. The concentration of permanent and temporary alternate housing options in Klamath Falls would likely draw the majority of short-term residents to that city. The vacancy rates for Klamath Falls indicate that 360 rental housing units were available in 2000. In addition, Klamath County provides 1,617 units of overnight accommodation (hotel/motel rooms) plus two large lodges. At least 17 of these facilities also accommodate recreational vehicles. Most of these temporary housing alternatives are located within the project area.

Some housing opportunities might also exist in the unincorporated communities of Lorella and Dairy, where Klamath County records indicate vacancies for some homes. To the extent that residential opportunities were available, some construction laborers would probably opt to locate in one of these communities. No known temporary housing options such as hotels or recreational vehicle parks were identified in either community. Some additional rental and overnight accommodations might be available in Siskiyou and Modoc counties in northern California, but the sparse population in these areas and the distance to the Facility site make it unlikely that demand for these accommodations would be high.

Based on the above information, the influx of construction workers throughout the construction period would be noticeable, but would not create a substantial burden on available housing in the project area or in Klamath County.

Vacancy rates for rental and owner-occupied housing in the project area indicate that a sufficient number of housing units would be available for permanent employees at the Energy Facility. If local hiring was not possible, the addition of 30 jobs would create only a minimal impact in an area seeking to stabilize its population and workforce and planning to sustain existing levels of service. Any new residents relocating to the area for these positions would have a choice of communities offering various levels of service within commuting distance. Any potential impacts would be distributed across project area communities.

Recommended Mitigation Measures. None are recommended.

3.11.3 Cumulative Impacts

The proposed Energy Facility would employ 30 people, many of whom would be hired from local communities. There would be cumulative impacts. However, given the limited number of new residents to the project area, residential vacancy rates, and an unemployment rate higher than the state or national rate, cumulative impacts on housing and employment would likely be minor. The value of the property and project would add significantly to the local tax base. This increase would be partly offset by closure of past industrial facilities, but nonetheless would add to positive cumulative impacts of increasing and diversifying the local tax base. Potential impacts to public services resulting from population increase are discussed in Section 3.12.

TABLE 3.11-1
Housing Units, Unemployment Rates, and Vacancy Rates in Project Area

Jurisdiction	Average Annual Payroll	Unemployment Rate	Population	Housing Units	Rent	Own	Vacancy Rate (%)
Klamath County	**$29,548 (1998)**	**13.2% (Feb. 2002)**	**63,755**	**28,883**	**8,067**	**17,138**	**3.0 Owned 8.5 Rental**
Bonanza			415	152	41	98	3.9 Owned 2.4 Rental
Klamath Falls			19,462	8,722	4,010	3,906	3.5 Owned 9.0 Rental
Merrill			897	380	116	228	3.0 Owned 9.4 Rental
Malin			638	217	78	122	3.2 Owned 6.0 Rental
Modoc County	**$29,128 (Mean wage 2001)**	**8.3% (March 2000)**	**9,449**	**4,807**	**1,109**	**2,675**	**5.1 Owned 9.3 Rental**
Siskiyou County	**$29,128 (Mean wage 2001)**	**9.5% (March 2000)**	**44,301**	**21,947**	**6,084**	**12,472**	**3.0 Owned 9.2 Rental**
Dorris			886	396	105	237	4.0 Owned 11.0 Rental
Tulelake			1,020	459	157	201	5.6 Owned 18.2 Rental

Sources: Oregon Employment Department, 2002b; Census, 2002a; Census, 2002b, Oregon Economic and Community Development Department, 2002a; California Employment Development Department, 2002

Note: Unless otherwise noted, data are for the year 2000.

TABLE 3-11.2
Estimated Annual Average Labor Force for 2000

	Region	Oregon	U.S.
Civilian Labor Force	32,400	1,802,900	140,863,000
Employed	29,740	1,715,400	135,208,000
Unemployed	2,660	87,500	5,655,000
Unemployment Rate	8.2%	4.9%	4.0%

Source: Oregon Economic and Community Development Department, 2002a
Note: The region referred to includes Klamath and Lake counties.

TABLE 3-11.3
Average Annual Covered Payroll Per Worker, by Industry Division, 1999

Industry	Region	Oregon	U.S.
Agriculture, Forestry, and Fishing	$17,345	$19,221	$19,405
Construction and Mining	$26,252	$36,070	$36,345
Manufacturing	$29,928	$41,223	$41,917
Transportation, Communication, and Utilities	$34,311	$38,115	$41,144
Wholesale Trade	$26,880	$42,522	$44,144
Retail Trade	$15,659	$18,319	$17,592
Finance, Insurance, and Real Estate	$24,987	$37,789	$50,865
Services	$21,289	$27,275	$31,491
Total Private Sector	$22,767	$30,452	$33,220

Source: Oregon Economic and Community Development Department, 2002a
Note: The region referred to includes Klamath and Lake counties.

3.12 Public Services and Utilities

The following section discusses the provision of water, sewer, stormwater, solid waste, police, fire, health care, and school services in the project area. The Facility would use its own raw water supply well system and would manage its own wastewater through one of three alternatives:

- Beneficial use of the water for irrigated pasture
- Evaporation in an onsite, lined evaporation pond
- Temporarily storing onsite and hauling to a WWTP for offsite disposal

The raw water would be supplied from a deep aquifer zone not used by local residents or irrigation districts. No stormwater from the Energy Facility would enter a public stormwater system. The Facility would take steps to minimize the need for police and fire protection services. If needed, the Klamath County Sheriff and the Bonanza Rural Fire Protection District have indicated they would have adequate resources. The Energy Facility would not have an adverse impact on the ability of health care providers and educators to provide their services. Utilities and public service providers have adequate capacity to serve existing and new customers.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.12.1 Affected Environment

The project area lies within a 30-mile radius of the Facility. It includes the southern half of Klamath County in Oregon, the northeastern corner of Siskiyou County in California, and the northwestern corner of Modoc County in California. In the project area there are four incorporated cities in Klamath County (Bonanza, Klamath Falls, Merrill, and Malin), two incorporated cities in Siskiyou County (Dorris and Tulelake), and no incorporated cities in Modoc County. Lorella and Dairy are unincorporated communities in Klamath County that are located within 12 miles of the Energy Facility.

Table 3.12-1 identifies providers of essential governmental services (listed in OAR 345-022-0110) in the project area. The following text describes, by service, the current service levels and proposed expansions or improvements in services for each community in the project area.

3.12.1.1 Utilities

3.12.1.2 Sewers and Sewage Treatment

Some of the larger communities, including Bonanza, Malin, Merrill, and Klamath Falls, have engineered wastewater collection and treatment systems. Klamath Falls has two Sanitary Districts: Klamath Falls Sanitary District and the South Suburban Sanitary District. Public services generally do not extend beyond the city limits of these incorporated jurisdictions, although some services are extended to serve developed areas within urban growth boundaries. Domestic sewage from ranches and residences outside of urban growth areas and in rural parts of the project area is discharged into individual, privately owned septic tank and drainfield systems.

Klamath County confirmed that sewer systems generally do not extend beyond city limits or urban growth boundaries. Residents of Klamath County, including the unincorporated communities of Lorella and Dairy, are served by private septic systems. There are no known areas of substandard septic suitability (Nelson, 2002). Jurisdictions confirmed having remaining capacity. Neither Bonanza nor Malin anticipate any sizeable increase in demand. Merrill, the Klamath Falls Sanitary District, and the South Suburban Sanitary District are planning changes or expansions to their systems. Merrill plans to replace its system. Both sewer districts in Klamath Falls anticipate increased demand as a result of industrial, residential, and commercial development, and are developing capital facilities plans to address anticipated demands (Brakeman, 2002; Meek, 2002; Matthews, 2002; Hapalla, 2002; Colahan, 2002; Newmeyer, 2002).

For the alternative of storing and hauling to a WWTP for offsite disposal, the project proponent has contacted the two municipal WWTPs in Klamath Falls—the South Suburban Sanitary District and the City of Klamath Falls Sanitary District. According to managers at both facilities, each would be required to evaluate whether they can meet the EPA categorical standard to accept industrial waste or whether local ordinance provide for acceptance of truck-hauled wastewater. Over the life of the Energy Facility, other WWTPs may be constructed or considered for management of wastewater generated at the Energy Facility. The project proponent would arrange with a trucking company to routinely haul the wastewater stored in the wastewater storage tanks at the Energy Facility to the WWTP.

There are no engineered wastewater collection and treatment systems in the Modoc County portion of the project area. No impacts are anticipated in Dorris or Tulelake in Siskiyou County because of the commuting distance from the site, limited populations, and limited housing opportunities.

3.12.1.3 Water Supply

Farms and residences in unincorporated areas of the project area obtain water from individual, privately owned wells. There are a few community potable water systems in the project area, and irrigation districts offer nonpotable water service for irrigation.

Service providers of potable water for the cities of Bonanza, Klamath Falls, Merrill, Malin, and Klamath County were contacted. Bonanza provides no public water service; its residents are served by private wells completed in a shallow zone aquifer. The other cities have adequate capacities to meet service needs. Klamath Falls has an existing capital improvement plan for its water system that includes funds to upgrade and maintain storage, distribution, and production facilities. Merrill plans to add storage and complete line replacement in the next 5 to 8 years (Brakeman, 2002; Meek, 2002; Steiner, 2002; Newmeyer, 2002). Klamath County confirmed that public water systems typically do not extend beyond city limits or urban growth boundaries. Residents of unincorporated areas, including Lorella and Dairy, are served primarily by private wells (Nelson, 2002).

Two irrigation districts, Horsefly and Langell Valley, provide irrigation water to land around the Facility. Horsefly provides irrigation water for about 7,700 acres (CH2M HILL , 1998). Langell Valley provides full service to 14,400 acres, and supplemental and variable service to additional land beyond that (U.S. Bureau of Reclamation, 1966). Irrigation district water is made available through surface water rights. Both irrigation districts draw from Gerber Reservoir through Lost River. Langell Valley also draws from Clear Lake through Miller Creek.

3.12.1.4 Stormwater

Stormwater facilities in the project area are limited because the area receives little precipitation, soil is quite permeable, and the communities are not large or dense urban areas. In rural areas, runoff drains to ditches, farm ponds, creeks, and local rivers. Most stormwater control measures are designed on a site-specific basis. There are no centralized public stormwater systems other than the system in Klamath Falls, which is administered jointly by the city and Klamath County and is reported to be in poor condition (Steiner, 2002; Newmeyer, 2002; Brakeman, 2002; Meek, 2002).

3.12.1.5 Solid Waste

Landfills. Solid waste generated in the project area is collected and hauled to one of the area's two landfills—Klamath Falls Landfill and Chemult Landfill.

Klamath Disposal (formerly USA Waste) has the hauling franchise for Klamath County, and parts of Lake, Modoc, and Siskiyou counties, including the Energy Facility site (Quifenberry, 2002). Most of the solid waste collected by Klamath Disposal is taken to the Klamath Falls Landfill, which is about 25 miles from the Energy Facility. The landfill is an unlined facility that accepts about 200 tons of solid waste per day. No hazardous waste is accepted. The Klamath Falls Landfill would cease to accept household waste in mid-2003. Construction and demolition waste would continue to be accepted for another 20 years.

The Chemult Landfill, at the north end of the Klamath County, is 70 miles from the Klamath Falls Landfill. The Chemult Landfill is an unlined facility capable of handling less than 20 tons of solid waste per day. It operates under a special ODEQ permit with an anticipated 20-year life span and only accepts waste from the north end of the County. No solid waste would be transported to the Chemult Landfill when the Klamath Falls Landfill ceases to accept household waste. There are no plans to expand either landfill (Henry, 2002).

3.12.1.6 Transfer Station Siting

The siting of a new transfer station is underway. The transfer station would collect waste to be taken by rail to Roosevelt Regional Landfill in Klickitat County, Washington. Tipping fees would almost double after the Klamath Falls Landfill is closed to household waste and that waste needs to be transported to the Roosevelt Regional Landfill. Fees would increase from the current $27 per ton to an anticipated $50 per ton (Henry, 2002).

Rabanco Regional Disposal Company, owner of Roosevelt Regional Landfill, is currently working with Klamath County to establish a transfer station. Roosevelt is permitted to accept up to 5 million tons per year of solid waste. At the current disposal rate of 2 million tons per year, it has an approximate 100-year capacity. It can accept solid waste from private haulers or through the proposed transfer station, depending on how the franchises work in a specific area. The new transfer station would be an intermodal facility and is expected to have the capability to provide rail containers to a project site to load sludge or other large quantities of waste directly into a rail container. This method of direct loading eliminates the need to tip wastes through the transfer station. Containerized wastes can be placed from delivery trucks directly into rail cars.

3.12.1.7 Police and Fire Protection

Local police and fire departments serve the communities in the project area. Outside the incorporated areas, the Oregon State Police (OSP) and Klamath County Sheriff's Department provide police protection. Table 3.12-2 lists current staffing levels for police and fire service providers in Klamath County. Mutual aid agreements exist among most service providers, and emergency response is coordinated centrally through the Klamath County Emergency Communications District covering Klamath County except Crater Lake (Thompson, 2002). Descriptions of the services offered by the service providers follow.

Police protection is provided by Klamath County Sheriff's Department in the rural unincorporated areas of Klamath County. The department serves a population of 71,000 and an area of 7,000 square miles. The main station is in Klamath Falls. One resident deputy is assigned to the Bonanza area and resides there. The resident deputy would be the primary responder to any call. Response time for first responder can be within minutes. Backup response would be provided by another deputy from the Klamath County Sheriff's Department from Klamath Falls or Chiloquin, or an officer from Malin or Merrill, depending on availability and proximity (Dailey, 2002). The Merrill Police Department, Malin Police Department, and Klamath Falls Police Department have mutual aid agreements with the sheriff's department and OSP. Each of these departments serves primarily within its city limits or urban growth boundaries (Ruddock, Broussard, and Redner, 2002).

Rural fire protection around Bonanza and Klamath Falls is provided by Klamath County Fire District #1, Fire District #4, Fire District #5, and the Bonanza Rural Fire Protection District (RFPD). Bonanza RFPD, which serves 2,000 residents and covers a 120-square-mile service area, would be the primary responder for the Energy Facility site. The Bonanza RFPD extends south to Malin (RFPD) and north to Klamath County Fire District #5. The nearest station is 3 miles from the Energy Facility site, and response time is estimated at 10 minutes (Lee, 2002).

The secondary responder to the Energy Facility site would be Klamath County Fire District #5, which has a service area of 70 square miles, covering the area around Highway 140, north of Bonanza (Longoria, 2002). Fire District #5's closest station is 10 miles from the Energy Facility.

Klamath County Fire District #1 has a mutual aid agreement with Bonanza RFPD. It has the only state-certified HazMat response team and would respond to any hazardous material spill. Fire District #1 has a 300-square-mile area of primary response, serving a population of 4,500. Four of the district's six stations are operated 24 hours a day. Station #2, the closest to the Energy Facility site, is 15 miles away, with a response time of approximately 20 minutes (Romsby, 2002).

Klamath County Fire District #4 serves a limited population consisting of the southwest portion of Klamath Falls known as Stewart Lennox. The service area is only 10 square miles and 3,000 to 4,000 residents are served. Fire District #4 has a mutual aid agreement with Bonanza RFPD, but is not a likely responder (Whisenhunt, 2002).

Keno RFPD, Bly RFPD, Malin RFPD, and the Merrill Fire Department have mutual aid agreements with Bonanza RFPD. Table 3.12-2 shows staffing levels for these service providers. Each of these service providers serves primarily within or immediately around its community. Keno and Bly are each more than 20 miles from the Energy Facility site.

3.12.1.8 Health Care

Merle West Medical Center in Klamath Falls is 35 miles from the Energy Facility site and serves the portion of the project area located in Klamath County. Merle West has remaining capacity, but does not have a trauma center. The closest trauma center is located in Bend. Bonanza Medical Clinic is 3 miles from the Energy Facility site. Lake District Hospital in Lakeview, Oregon, is about 65 miles from the site and Modoc Medical Center in Alturas, California, is about 75 miles from the site. Life Flight of Oregon is located in Bend and Medford, and provides helicopter and fixed wing transport 24 hours a day. By helicopter it is approximately 45 minutes from Bend or 35 minutes from Medford to Merle West Medical Center. When Life Flight is required, the patient is stabilized at Merle West, then sent to Bend, Medford, or Portland for treatment.

3.12.1.9 Schools

Four school districts serve the project area. Two of the four districts, the Klamath County School District and Klamath Falls City Schools, serve most of the project area. Table 3.12-3 summarizes capacity data for the public schools in the area.

All four school districts report declining enrollment. None of the districts has any immediate plans to put a bond on the ballot. Klamath Falls City Schools is considering the need for a bond to support capital improvements and maintenance, but additional capacity is not anticipated. Klamath County School District enrollment is at 86 percent capacity. Thirteen of 20 schools in the district have an enrollment of 70 to 88 percent capacity. Klamath Falls City Schools have a similar but lower enrollment-to-capacity ratio. The city’s overall enrollment is at 78 percent capacity, and enrollment in five of its nine schools ranges from 53 to 79 percent capacity. The school districts in northern California have even greater remaining capacity (Coltrane, Davis, Hamilton, and Scott 2002).

Nonpublic elementary and secondary schools also provide services in Klamath County. According to the Oregon Department of Education’s Web site, three schools offer preschool to grade 12, one school offers elementary grades only, three schools offer middle and high school grades, and two schools offer high school grades only.

3.12.2 Environmental Consequences and Mitigation Measures

The Energy Facility would not have any adverse effects on public services or utilities during its construction or operation. During construction and operation, the Energy Facility would be self-sufficient, providing its own sewage, water, and stormwater systems. The capacity of the Roosevelt Regional Landfill would be adequate to accommodate the increased demand. The local utilities would have adequate capacity to serve the residential demands of facility workers during construction and operation.

As described below, the Energy Facility would have no significant unavoidable adverse impacts on utilities or public services.

<u>Impact 3.12.1. Energy Facility would have limited, if any, effects on the capacity of local utilities during construction, and no effects during operations.</u>

Sewers and Sewage Treatment

The Energy Facility would generate little sanitary sewage during its anticipated 30-year operational period. Conservatively assuming that about 1 gpm or 1,500 gallons per day of sanitary sewage would be generated and discharged into a septic tank and drainfield, there would be no connection to or reliance on any public sewer system. Many of the 30 jobs created to operate the Energy Facility would likely be filled by local residents. Some employees would relocate to the area. Given the slow growth and current vacancy rates in the project area, employees that are new residents to the area are not expected to generate substantial demand for new housing units or sewer hookups from any sewer service providers. Therefore, operation of the Facility would have no adverse impact on sewer systems in the project area.

During the construction phase, a contractor would provide onsite chemical toilet service. Construction laborers not hired locally are expected to reside in existing houses or other temporary housing options that are already receiving sewer service on systems designed to accommodate the existing dwelling units or overnight accommodations. Accordingly, no substantial adverse impacts to local sewer systems would result from construction of the Facility.

Water

The sole source of water for construction and operation of the Energy Facility would be groundwater from a deep aquifer system. The deep aquifer system would be isolated from the shallow aquifer system and surface water. Under annual average conditions with supplemental duct firing, the Energy Facility would need 72 gpm from the Babson well. Under maximum consumption conditions with supplemental duct firing, that rate would increase to 210 gpm.

Nearby residents of Bonanza have expressed concern that water use at the Energy Facility would affect their available well water and the surface water available to irrigation districts. The residents obtain their water from private wells, many of which are shallow. As described below, tests conducted have shown that these residents' water source would not be affected by use of the Babson Well.

The Babson well is located approximately 2 to 3 miles east of the Energy Facility. The well is reported to have been originally drilled to depths exceeding 5,000 feet for oil and gas exploration in the 1920s, and currently has partial obstructions at depths of 1,870 and 2,050 feet. Previous borehole geophysics and aquifer testing at the Babson well (CH2M HILL , 1994) indicated the presence of two separate aquifer systems within the upper 2,050 feet of the borehole. The Energy Facility would use the deep water-bearing zones that are present below a depth of 1,580 feet to supply its water.

The shallow aquifer system (above approximately 500 feet) is a heavily appropriated basalt aquifer that is in varying degrees of hydraulic connection with the Lost River. The shallow aquifer system is used for irrigation and domestic water supply. The Energy Facility would not use any water from the shallow aquifer system. An intensive 30-day aquifer test in 1993 at the Babson well (CH2M HILL , 1994) demonstrated that the deep groundwater-bearing zones below 1,580 feet are hydraulically isolated from the shallow aquifer system and surface water in the vicinity of the Energy Facility. No other Langell Valley area wells or water rights in the deep aquifer system are known to exist.

The project proponent conducted an additional long-term aquifer test at the Babson well during 2002 at an average rate of 6,800 gpm for approximately 30 days. An expanded observation well network of 31 different locations was used that included both shallow wells and deeper irrigation wells in Langell Valley, Yonna Valley, Swan Lake Valley, Malin, and Klamath Falls. There was no hydraulic response in the observation well network to pumping the Babson well that indicated a geologic connection between the two systems. This lack of response indicates that deep aquifer system withdrawals from a reconstructed Babson well would not affect shallow aquifer system water levels or supplies. Deep aquifer response suggests extremely high aquifer transmissivity; at the end of the 30-day pumping period, water levels had recovered to the pretest static level within 5 minutes. These observations show that the roughly 294 million gallons withdrawn for this test was an insignificant quantity relative to the rate and volume of water available to the Babson well.

During construction, bottled water would be provided at the construction site for potable use. Water for construction activities would be provided by the water supply well system and purchased as necessary during well reconstruction and construction of the water supply pipeline to the Energy Facility site. Water usage during construction would be intermittent, with no more than 100 gpm required at any time. Once the water supply well system was functioning and providing water to the site, construction-related water needs would be met by the onsite system.

The Energy Facility would use water from its own water supply well system to supply the demineralized water, potable water, service water, and sanitary systems along with continued dust abatement during the testing and commissioning phase.

There would be no reliance and therefore no impact, on any public or community water system.

Stormwater

Stormwater would be managed through three systems—the plant drains system, stormwater sewer system, and offsite stormwater diversion system.

For the industrial, developed part of the site, a plant drains system would route stormwater through an o/w separator and then into a collection basin where it would be routed back into the Facility water supply system for reuse. For rooftops, parking lots, and landscaped areas, stormwater would be routed to a stormwater pond. From the stormwater pond there would be two options:

- The preferred option is to discharge the water into a 4.7-acre infiltration basin where the water would be allowed to infiltrate into the ground. This option would not impact existing public systems.

- The second option would be to discharge the stormwater from the pond into the West Langell Valley Road side ditch. The stormwater, commingled with water runoff from the road and adjacent fields, would flow approximately 8,000 feet before discharging into an irrigation canal. This option would impact the West Langell Valley Road side ditch that is owned and operated by Klamath County.

Stormwater that would run onto the site from adjacent undeveloped areas would be routed around the proposed Facility in a network of swales and drainage ditches. This stormwater would be routed to existing natural drainages that currently carry this water or to the West Langell Valley Road side ditch.

During construction, stormwater would be managed in accordance with the Facility's NPDES General Construction Permit 1200-C and an erosion and sediment control plan. Because the Facility would not rely on offsite stormwater systems, there would be no impact on the ability of service providers in the area to provide stormwater services.

Additional information on these stormwater options is provided in Section 3.3.2.

Solid Waste

The Energy Facility would produce an estimated 50 tons of conventional solid waste (such as trash) per year. Recyclables would be separated and recycled. Other waste would be stored in onsite bins to be collected periodically and hauled to a licensed disposal facility.

Under the process wastewater management alternative involving an evaporation pond, the wastewater from hydrostatic testing and flushing and the wastewater from Energy Facility operations would be treated in a lined, onsite evaporation pond. Evaporation would leave a solid waste that would occasionally be removed for disposal in a licensed landfill. This solid waste would be a nonhazardous solid waste composed of water-treatment chemicals and constituents concentrated from the raw water supply.

As described above, the Klamath County Landfill currently accepts solid waste in the project area. Eventually the solid waste from the project area would be transported by rail to the Roosevelt Regional Landfill in southern Washington. The Klamath County Landfill and the regional landfill would accommodate solid waste generated as a result of the operation of the Energy Facility. Recognizing the size and capacity of the regional landfill, there would be no adverse impacts on service providers managing solid waste in the project area

A variety of nonhazardous, inert construction wastes would be generated by the Energy Facility. As much waste as feasible would be recycled, and any nonrecyclable construction wastes would be collected and transported to Klamath Falls Landfill. The Klamath Falls Landfill has adequate capacity to accommodate anticipated quantities of construction wastes so there would be no adverse impact on service providers managing solid waste in the project area. Closure of the Klamath Falls landfill to all but construction waste in mid-2003 would require wastes from Facility operations to be sent to a regional landfill.

<u>Recommended Mitigation Measures</u>. No measures beyond those included in the proposed project are recommended.

Impact 3.12.2. Energy Facility would not affect the level of service provided by local public services.

Assessment of Impact. The proposed Energy Facility would employ approximately 30 full-time staff who would be hired as much as possible from the local area. As a result, there would be little measurable population increase attributable to the project; therefore, the proposed Energy Facility would not place additional demand on local police and fire protection services.

Short-term increases in demand for local services by the in-migration of construction workers would not cause substantial impacts on the level of service because services possess capacity adequate to accommodate the increased demand.

Police

During operations, the Energy Facility site would be fenced and access controlled. Personnel would be on duty at the Energy Facility site at all times (24 hours a day) and available to respond to concerns at other portions of the Facility. These onsite security features would minimize opportunities for theft and vandalism. Police protection as currently provided by OSP and the Klamath County Sheriff's Office is adequate to serve current demand, and could serve the demand of the Facility (Dailey, 2002). The Klamath County Sheriff's Office has provided a letter stating the office's willingness and ability to serve the Energy Facility site (Dailey, 2002).

During construction, onsite security would be provided by the construction contractor, who would provide fencing and security services.

Fire

Fire risks would be addressed during operation of the Energy Facility. The Energy Facility would have its own fire prevention, protection, and fire detection system, including a dedicated water storage system, hose stations, and fire pumps. Water storage dedicated to fire protection use would be provided onsite in accordance with or exceeding code requirements.

Facility staff would receive basic fire suppression training, which would cover only small fires that can be controlled and/or extinguished with rack hoses and fire extinguishers. If a fire exceeds the resources available, assistance from the Fire District would be requested.

Fire risks during construction would be addressed in three ways: (1) work crews would suppress any small fires that can be controlled with extinguishers; (2) if a larger fire occurs, the fire protection district and 911 would be notified immediately; and (3) during mobilization, the contractor would coordinate with the local fire marshal and fire district regarding activities at the construction site.

Bonanza Rural Fire Protection District has stated that the fire district has the capacity to serve the Facility without adversely affecting its ability to serve the surrounding community (Lee, 2002). The Energy Facility was not mentioned as a concern by the Bonanza Rural Fire Protection District. The fire chief has provided a letter stating the district's willingness and ability to serve the Energy Facility site (Lee, 2002).

Accordingly, the Facility would not have an adverse impact on the ability of local departments to provide police or fire services.

Health Care

Merle West Medical center in Klamath Falls is located 35 miles from the Energy Facility site and Bonanza Medical Clinic is 3 miles from the site. Lake District Hospital in Lakeview, Oregon, is about 65 miles from the site and Modoc Medical Center in Alturas, California, is about 75 miles from the site. Life Flight of Oregon, located in Bend, provides helicopter and fixed-wing transport. By helicopter it is approximately 45 minutes from Bend to the Energy Facility site and Life Flight patients typically are taken to Merle West to be stabilized, then sent to Portland, Bend, or Medford for treatment. According to emergency medical service (EMS) personnel at Bonanza Medical Clinic, local medical facilities and transport services (described under Section 3.13.1.1 have adequate capacity to accommodate the Energy Facility during construction and operations (O'Keefe, 2002). The Bonanza Ambulance Service provided a letter documenting its capacity to respond to calls for service (O'Keefe, 2002).

Accordingly, the proposed Energy Facility would not have an adverse impact on the ability of local service providers to provide health care services.

Schools

The Energy Facility is anticipated to require 30 full-time employees. Most of these employees are expected to be hired from the local area. There would not be a substantial increase in student enrollment resulting from families relocating to the area for the new jobs created by the Energy Facility. Any increase in enrollment could be accommodated readily based on available capacity in the public school system and the availability of private school options. Enrollment is in a general decline in Klamath County and Klamath Falls City Schools. Capacity remains in almost all schools and both districts are seeking stability in enrollment, if not growth. Private school alternatives also exist. The scenario is similar in Modoc and Siskiyou counties (see Table 3.12-3).

The Energy Facility would be constructed using local labor to the extent possible. Nonlocal construction workers are not expected to bring their families into the area because of the short duration of construction work at the Energy Facility site. Without their families, nonlocal construction workers are not expected to affect school enrollment in public or private schools. However, even if some portion of the nonlocal workforce were to bring school-aged children into the area, local schools could readily accommodate the new students.

Several factors suggest that construction of the Energy Facility would not adversely affect schools. These factors include the likelihood of local hiring of construction workers; the improbability of a temporary, nonlocal workforce bringing families to the area; dropping enrollment; and remaining capacity.

<u>Recommended Mitigation Measures</u>. No measures beyond those included in the proposed project are recommended.

3.12.3 Cumulative Impacts

The Energy Facility would be largely self-sufficient, providing it own utilities and security services; therefore, it would not affect the capacity of services provided to the local community in the future. If process wastewater is managed by storing and hauling to a WWTP, agreements would be put in place to ensure the WWTP has the capacity to manage the Energy Facility's volume of process wastewater. The Energy Facility would employ 30 people, many of whom would be hired from local communities. Given the limited number of new residents to the project area, the low growth rate, and the existing capacity of public services and utilities, cumulative impacts to utilities and other public services would not be significant.

TABLE 3.12-1
Service Providers in Facility Area

Jurisdiction	Sewage Collection and Treatment	Water Supply	Stormwater Drainage	Solid Waste	Police/Fire	Health Care/EMS	Education
Klamath County	Private septic	Private wells	NA	Klamath County—landfill; Klamath Disposal—hauler	Klamath County Sheriff; Oregon State Police/Klamath County Fire District #1, #4; #5 volunteer RFPDs	Merle West Medical Center/Klamath County Fire District #1 and #4; volunteer ambulance providers	Klamath County School District
Klamath Falls	City of Klamath Falls, South Suburban Sanitary District	City of Klamath Falls	City of Klamath Falls and Klamath County	Klamath County—landfill; Klamath Disposal—hauler	City of Klamath Falls/Klamath County Fire District #1 and #4	Merle West Medical Center/Klamath County Fire District #1 and #4	Klamath Falls City Schools
Bonanza	City of Bonanza	Private wells	None	Klamath County—landfill; Klamath Disposal—hauler	Klamath County Sheriff/Bonanza RFPD	Bonanza Clinic; Merle West Medical Center/Bonanza Quick Response	Klamath County School District
Malin	City of Malin	City of Malin	None	Klamath County—landfill; Klamath Disposal—hauler	Malin Police Department/Malin RFPD	Merle West Medical Center/Basin Volunteer Ambulance	Klamath County School District
Merrill	City of Merrill	City of Merrill	None	Klamath County—landfill; Klamath Disposal—hauler	Merrill Police Department/Merrill Fire Department	Merrill Clinic; Merle West Medical Center/Basin Volunteer Ambulance	Klamath County School District
Lake County	Private septic	Private wells	NA	Klamath County—landfill; Klamath Disposal—hauler	Lake County Sheriff/Lakeview Fire Department	Lake District Hospital/Basin Volunteer Ambulance	Lake Education Service District
Siskiyou County	Private septic	Private wells	NA	Klamath County—landfill; Klamath Disposal—hauler	Siskiyou County Sheriff/California Department of Forestry and Fire Protection	Tulelake Health Center; Butte Valley Health Center/Basin Volunteer Ambulance	Butte Valley Unified School District; Tulelake Basin Joint Unified School District
Tulelake	City of Tulelake	City of Tulelake	None anticipated	Klamath County—landfill; Klamath Disposal—hauler	Tulelake Police Department/ Tulelake Fire Department	Tulelake Health Center; Modoc Medical Center/Basin Volunteer Ambulance	Tulelake Basin Joint Unified School District
Dorris	City of Dorris	City of Dorris	None anticipated	Klamath County—landfill; Klamath Disposal—hauler	Dorris Police Department /Dorris Volunteer Fire Department	Butte Valley Health Center/Basin Volunteer Ambulance	Butte Valley Unified School District
Modoc County	Private septic	Private wells	NA	Klamath County—landfill; Klamath Disposal—hauler	Modoc County Sheriff/California Department of Forestry and Fire Protection	Tulelake Health Center; Modoc Medical Center/Basin Volunteer Ambulance	Tulelake Basin Joint Unified School District

Sources:

Sewer and water: Steiner, 2002; Colahan, 2002; Hapalla, 2002; Nelson, 2002; Parks, 2002; Newmeyer, 2002; Grounds, 2002; Brakeman, 2002; Matthews, 2002; Meek, 2002; King, 2002, Clark, 2002

Solid waste: Henry, 2002; Quifenberry, 2002

Police/Fire: Dailey, 2002; Ruddock, 2002; Broussard, 2002; Redner, 2002; Romsby, 2002; Ketchum, 2002; Lawrence, 2002; Lee, 2002; Stratton, 2002; King, 2002, Clark, 2002; Oregon State Fire Marshal, 2002

Health Care/EMS: O'Keefe, 2002; Romsby, 2002;Vickerman, 2002; Ongman, 2002; Thompson, 2002; Ketchum, 2002; Tulelake Chamber of Commerce, 2002; Butte Valley Chamber of Commerce, 2002

Education: Davis, 2002; Hamilton, 2002; Stratton, 2002

Notes:

NA = Not applicable. Public stormwater systems typically are not found outside city limits or urban growth boundaries.
None = No centralized stormwater system is administered by the city or any special district.
RFPD = Rural Fire Protection District

TABLE 3.12-2
Police, Fire, and Emergency Medical Service Summary

Jurisdiction	Police			Fire			EMS		
	Agency	Staffing	Services	Agency	Staffing	Services	Agency	Ambulances	Services
Klamath County	Klamath County Sheriff	1 sheriff 27 patrol officers plus jail and support staff	Primary response (other than highway incidents)	Klamath County Fire District #1	1 chief, 1 operations chief, 1 training chief, 1 fire marshal, 3 battalion chiefs, 3 fire prevention officers, 12 captains, 57 fire fighters, 3 office staff	Primary response for HazMat/Mutual aid	Klamath County Fire District #1 Klamath County Fire District #4	6 2	Secondary response Mutual aid
	Oregon State Police	Not available	Primary response to emergency calls for service on Oregon's State and Interstate Highways	Klamath County Fire District #4 Klamath County Fire District #5	1 chief, 20 volunteer firefighters	Mutual aid Secondary response			
Bonanza	Klamath County Sheriff	See Klamath County	See Klamath County	Bonanza RFPD	1 chief, 1 assistant chief, 20 volunteer firefighters	Primary response (except for HazMat, see Klamath Co. F.D. #1)	Bonanza Quick Response	1	Primary response
Klamath Falls	Klamath Falls Police	1 chief, 1 captain, 1 code enforcement officer, 1 code enforcement tech, 1 captain, 1 lieutenant, 8 detectives, 36 patrol officers, 1 evidence tech, 3 clerical	Mutual aid*	Klamath County Fire Districts #1, #4, #5	See Klamath County	See Klamath County	Klamath County Fire District #1 and #4	See Klamath County	See Klamath County
Malin	Malin Police	1 chief, 2 part-time officers, 2 reserves (unpaid)	Secondary response/mutual aid*	Malin RFPD	Not available	Mutual aid	Basin Ambulance	4	Mutual aid
Merrill	Merrill Police	1 chief, 3 reserve officers, 1 clerk	Secondary response/mutual aid*	Merrill Fire Department	Not available	Mutual aid	Basin Ambulance	See Malin	See Malin
Bly	Klamath County Sheriff	See Klamath County	See Klamath County	Bly RFPD	1 chief, 25 volunteer firefighters	NA	Bly Ambulance	1	NA
Keno	Klamath County Sheriff	See Klamath County	See Klamath County	Keno RFPD	1 chief, 25 volunteer firefighters, 2 office staff	Mutual aid	Keno RFPD Ambulance	2	Mutual aid

Sources:

Police: Dailey, 2002; Ruddock, 2002; Broussard, 2002; Redner, 2002; Oregon State Police, 2002

Fire: Romsby, 2002; Ketchum, 2002; Lawrence, 2002; Lee, 2002; Whisenhunt, 2002; Oregon State Fire Marshal, 2002

EMS: O'Keefe, 2002; Romsby, 2002; Vickerman, 2002; Ongman, 2002; Oregon Public Health Services, 2002

Notes:

NA = Not applicable. Provider's driving distance to COB Energy Facility precludes it from providing any services.
RFPD = Rural Fire Protection District

* The Klamath County Sheriff has a written mutual aid agreement with Oregon State Police only. Informal agreements exist with local police agencies.

TABLE 3.12-3
Summary of School District Service Level in the Facility Area

Schools by District	City/Town Served	Enrollment	Capacity	Enrollment as % of Capacity
Klamath County				
Klamath County School District				
Bonanza Schoo1—K-12	Bonanza	439	600	73%
Gearhart Elementary School	Bly	85	125	68%
Chiloquin Elementary School	Chiloquin	300	350 w/portables	86%
Chiloquin High School	Chiloquin	270	325 w/portables	83%
Gilchrist School—K-12	Gilchrist	371	470	79%
Keno Elementary School	Keno	243	275	88%
Falcon Heights Academy—K-12 Alternative School	Klamath Falls	75	100	75%
Altamont Elementary School	Klamath Falls	284	350	81%
Fairhaven Elementary School	Klamath Falls	240	250 w/portables	96%
Ferguson Elementary School	Klamath Falls	523	550 w/portables	95%
Henley Elementary School	Klamath Falls	390	400 w/portables	98%
Peterson Elementary School	Klamath Falls	503	550 w/portables	91%
Shasta Elementary School	Klamath Falls	506	506	100%
Stearns Elementary School	Klamath Falls	343	400	86%
Brixner Jr. High School	Klamath Falls	470	535	88%
Henley Middle School	Klamath Falls	420	500	84%
Henley High School	Klamath Falls	645	720	90%
Malin Elementary School	Malin	157	180	87%
Merrill Elementary School	Merrill	165	180 w/portables	92%
Lost River High School	Merrill	278	350	79%
Klamath Falls City Schools				
Fairview Elementary School	Klamath Falls	250	350	71%
Joseph Conger Elementary School	Klamath Falls	226	250	90%
Mills Elementary School	Klamath Falls	461	500	92%
Pelican Elementary School	Klamath Falls	166	250	66%
Riverside Elementary School	Klamath Falls	116	220	53%
Roosevelt Elementary School	Klamath Falls	346	375	92%
Ponderosa Junior High School	Klamath Falls	475	525	90%
Klamath Union High School	Klamath Falls	985	1,250	79%
Mazama High School	Klamath Falls	783	1,100	71%
Siskiyou County				
Butte Valley Unified School District				
Butte Valley Elementary School	Dorris	150	250	60%
Butte Valley Middle School	Macdoel	54	100	54%

TABLE 3.12-3
Summary of School District Service Level in the Facility Area

Schools by District	City/Town Served	Enrollment	Capacity	Enrollment as % of Capacity
Butte Valley High School	Dorris	84	100	84%
Cascade High School (Continuation)	Dorris	12	20	60%
Picard Community Day School (Alternative)	Dorris	3	NA	
Mahogany Community Day High School (Alternative)	Dorris	3	NA	
Modoc and Siskiyou Counties				
Tulelake Basin Joint Unified School District				
Newell Elementary School—K-2	Tulelake and Newell	179	300	60%
Tulelake Basin Elementary School—3-6	Tulelake	181	300	60%
Tulelake High School	Tulelake	240	400	60%
Tulelake Continuation High School	Tulelake	10	20	50%

Sources: Davis, 2002; Hamilton, 2002; Coltrane, 2002; Scott, 2002

Note:

NA = Not applicable. District must accommodate all students who need services.

3.13 Health and Safety

A power plant could potentially increase risk to health and safety as a result of using hazardous materials and transmitting natural gas in an underground pipeline. However, the Energy Facility would be designed with attention to the reduction of potential hazards associated with its operation and meets or exceeds state and Federal safety standards in its components. Its design includes safety and emergency systems that would be included during construction to ensure safe and reliable operation of the proposed Energy Facility. Through continuous monitoring of process variables and a thorough maintenance program, safety and reliability would be further increased. Both electric and magnetic fields (EMFs) and noise would increase but would be within allowable limits.

This section discusses health and safety matters, including occupational health and safety; fuel management; use, handling, and storage of hazardous non-fuel substances; fire protection; electric shock hazard; EMFs; and noise. The affected environment is not described in this section because there are no activities currently ongoing at the site to which these issues apply. Rather, aspects of the proposed operations at the Facility are described, followed by a discussion of their potential impacts and mitigating measures.

The information presented in this section is based on the studies and analysis conducted for the SCA as amended by Amendments No. 1 and No. 2, filed with EFSC on July 25, 2003, and October 15, 2003, respectively.

3.13.1 Construction and Operation of Proposed Energy Facility

3.13.1.1 Occupational Health and Safety

A comprehensive occupational health and safety program would be implemented to protect workers during construction and operation of the proposed Facility. The health and safety program would meet Federal, state, and local health requirements.

If an accident occurred, Merle West Medical Center, located 35 miles from the Energy Facility site, and Bonanza Medical Clinic, located 3 miles from the site, could provide medical services. Life Flight of Oregon, located in Bend, provides helicopter and fixed-wing transport. By helicopter it is approximately 45 minutes from Bend to the Energy Facility site and Life Flight patients typically are taken to Merle West to be stabilized, then sent to Portland, Bend, or Medford for treatment. According to emergency medical service (EMS) personnel at Bonanza Medical Clinic, these facilities have adequate capacity to accommodate the proposed Facility during construction and operation (O'Keefe, 2002). The Bonanza Ambulance Service provides local response to calls for service. Klamath County Fire District #1 has the only state-certified HazMat response team and would respond to any hazardous material spill.

Health and Safety During Construction. During construction, a health and safety program would be implemented by the construction contractors, based on industry standards for accident prevention. At a minimum, the construction health and safety program would comply with Federal, state, and local health and safety regulations. Contractors involved with the proposed Facility would be required by contract to comply with the construction health and safety program. Key elements of the plan would include:

- Responsibilities of construction team and subcontractors
- Job site rules and regulations
- Emergency response procedures
- Safety inspections and audits
- Medical services and first aid
- Safety meetings, employee training, and communications, including the hazard communications program and a review of procedures when performing high risk tasks
- Personal protective equipment
- Standard construction procedures
- Accident investigation and reporting

Health and Safety During Operation. An employee health and safety program would be implemented for operations personnel. It would include regular employee education and training in safe working practices; communication of hazards in accordance with Federal, state, and local standards; accident incident evaluations; administrative health and safety procedures; emergency response; fire protection and fire response; and reporting and recordkeeping of safety performance data. Operations personnel would be provided with written safety guidance similar to that used at other project proponent facilities. A first aid station containing basic first aid equipment would be established at several locations around the Facility. First aid training would be required for operations personnel.

3.13.1.2 Fuel Management

Fuels used during construction would likely include diesel fuel and gasoline. These fuels would be stored in aboveground storage tanks located within secondary containment. The chemicals would be stored in drums and containers located inside construction storage trailers.

During operations, natural gas would be delivered from the existing PG&E GTN pipeline system through a 4.1-mile natural gas pipeline constructed from the Bonanza Compressor Station to the Energy Facility along the right-of-way of existing Klamath County roads. Natural gas would not be stored onsite.

Diesel fuel would be stored onsite for the diesel-fired fire water pump. The pump would be equipped with a diesel fuel tank of approximately 100 gallons that would be used for diesel fuel storage. The diesel-fired pump and fuel tank would be located inside a concrete spill containment berm sized to contain 110 percent of the fuel tank volume.

Diesel fuel also would be used for the backup generators at the water supply well system and would be stored in skid-mounted, double-walled, diesel fuel tanks. An interior tank would be located inside a rupture containment basin. The tanks would be located inside a concrete spill containment berm sized to contain 110 percent of the fuel tank volume. Each tank would hold approximately 2,150 gallons of diesel fuel. The diesel fuel storage tanks at the water supply wells would provide sufficient diesel fuel to accommodate operation of the water supply wells for up to approximately 37 hours on diesel fuel if necessary.

3.13.1.3 Hazardous Nonfuel Substances

Several hazardous materials would be used at the Energy Facility. The following list summarizes typical chemicals currently planned for use at the proposed Energy Facility:

- Lubricants: medium and heavy weight oil, light lubrication oil, generator lube oil, and combustion turbine lube oil
- Aqueous ammonia
- Water treatment chemicals: sulfuric acid, sodium hydroxide, EDTA, hydrazine, ammonia hydroxide, sodium hypochlorite, sodium bisulfite, sodium metabisulfite, sodium nitrite, organic phosphate, sodium phosphate, lime, soda ash, magnesium chloride, polymers, filter acid, and iron chloride.
- Cleaning fluids and detergents: solvents, Pen-7 surfactant, sodium hypochlorite, and nitrogen
- Hydrogen
- Carbon dioxide

3.13.1.4 Fire Protection

During construction and operations, facility workers would receive basic fire suppression training to address small fires that could be controlled and/or extinguished with rack hoses and fire extinguishers. If a fire exceeds the resources available, assistance from the Bonanza Rural Fire Protection District (RFPD) would be requested.

3.13.1.5 Electrical Shock Hazard

Power lines can cause serious electric shocks if they are not constructed to minimize the shock hazard. Also, high-voltage transmission lines can cause nearby ungrounded metal objects to become charged, such as wire fencing mounted on wooden fence posts that prevent the energy from discharging into the ground. Providing grounding for the charged objects solves this problem.

3.13.1.6 Electric and Magnetic Fields

Transmission lines constructed to connect the Energy Facility to the regional power grid would emit electric and magnetic fields. Background on EMF fields is provided in this section.

Background. Oscillating EMFs are invisible lines of force surrounding devices that carry or use electricity. These fields are present wherever electricity is used or distributed, not just from overhead power lines but from indoor wiring, household appliances such as television sets, toasters, hair dryers, and computers. All electrical devices generate EMFs. The earth itself has a naturally occurring steady-state EMF.

The strength of EMFs falls off rapidly (exponentially) with distance. People are much more likely to be exposed to relatively high levels from appliances in their homes than from power lines, especially since most power lines are built on dedicated rights-of-way that are, by their nature, unoccupied.

Electric fields are related to voltage and are measured in units of volts per meter (V/m). When a conductor is energized, an electric field exists around the conductor that is proportional to the energized voltage. The closer to the conductor, the higher the electric field. Magnetic fields are generated by the electric current flowing through the wire. When alternating current flows through a conductor, an alternating magnetic field is created around the conductor. Magnetic fields are measured in milligauss (mG). In the United States, most AC has a frequency of 60 Hertz (Hz); the EMFs created by AC are referred to as 60-Hz fields.

Throughout the home, the electric field strength from wiring and appliances is typically less than 10 V/m; however, fields of 10 V/m and higher can be found very close to electrical appliances. Average magnetic field strength in most homes (away from electrical appliances and home wiring, etc.) is typically less than 2 mG. Very close to appliances carrying high current, fields of tens to hundreds of mG are present.

Studies of Health Risk Associated with Electric and Magnetic Fields. Both electric and magnetic AC fields induce currents in conducting objects, including people and animals. These currents, even from the largest power lines, are too weak to be felt. Despite this, some scientists believe that these currents might be potentially harmful and that long-term exposure should be minimized. Hundreds of studies on EMFs have been conducted in the United States and other countries. Studies of laboratory animals generally show that these fields have no obvious harmful effects (COB Energy Facility, LLC, 2002).

Concern about health effects arose in 1979 when researchers looked at wired code classifications for residences and the incidence of leukemia (COB Energy Facility, LLC, 2002). The study resulted in a weak statistical link between proximity to power lines and childhood leukemia. Since the release of this study there has been a lot of effort to determine if this statistical link is reproducible and if there are any other human health effects from exposure to EMFs. The National Academy of Sciences reviewed more than 500 studies from a period of 17 years and issued a report in October 1996 which says that there is no conclusive evidence that EMFs play a role in the development of cancer, reproductive and developmental abnormalities, or learning and behavioral problems (NRC, 1996). An additional report issued May 4, 1999, by the National Institute of Environmental Health Science (NIEHS) came to the conclusion that the data showing the link between EMFs and cancer showed only marginal scientific support and concluded that aggressive regulation was not warranted. The report did recommend that attempts be made to minimize the exposure of the public to EMFs (NIEHS, 1999).

3.13.1.7 Noise

The Energy Facility site consists primarily of scrub brush with limited cattle grazing. There are no continuous noise sources in the project area. Intermittent noise includes traffic on local roads, agricultural activities, and distant overhead aircraft. Measurements reveal most noise occurs during the daytime; nighttime noise levels are low.

Noise Measurement and Terminology. To understand how the significance of noise impacts is determined, it is useful to understand how noise is defined and measured.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Chapter 8, Glossary of Terms and Acronyms, defines the acoustical terms used in this discussion of noise.

In this discussion, some statistical noise levels are stated in terms of decibels on the A-weighted scale (dBA). Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some of the noise in the low- and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most ordinances and standards, including the ODEQ standard. The equivalent sound pressure level (L_{eq}) is defined as the average noise level, on an energy basis, for a stated period of time (such as hourly).

In practice, the level of a sound source is conveniently measured using a sound-level meter that includes an electrical filter corresponding to the A-weighted curve. The sound-level meter also performs the calculations required to determine the L_{eq} for the measurement period. The following measurements relate to the noise-level distribution during the measurement period. The L_{90} is a measurement that represents the noise level exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

Table 3.13-1 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Noise Regulations. OAR Chapter 340, Division 35, establishes statewide maximum permissible environmental noise levels for new commercial and industrial uses. The noise regulations apply at “appropriate measurement points” on “noise-sensitive property.” The “appropriate measurement point” is defined as whichever of the following is farther from the noise source:

- Twenty-five feet toward the noise source from that point on the noise-sensitive building nearest the noise source; or
- That point on the noise-sensitive property line nearest the noise source.

“Noise-sensitive property” is defined as “real property normally used for sleeping, or normally used as schools, churches, hospitals or public libraries.”

Residences are the only noise-sensitive property identified in the project area. Table 3.13-2 summarizes the applicable Oregon regulations.

The proposed Energy Facility may operate 24 hours per day and would generally represent a constant noise source.

Exemptions. Exemptions to the noise regulations (per OAR 340-035-0035(5)) are as follows:

- Sounds created by the tires or motor used to propel any road vehicle complying with the noise standards for road vehicles
- Sounds that originate on construction sites

- Sounds created in construction or maintenance of capital equipment
- Impulse noise regulated in OAR 340-035-0035(1)(d). However, gas turbines do not generate impulse noise.

Noise Emissions. Construction of the proposed Energy Facility is expected to be typical of other energy facilities in terms of schedule, equipment used, and other types of activities. The noise level would vary, depending on the construction phase. Construction of energy facilities generally can be divided into five phases in which different types of construction equipment are used: site preparation and excavation, concrete pouring, steel erection, mechanical, and cleanup. The specific equipment that would be used at the site is not known at this time. Based on similar construction projects, noise would be produced by a range of construction equipment, including light and heavy trucks, backhoes, bulldozers, graders, cranes, air compressors, welding machines, and power hand tools.

The primary operational noise sources anticipated with this Energy Facility are the CTG packages, the HRSG packages, the STG packages, and the air-cooled condensers. Secondary noise sources are anticipated to include the generator step-up transformers (GSUT), the HVAC systems, the boiler feed pumps (BFP), and the circulating water pumps (CWP).

Sensitive Receptors. The only noise-sensitive receptors in the vicinity are residences. The closest residences are on land controlled by the project proponent and would be kept vacant or razed if necessary to comply with ODEQ noise standards. Accordingly, the noise analysis focuses on the two closest residential receptors not controlled by the Facility. One receptor (R1), located about 6,700 feet to the southeast, has a direct line of sight to the Energy Facility. The other receptor (R3), with no line of sight, is located over the bluff about 5,700 feet away to the northwest. Noise-level measurements were conducted at these receptors—R1 and R3. These receptors are also referred to as monitoring locations M1 and M2, respectively. The receptors and the two monitoring locations are shown in Figure 3.13-1.

Ambient Noise Measurements. Representative nighttime L_{50} levels of 20.5 dBA were calculated for M1 by averaging L_{50} levels between 10:00 p.m. and 4:00 a.m. the nights of May 10, 11, and 12, 2002. Similarly, a representative nighttime L_{50} of 20 dBA was calculated for M2 by averaging L_{50} levels between 10:00 p.m. and 4:00 a.m. the night of May 16, 2002. The average L_{10} levels at M1 and M2 during those same periods were calculated to be 29 and 26, respectively. At M1, the L_{10} was between 3 and 20 dBA higher than the L_{50} during those same periods. The wide variation between the L_{10} and L_{50} is likely the result of residents dogs barking, and it was thought to be inappropriate to include such activity in the average L_{10} calculation[14].

To limit the effect of "outliers" on the L_{10}, the median difference between the L_{10} and L_{50} was used rather than the average. The median difference between the L_{10} and L_{50} during the averaging period is 7 dBA at M1, resulting in an L_{10} of 27 dBA. At M2, the median difference between the L_{10} and L_{50} is 4 dBA during the averaging period resulting in an L_{10} of 24 dBA. It should be noted that the L_{50} is the more restrictive noise criterion. The hours between 10:00 p.m. and 4:00 a.m. were the quietest hours of the night on an L_{50} basis. Averaging the L_{50} during the quietest hours results in data that do not emphasize either the noise peaks or

[14] Based on conversation between Mark Bastasch/CH2M HILL and Kerrie Standlee/Daly Standlee Associates.

unusual quiet, as required by Section 4.5.6 of the ODEQ publication titled NPCS-1: Sound Measurement Procedures Manual (1983).

3.13.2 Environmental Consequences and Mitigation Measures

Construction and operation of the proposed Energy Facility would not have a substantial adverse effect on health and safety. Various features would be built into the proposed Energy Facility, and operational practices adopted, to ensure that the Energy Facility would meet or exceed state and Federal safety standards in its components.

Impact 3.13.1. A natural gas leak could occur, posing a risk of fire.

Assessment of Impact. Natural gas could leak, posing a risk of fire. The proposed Energy Facility would include design features to reduce the chance of a natural gas leak, as well as prescribe measures to be taken in the event of a gas leak. The natural gas pipeline would be constructed in accordance with the requirements of the U.S. Department of Transportation as set forth in 49 CFR and OAR 345-24-060.

The natural gas pipeline would have a shutoff system to quickly shut down natural gas flow in the event of fire. In addition, PG&E GTN would have remote shutdown capability from its 24-hour operated gas control center in the event of excess flow conditions or other incidents.

Recommended Mitigation Measures. No measures beyond those included in the proposed Energy Facility are recommended.

Impact 3.13.2. Diesel fuel could leak from a storage container, posing a fire risk or possible contamination of soil.

Assessment of Impact. Diesel fuel storage of approximately 100 gallons for the diesel-fired fire water pump and approximately 4,300 gallons for the backup generators at the water supply well system would be provided. Diesel fuel could leak from the storage container, posing a fire risk and possible contamination of soil.

The proposed Energy Facility would include measures to reduce the risk of fire and to contain any spill to prevent contamination. Systems for fire prevention, detection, and control would be installed throughout the Facility's buildings and yard areas as required by the National Fire Protection Association (NFPA) and insurance requirements. Diesel fuel would be stored in areas designed to contain spills through berms, curbs, and other secondary containment features during construction and operation of the Facility. A spill prevention control plan would be in effect from the beginning of construction and continue throughout the life of the Facility.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.13.3. Aqueous ammonia spill could spill and/or ammonia vapor could be released to the atmosphere, posing a health risk.

Assessment of Impact. Aqueous ammonia solution would be stored in a 30,000-gallon aboveground storage tank. The design of the aqueous ammonia storage and handling subsystem would be done with careful attention to the goal of eliminating hazards associated with the use of ammonia. Nonetheless, ammonia could spill or ammonia vapor could be released to the atmosphere, posing a health risk.

The tank would be contained within a bermed area, and would be designed in accordance with applicable industry specifications. The tank would be equipped with a level gauge and would be monitored from the control room. The area for delivery of aqueous ammonia to the storage tank also would be bermed.

The spill prevention control plan, mentioned previously, would address the potential for an aqueous ammonia spill.

A material safety data sheet (MSDS) for aqueous ammonia would be available at the Facility. The MSDS would identify the appropriate procedures for handling the aqueous ammonia, which would be maintained and enforced by the Energy Facility manager or the manager's delegated safety coordinator.

Recommended Mitigation Measures. Hazardous materials would be stored in structures that meet the requirements of the Uniform Fire Code, Article 80. In addition, a Hazardous Materials Inventory Statement and a Hazardous Materials Management Plan would be written and filed with the Bonanza RFPD and Klamath County Fire District #1, which has a mutual aid agreement with the Bonanza RFD and has the only state-certified HazMat response team within the area.

Impact 3.13.4. Spills of other hazardous, nonfuel substances could occur, with the potential to harm people at the Energy Facility and in the surrounding area.

Assessment of Impact. Hazardous nonfuel substances could spill, with the potential to harm people in the Energy Facility and in the surrounding area.

The following measures would be taken to prevent and minimize the impacts of a spill of any hazardous, nonfuel substance:

- Management of hazardous substances would be conducted in accordance with applicable Federal, state, and local regulatory standards for public and occupational safety and health protection.
- Training would be provided to appropriate workers in materials handling and disposal.
- The storage and conveyance systems for liquid hazardous chemicals would be designed to prevent and contain spills through pumping and storage controls and secondary containment tanks.

Recommended Mitigation Measures. The recommended mitigation measures are the same as those proposed for aqueous ammonia.

Impact 3.13.5. A fire could occur at the Energy Facility, posing a threat to workers and nearby people and structures.

Assessment of Impact. A fire could occur at the Energy Facility, posing a threat to workers and nearby people and structures. To reduce the risk and consequences of fire, systems for fire prevention, detection, and control would be installed at the Energy Facility. These systems would meet local, state, and NFPA standards.

The main fire protection system would include a dedicated water storage system, hose stations, and fire water pumps. A portion of the raw water aboveground storage tank would be dedicated to the fire protection system. NFPA requires providing a 2-hour supply for the largest fire system demand plus a minimum 500-gpm rate.

The fire detection system would continuously monitor the Energy Facility, provide an indication of the location of fires, warn Energy Facility personnel, and activate the fire protection system. The combustion turbine enclosures would include carbon dioxide fire-extinguishing systems. Smoke detectors, heat detectors, manual alarm stations, and indicating devices would be installed throughout the Energy Facility. Portable fire extinguishers would be placed at key locations. Flammable materials would be stored in appropriate containers and cabinets.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.13.6. The high-voltage electric transmission line could cause electrical shocks directly and from induced charges.

Assessment of Impact. The high-voltage electric transmission line could cause electrical shocks directly and from induced charges. The electric transmission line would be designed so that induced currents resulting from the transmission line and related facilities would be as low as reasonably achievable. The project proponent would agree to a program that would provide reasonable assurances that fences, gates, cattle guards, trailers, or other permanent objects or structures that could become inadvertently charged with electricity would be grounded through the life of the line.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.13.7. Electric and magnetic fields would increase but would be well within allowable limits.

Assessment of Impact. EMF estimates were calculated for the proposed Energy Facility's 7.2-mile electric transmission line to obtain the maximum possible EMF strengths that would be produced. The maximum operating voltage is expected to be 550 kV. The nominal operating voltage would be 500 kV, and the normal operating voltage would be 540 kV. These estimates are computed at a height of 1 meter (3.3 feet) aboveground at midspan. The estimates also consider the maximum current per phase of 1,260 amps. There would be one three-phase circuit on the easement. The circuit configuration would be delta, which minimizes EMFs.

Figures 3.13-2 and 3.13-3 present the EMF estimates. Because the proposed electric transmission lines would be symmetrical (Figure 2-3), the EMF profiles on both sides of the line would be identical. The maximum magnetic field would be at the center of the easement and the maximum electric field would occur at 24 feet from centerline for the 138M tower and 20 feet from centerline for the 238M tower.

The allowable limit for electric field intensities for the state of Oregon is 9 kV/m at the peak. The maximum electric field for a line using the 138M tower is slightly above the peak, whereas the maximum electric field for a line using the 238M tower is below the peak.

Figure 3.13-4 shows that, based on the calculations, the electric fields would be 1.92 and 1.48 kV/m at the edge of the 154-foot easement for the 138M and 238M towers, respectively, for a minimum clearance at midspan of 33 feet.

Figure 3.13-5 shows that the maximum magnetic field for 1,260 amps flowing in each phase would be approximately 214 mG and 188 mG for the lines using the 138M and 238M structures, respectively. The maximum values would occur directly under the center phase. At 77 feet from the center of the line (or the edge of the planned easement), the magnetic fields would decrease to 45.9 mG and 36.7 mG for the lines using the 138M and 238M structures, respectively.

Based on the estimates, the EMFs would be well within allowable limits.

Recommended Mitigation Measures. No measures beyond those included in the proposed project are recommended.

Impact 3.13.8. Operation of the proposed Energy Facility could affect noise levels but would be within limits allowed by state statute.

Assessment of Impact. The modeling used to predict the Energy Facility's noise emissions during operation assumed a "worst case" scenario, with the Energy Facility operating under steady-state conditions at full capacity and with the combustion and steam turbines at base load and the air-cooled fans operating. After Energy Facility noise emissions were determined, modeling was performed to predict sound levels at the closest noise sensitive receptors—monitoring locations M1 and M2. This modeling also conservatively assumed environmental conditions that facilitate sound transmission.

Energy Facility

The Energy Facility sound level, with mitigation incorporated, would be 30.5 dBA or less at residences, as shown in Figure 3.13-1. This level would be the maximum sound level audible at the nearest residences during ideal sound propagation weather conditions. During most weather conditions and at the most times, the Facility sound level would be well less than 30 dBA and would not be audible at the residences.

Actual mitigation measures would be determined by the equipment manufacturers and suppliers. A barrier wall would be reserved as a contingency mitigation measure that would be installed in the event a noise exceedance is detected during Facility performance testing.

A sound level of 30 dBA is quite low; for comparison, a typical cooling fan on a desktop computer is 40 to 45 dBA at the operator's ears, and rustling leaves in a light breeze are generally louder than 30 dBA. Power plant noise is typically very steady in nature, with no extraordinary tones or impact type noises. The noise is similar to an idling car or a neighbor's air conditioning unit. The Energy Facility noise would tend to be a steady faint background noise source in the everyday noise environment to which people are exposed.

Electric Transmission Line

The corona discharge from high-voltage electric transmission lines is known to generate audible noise (often described as crackling or sizzling) under certain conditions. Noise from AC electric transmission lines would be at a maximum during periods of precipitation. Formulas have been developed by BPA and others to estimate maximum electric transmission line noise based on operational parameters and distance from the line. The general equation for AC electric transmission lines developed by BPA was used to estimate L_{50} noise levels under maximum conditions.

The estimated L_{50} electric transmission line noise under worst case conditions is presented for several distances in Table 3.13-3. The maximum L_{50} estimated at the closest residence would be 27 dBA. This would be much less than the L_{50} nighttime absolute limit of 50 dBA. The increase in noise over the existing nighttime average L_{50} of 20 dBA (as estimated at M2) would be less than 10 dBA. The electric transmission line noise level would be lower most of the time.

Water Supply Well System

Pumphouses would be designed to mitigate noise levels to less than 27 dBA at the nearest residence, which would be R8 (located approximately 3,500 feet away). The major noise generating equipment would be located in a fully enclosed and acoustically designed structure. In addition, submersible pumps would be used. Currently, acoustically designed enclosures capable of achieving 20 dBA at 3,000 feet are available.

An emergency generator would be located at the pumphouse site. It is likely that this generator would only run continuously if power was lost for a minimum of 7 days. The generator would probably also be run once monthly for 15 minutes during the day for maintenance and reliability. The emergency operation of the generator would be exempted from ODEQ's noise regulations because it is "emergency equipment not operated on a regular or scheduled basis." Scheduled operation of the emergency generator would be 15 minutes per month for maintenance and reliability. Operation would be limited to between the hours of 8:00 a.m. and 6:00 p.m. During these hours, the ambient noise levels are elevated from agricultural, transportation, or other activities and the generator noise level should not be a concern at the nearest residence 3,500 feet away. Scheduled operation would likely qualify for an exemption from ODEQ's noise restrictions as an "infrequent event" or exempted as "sounds created in construction or maintenance of capital equipment."

Recommended Mitigation Measures. Noise emissions from major equipment at the Energy Facility would be specified at an appropriate level to ensure the overall Energy Facility sound levels satisfy the noise criteria. Final selection of mitigation measures would be determined by the project proponent's engineer, equipment manufacturers, and suppliers prior to procurement. Noise mitigation is not recommended for the electric transmission line or the natural gas pipeline because noise from these facilities would not exceed any applicable ODEQ noise standard. A barrier wall would be reserved as a contingency mitigation measure that would be installed in the event a noise exceedance is detected during Facility performance testing.

Impact 3.13.9. Construction of the proposed Energy Facility could affect noise levels.

Assessment of Impact.

Energy Facility

Table 3.13-4 shows the loudest equipment types generally operating at a power plant site during each phase of construction.[15] The composite average or equivalent site noise level, representing noise from equipment, is also presented in Table 3.13-4 for each phase.

The Wright residence, the receptor closest to the site with a direct line of sight, would be more than 1 mile (6,700 feet) away (receptor position R1 in Figure 3.13-1). Table 3.13-5 shows the average or equivalent construction noise levels projected to the nearest residences from the Energy Facility site. These results are conservative because topography and other potentially attenuating factors are not included.[16] Average noise levels during construction activities would be between 35 and 46 dBA at R1 and between 37 and 48 dBA at R2.

Table 3.13-6 shows the maximum noise levels from construction equipment projected to the residences nearest to the Energy Facility site.

Noise generated during the testing and commissioning phase of the proposed Facility would not be substantially different from noise produced during normal, full-load operations. Starts and abrupt stops would be more frequent during this period, but on the whole they would usually be short-lived. The steam releases associated with these starts and stops should not be problematic because they would be vented through permanent vent silencers.

Electric Transmission Line

Noise from electric transmission line construction is represented by the site clearing and excavation, concrete pouring, and steel erection phases shown in Table 3.13-5. The closest receptor would be 3,000 feet from the electric transmission line. As with the Energy Facility construction noise, these estimates are conservative because divergence is the only attenuating mechanism taken into account. Depending on the construction activity, the noise level would range between 42 and 53 dBA. Table 3.13-6 shows the maximum noise levels from construction equipment projected to the nearest residences from the electric transmission line, which would range between 37 and 52 dBA.

Water Supply Well System and Water Supply Pipeline

Noise levels from construction equipment associated with the water wells, pumphouses, and water pipeline are anticipated to be similar to the levels presented in Table 3.13-6. The closest receptor would be located 0.7 mile away (Receptor R8).

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[15] Because specific data regarding the types, quantities, and operating schedules of construction equipment that would be used for the proposed Facility are not currently available, the DEIS analysis relies on research conducted by the EPA Office of Noise Abatement and Control and the Empire State Electric Energy Research Company, which have extensively studied noise from individual pieces of construction equipment as well as from construction sites of power plants and other types of facilities similar to the proposed Energy Facility. The use of these data, which are 21 to 26 years old, is conservative because the evolution of construction equipment has been toward quieter designs as the nation becomes more urbanized and the population becomes more aware of the adverse effects of noise.

[16] Topographic attenuation is expected to be significant at R2, which is over a bluff from the Energy Facility site. Because this factor is not accounted for in the analysis of construction noise in this exhibit, predicted construction sound levels at R2 and other receptors where the line of sight is blocked by terrain are likely overstated. Similarly, given the large distance to R1 (over 1 mile), atmospheric attenuation is expected to be significant. As with R2, because this factor is not accounted for in the analysis of construction noise in this exhibit, predicted construction sound levels at R1 and other distant receptors are likely overstated.

Natural Gas Pipeline

Noise levels from construction of the natural gas pipeline are anticipated to be similar to levels presented in Table 3.13-6.

Recommended Mitigation Measures. No mitigation measures are recommended because construction noise is exempt from state of Oregon noise regulations.

3.13.3 Cumulative Impacts

There are no other existing or proposed facilities in the vicinity of the proposed project that would produce typical industrial or urban sounds. The proposed Energy Facility would not lead to cumulative impacts to the health and safety of workers or the community.

3.13.3.1 Hazardous Materials

Some elements of the proposed Energy Facility could potentially increase risk to public health and safety. This includes the transmission of natural gas in an underground pipeline and use and storage of hazardous chemicals. Although safety features would be built into the proposed Energy Facility to reduce hazards to public health and safety, the risk of accidents could not be completely eliminated. However, the proposed Energy Facility is unlikely to contribute to a cumulative increase to risks to public health and safety because uses in the vicinity of the Energy Facility are limited to farming and forest use.

3.13.3.2 Electric and Magnetic Fields

The proposed Energy Facility would not create EMFs over the allowable state limit, so the project would not lead to a cumulative impact.

3.13.3.3 Noise

The proposed Energy Facility would be a new source of noise, but it would comply with Oregon's noise regulations. Land uses around the Energy Facility are devoted to farming and forest use, so it is unlikely that future development would occur that would cumulatively add to noise generation within the vicinity of the Energy Facility.

TABLE 3.13-1
Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Impression
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Pain threshold
	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)	90	Boiler room	
Freight cars (50 feet)	—	Printing press plant	
Pneumatic drill (50 feet)	80	In kitchen with garbage disposal running	
Freeway (100 feet)	70		Moderately loud
Vacuum cleaner (10 feet)	60	Data processing center	
Department store	—		
Light traffic (100 feet)	50	Private business office	
Large transformer (200 feet)	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
	10		Hearing threshold

Source: Peterson and Gross, 1974

TABLE 3.13-2
State of Oregon Noise Regulations

	Maximum Permissible Environmental Noise Levels (dBA)	
Statistical Descriptor	**Daytime (7 a.m. to 10 p.m.)**	**Nighttime (10 p.m. to 7 a.m.)**
L_{50}	55 or Ambient + 10 dBA	50 or Ambient + 10 dBA
L_{10}	60 or Ambient + 10 dBA	55 or Ambient + 10 dBA
L_{1}	75	60

dBA = decibel (A-weighted scale)
Note: Based on Table 8 of OAR 340-035: New Industrial and Commercial Noise Source Standards and OAR 340-035-0035(1)(b)(B)(i).

TABLE 3-13.3
Maximum L_{50} Noise Levels from Electric Transmission Line Operation

Description	Distance from Centerline of Electric Transmission Line (feet)	Estimated Sound Pressure Level (dBA)
Edge of Right-of-Way	125	43
Edge of Corridor	750	34
Closest Residence	3,000	27

Source: CH2M HILL calculations based on equations developed by Bonneville Power Administration.

TABLE 3-13.4
Construction Equipment and Composite Onsite Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level at 50 feet (dBA)	Composite Onsite Noise Level at 50 feet (dBA)
Site clearing and excavation	Dump truck Backhoe	91 85	89
Concrete pouring	Truck Concrete mixer	91 85	78
Steel erection	Derrick crane	88	87
Mechanical	Derrick crane Pneumatic tools	88 86	87
Cleanup	Rock drill Truck	98 91	89

Source: EPA, 1971; Barnes et al., 1976

TABLE 3-13.5
Average Construction Noise Levels at the Nearest Residential Receptor

Construction Phase	Expected Sound Pressure Level at 3,000 Feet (dBA)	Expected Sound Pressure Level at 5,700 Feet (dBA)	Expected Sound Pressure Level at 6,700 Feet (dBA)
Site clearing and excavation	53	48	46
Concrete pouring	42	37	35
Steel erection	51	46	44
Mechanical	51	46	44
Cleanup	53	48	46

Source: EPA, 1971; Barnes et al., 1976

TABLE 3.13-6
Maximum Noise Levels from Common Construction Equipment and Resultant Receptor Noise Levels

Construction Equipment	Typical Sound Pressure Level at 50 feet (dBA)	Expected Sound Pressure Level at 3,000 Feet (dBA)	Expected Sound Pressure Level at 5,700 Feet (dBA)	Expected Sound Pressure Level at 6,700 Feet (dBA)
Bulldozer (250 to 700 horsepower)	88	52	47	45
Front-end loader (6 to 15 cubic yards)	88	52	47	45
Truck (200 to 400 horsepower)	86	50	45	43
Grader (13- to 16-foot blade)	85	49	44	42
Shovel (2 to 5 cubic yards)	84	48	43	41
Portable generators (50 to 200 kilowatts)	84	48	43	41
Derrick crane (11 to 20 tons)	83	47	42	40
Mobile crane (11 to 20 tons)	83	47	42	40
Concrete pumps (30 to 150 cubic yards)	81	45	40	38
Tractor (3/4 to 2 cubic yards)	80	44	39	37
Unquieted paving breaker	80	44	39	37
Quieted paving breaker	73	37	32	30

Source: Barnes, et al., 1977

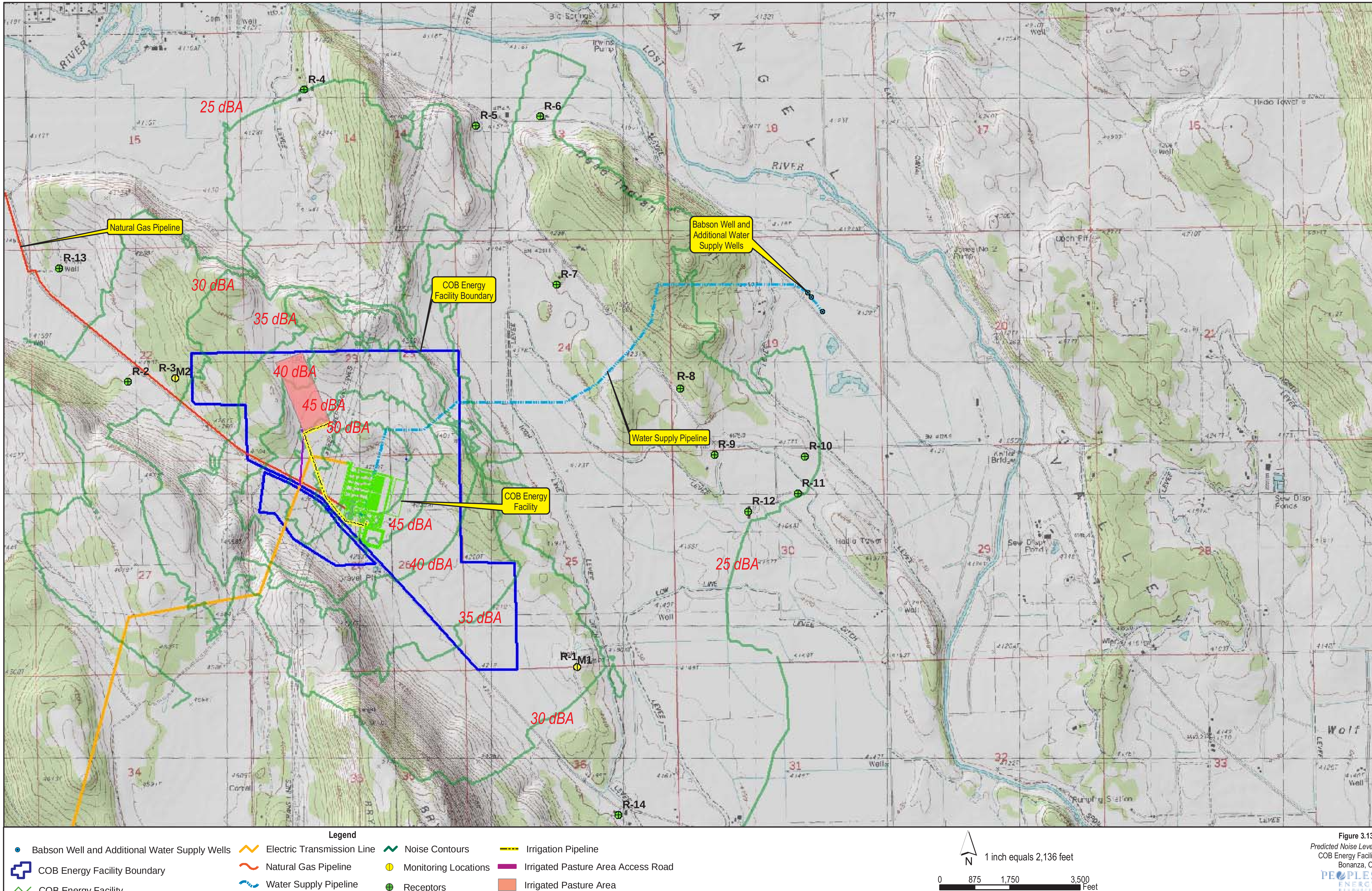

Figure 3.13.1
Predicted Noise Levels
COB Energy Facility
Bonanza, OR

File Path: \\Rosa\Proj\PERC\167426\Gis\EIS\mxds\EIS_October_03\3.13-1_predicted-noise.mxd, Date: October 27, 2003 4:21:07 PM

Figure 3.13-1
noise levels
11 x 17
Back

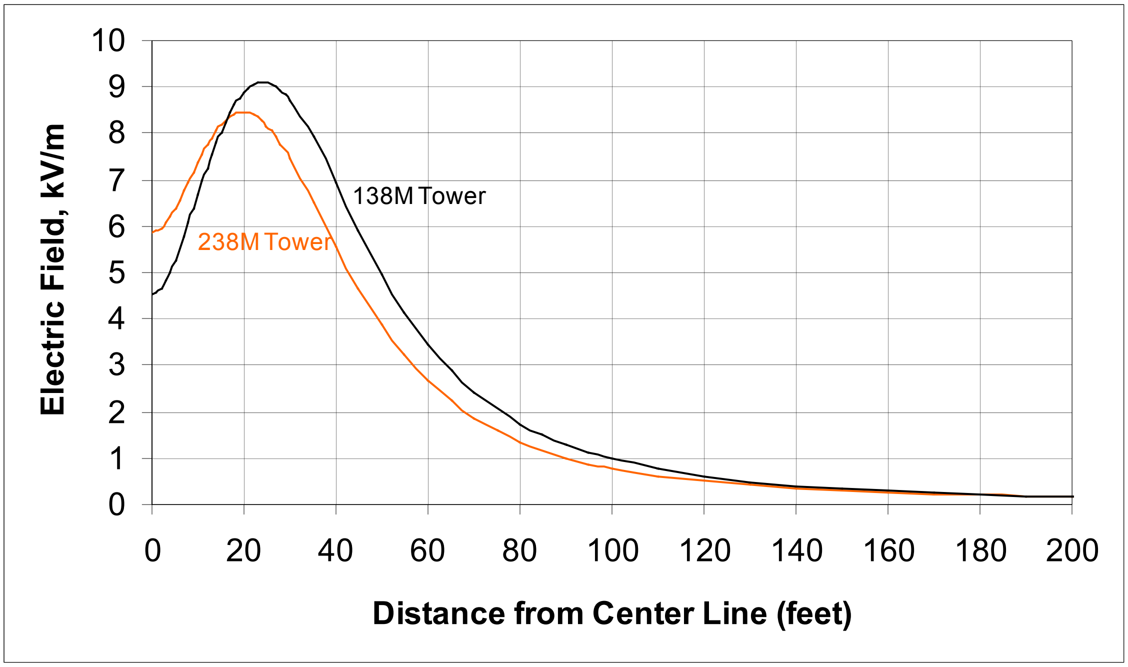

FIGURE 3.13-2

Predicted Electric Field Profiles for two Delta-Configured Lines Under Consideration Based on Maximum Three-Phase Voltage of 550 Kilovolts

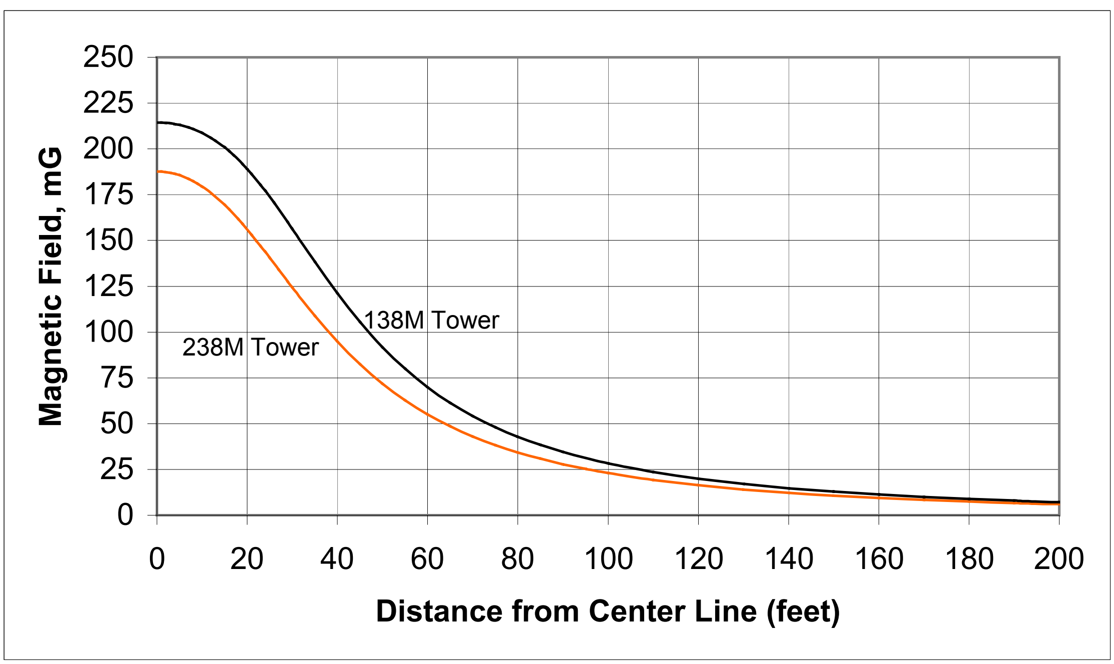

FIGURE 3.13-3

Predicted Magnetic Field Profiles for two Delta-Configured Lines Under Consideration Based on Maximum Current Per Phase of 1,260 Amps

Figure 3.13-4
Noise Monitoring - M1 (Wright Residence)

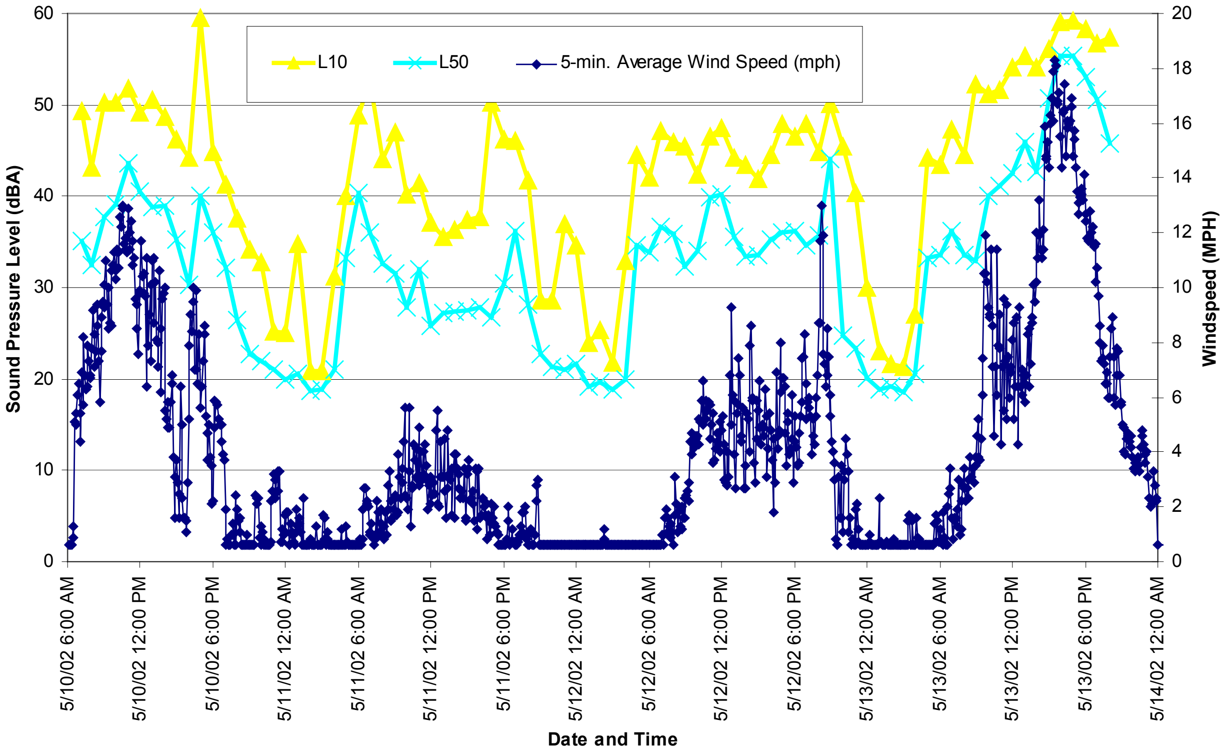

Figure 3.13-5
Noise Monitoring - M2