Summary

In this Summary:

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This summary gives the major points of the Final Environmental Impact Statement (EIS) prepared for the BPA/Lower Valley Transmission Project by Bonneville Power Administration (BPA). BPA is the lead federal agency on this project and supervises the preparation of the EIS. The U.S. Forest Service is a cooperating agency and assists BPA in EIS preparation. The Targhee and Bridger-Teton National Forests are crossed by BPA's existing transmission line and some of the alternatives.

S.1 Purpose and Need For Action

For Your Information

Words in bold are defined in sidebars.

S.1.1 BPA

Lower Valley Power and Light, Inc. (LVPL) buys electricity from BPA and then supplies it to the residences, farms and businesses of the Jackson and Afton, Wyoming areas. Since the late 1980s, LVPL's electrical load has been growing by an average of 4-5 **megawatts** (**MW**) per year, and LVPL expects continued growth at about this rate.

*A **megawatt** is one million watts, or one thousand kilowatts. A megawatt is enough power to light 10,000 100-watt lightbulbs.*

Four to five megawatts per year is equivalent to about 3-4% load growth per year. Normal growth rates for other areas of the Northwest are closer to 1-2% per year.

LVPL serves its customers from two 115-**kilovolt** (**kV**) transmission lines. One line, owned and operated by BPA, runs from Swan Valley Substation east to Teton Substation, near Jackson, Wyoming. The second line, owned by LVPL, runs from Palisades Switchyard at Palisades Dam, southeast along the reservoir to LVPL's Snake River Substation. (See Map 1, **Location Map**.) At Snake River Substation, the line splits; one line follows the Snake River most of the way into Jackson, the other runs south to serve the Afton area.

*A **kilovolt** is one thousand volts.*

The existing system can reliably serve up to 125 MW of electricity to LVPL, even if one of the lines described above goes out of service. The system is built for that emergency. However, load growth in the Jackson, Wyoming area has passed the 125 MW limit recently. In 1996, the peak climbed to 141.2 MW; in 1997 and 1998, the winter peak was close to 130 MW. If one of the transmission lines had gone out of service (had an outage) during the winter peaks, **voltage** would have quickly dropped below acceptable levels in the Jackson area and to a lesser extent in the

***Voltage** is the driving force that causes a current to flow in an electrical circuit.*

For Your Information

*A **brownout** is a partial reduction of electrical voltages that causes lights to dim and motor-driven devices to lose efficiency.*

*A **blackout** is the disconnection of the source of electricity from all electrical loads in a certain geographical area.*

Afton area. Low voltage levels can cause **brownouts**, or under certain conditions, a **blackout**. In a blackout, homes, farms and businesses lose electricity completely.

These conditions can be dangerous to residents, farmers, and businesses, especially in winter. The reliability of BPA's transmission system is critical to LVPL's system. The transmission system that serves the Afton and Jackson, Wyoming areas needs to be reinforced as soon as possible to maintain voltage stability.

BPA will use the following purposes to choose among alternatives:

- Maintain environmental quality;
- Minimize costs while meeting BPA and LVPL's long-term transmission system planning objectives for the area;
- Maintain BPA and LVPL transmission system reliability.

S.1.2 Forest Service

The US Forest Service (Targhee and Bridger-Teton National Forests) manages 84 percent of the land crossed by BPA's existing transmission line.

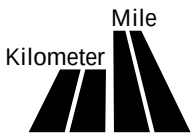
The USFS, represented by the Targhee and Bridger-Teton National Forests, is responsible for management of the national forests crossed by BPA's existing transmission line from Swan Valley Substation near Swan Valley in Bonneville County, Idaho east to Teton Substation, near Jackson in Teton County, Wyoming. (See Map 1, **Location Map**.) The USFS needs to evaluate the project for consistency with its Forest Plans and appropriate legislation such as the National Environmental Policy Act, the Endangered Species Act, etc. The Forest Service could then issue a special use permit for the construction, operation, and maintenance of any new facilities that cross these lands.

S.2 Alternatives

BPA and LVPL have been studying ways to reinforce the transmission system that serves the Jackson and Afton, Wyoming areas. Each alternative has different components and ability to solve the problem.

S.2.1 Agency Proposed Action

BPA uses metric measurements to comply with Public Law 100-418. See metric conversion chart on the inside of the back cover.



In the Agency Proposed Action, BPA and LVPL would construct a new 115-kV line from BPA's Swan Valley Substation near Swan Valley in Bonneville County, Idaho about 58 km (36 miles) east to BPA's Teton Substation near Jackson in Teton County, Wyoming. (See Map 1.) The Agency Proposed Action has the following components and would cost about $14,500,000 (1997 dollars). The cost, including all potential future planning actions, is estimated to be $19,400,000 (1997 dollars) over 30 years.

S.2.1.1 Transmission Line Structures and Conductors

For Your Information

*A **single-circuit** line has one electrical circuit on one structure.*

*A **double-circuit** line has two separate electrical circuits on the same structure.*

A new 115-kV line would be built next to the existing Swan Valley-Teton No. 1, 115-kV transmission line wherever possible. Most of the new line would be supported by a mix of **single-circuit** wood pole H-frame structures or steel single pole structures.

BPA proposes to use 2-4 double-circuit single pole structures across from the Pine Basin Lodge in the Pine Creek area. This is described in Section 2.1.2. At Teton Pass (***structure numbers*** 26/2 to 29/3), BPA proposes to use the existing structure footings and replace the body and tops of the existing structures with new ***double-circuit*** steel lattice structures for structures 28/3, 28/4, 29/1, and 29/2. Structures 27/5 to 28/2, 28/5, and 29/3 will need to be totally rebuilt. Coming off Phillips Ridge into Teton Substation (structure numbers 35/1 to 36/2), BPA would remove the existing single-circuit structures and replace them with double-circuit single steel pole structures. A few single circuit steel and wood poles would be used close to the substation.

__Structure numbers__ refer to a specific structure in a given mile (from west to east) of the existing Swan Valley - Teton No. 1, 115-kV transmission line. For example, a road near structure 6/2 is near the second structure in mile six of the existing line east of Swan Valley Substation.

The wires or lines that carry the electrical current in a transmission line are called conductors. A single-circuit 115-kV line has three conductors; a double-circuit 115-kV line has six conductors. Each conductor would be about 0.24 cm (0.93 in.) in diameter.

S.2.1.2 Additional Right-of-Way (ROW)

Additional ROW would be needed for the new structures and line. The amount of additional ROW width needed would range from 0-30 m (0-90 feet), with the average additional width at about 12 m (40 feet). New ROW is proposed for the north side of the existing ROW except for the following areas:

- Through the Swan Valley area and into the mouth of Pine Creek (Swan Valley Substation to structure 6/1), the new ROW would be east and south of the existing line.
- Through the Pine Creek area to the Idaho State Route 33 crossing (between structures 7/3 and 21/1), the new line would be south of the existing ROW.
- In areas where double-circuit structures would be used, no additional ROW would be needed.

BPA also considered several routing options in the Pine Creek area that required additional ROW. All options considered for the Pine Creek area are described below.

Pine Creek Routing Option A — BPA would place the new transmission line north of the existing line, up the hill about 244 m (800 feet) or more.

Pine Creek Routing Option B — BPA would place the new transmission line next to and north of the existing line.

Pine Creek Routing Option C — BPA would cross State Route 31 at structure 6/1, route the line on the south side of Pine Creek up the hill behind Pine Basin Lodge, and tie into the existing ROW at structure 7/2 on the south side of the existing ROW.

Pine Creek Routing Option D (Preferred) — BPA would remove up to seven existing structures from structures 6/2 to 6/8 and replace them with two to four double-circuit structures on the existing ROW.

Pine Creek Routing Option E — At structure 5/8, BPA would route the line to the east and cross the highway and Pine Creek. The line would remain south of the highway and Pine Creek. Before the line reached Pine Basin Lodge, it would turn and cross the highway and Pine Creek again. The line would then return to the existing ROW at structure 6/8.

S.2.1.3 Clearing Required

For safe and uninterrupted operation of a transmission line, vegetation within a ROW is not allowed to grow above a certain height. Restrictions vary depending on the size of the transmission line, type of vegetation on and off the ROW, and terrain.

BPA would develop a clearing plan that identifies the area on either side of the structures where existing vegetation must be removed. It also specifies the correct vegetation heights along and at varying distances from the line.

The new line would be placed close to or within the existing ROW edge. In most cases, clearing for the new ROW would be to the new ROW edge, which in most cases would be within the old backline. Any leaning or diseased trees beyond the new ROW edge would be cleared. In addition, to account for heavy ice loads on the conductors (wires), the new wires may hang lower than the existing wires and cause trees to be removed in the existing ROW in valleys between structures.

About 25 hectares (62 acres) would be cleared. This is based on clearing an average of 16 m (40 ft) of additional ROW.

An additional 6 hectares (15 acres) would be cleared for roads that are needed off the ROW and for roads in poor condition that BPA would upgrade. Roads are discussed in the next section.

S.2.1.4 Access Roads

BPA normally acquires rights and develops and maintains permanent overground access for travel by wheeled vehicles to each structure. Access roads designed for use by cranes, excavators, supply trucks, boom trucks, and line trucks for construction (including tree removal) and maintenance of the transmission line. Truck size and carrying weight help determine road specifications. BPA prefers road grades of 6 percent or less for highly erodible soils (silts), and 10 percent or less for erosion resistant soils (earth and broken rock). For short distances, maximum acceptable road gradients are 15 percent for trunk or main roads, and 18 percent for spur roads (roads that go to each structure if the structure is not located on a trunk road). Grades in excess of 18 percent would be approved by the Forest Service on lands managed by the Forest Service.

Trunk and Spur Roads — Most of the new line could be built using existing access roads that cover over 80 percent of the line. This existing road system consists of trunk roads, which are the main roads travelled by construction and maintenance vehicles, and spur roads, which are short road segments branching off the trunk roads. Spur roads access existing structures. Trunk roads are located on and off the ROW.

About 4.5 km (2.8 miles) of new, permanent off-ROW and about 2.7 km (1.7 miles) of new, permanent on-ROW trunk roads would be needed for construction and maintenance for the new and existing lines.

Easements for new trunk roads outside the existing ROW would be 15 m (50 feet) wide. New or existing trunk roads would be graded to provide a 4.2 m (14 foot) travel surface, with an additional 1.2-1.8 m (4-6 feet) to accommodate curves. About 3 m (10 feet) on both sides of the road would be disturbed for ditches, etc.

Spur roads would be built from the on-ROW trunk roads to access new structures and would be on existing or new ROW. The amount of new, permanent spur roads is about 7.3 km (4.5 miles), assuming the average length is about 30 m (100 ft.).

Stream Crossings — New and existing access roads would cross both perennial and intermittent streams. For construction, BPA would use or improve existing bridges, build new or replace unusable bridges, and use temporary bridges.

Gates — Access roads that cross private land and land managed by the Forest Service are typically gated and locked by BPA. Thirteen gates presently limit access to the existing ROW. Gates are constructed of heavy pipe and painted yellow on Forest Service land. All parties that have a right to use the road would have access to it. At this time, BPA estimates installing about 13 new gates.

S.2.1.5 Staging Areas

During construction of the transmission line, areas would be needed off the main highways, near the existing ROW, where equipment such as steel, spools of conductor, and other construction materials would be stored until the material is needed for construction.

BPA has identified five areas that could be used as staging areas. All four areas are located off the main highways between Swan Valley and Jackson and are shown on Map 1.

S.2.1.6 Line Termination and Equipment

For Your Information

The Bureau of Reclamation manages the land that the Swan Valley Substation occupies and has granted BPA a right-of-way for the operation of the Swan Valley Substation.

The new line would terminate at Swan Valley and Teton substations. Terminating a line requires special types of equipment. New equipment would be placed on BPA property within the substation yard at Teton Substation. The fenced yard at Swan Valley Substation would be expanded east into an existing parking lot.

The following equipment would be installed at Swan Valley and Teton substations: power circuit breakers, substation dead ends, transmission dead end towers, **ground wire**, a substation fence, substation rock surfacing, disconnect switches, bus tubing, and bus pedestals.

Ground wire *is wire that is strung from the top of one structure to the next; it shields the line against lightning strikes.*

S.2.1.7 Communication Equipment

BPA has an existing communications network in place that delivers signals from control centers to operate substation equipment in remote locations. This network also provides voice communication for substation operators and maintenance personnel. BPA uses a combination of fiber optics, microwave, and radio communication at Swan Valley Substation. For Teton Substation, BPA uses the transmission line as a carrier for communication signals.

BPA is proposing to install fiber optic cable on the new line for communication. Because ground wire would be installed along the entire line, the fiber optic cable could be contained within the ground wire, otherwise, the new cable could be installed on the structures underneath the conductors and would be about 1.6 cm (0.625 in.) thick.

S.2.1.8 Maintenance

BPA would perform routine, periodic maintenance and emergency repairs on structures, substations, and accessory equipment. These activities typically include replacing poles,

crossarms, and insulators. Within substations, BPA may need to replace equipment periodically. If BPA develops new access to structures, this access would remain throughout the life of the line so BPA can perform routine and emergency maintenance on the line. Maintenance activities include grading, clearing and repairing ditches, and other typical road work. A new ROW Management Plan would be developed within a year of project completion that addresses how BPA would maintain the line. More specifics on maintenance activities could be included in that plan. This plan would be developed in cooperation with the Forest Service.

Another large part of maintenance activities is vegetation control. During the transmission line design phase, clearing specialists develop a clearing plan for the project. Specialists consider the kind of line, the height and growth habits of the vegetation, slope, allowable conductor height, and wind and snow patterns, to determine which vegetation must be removed.

After construction, maintenance crews assume responsibility for the line. This includes controlling noxious weeds, and managing for tall growing vegetation in and adjacent to the ROW. The ROW Management Plan would identify methods used to manage vegetation. At that time BPA would work with the Forest Service to identify the manual, mechanical, biological, and chemical methods needed to manage vegetation. Those methods chosen would be evaluated under the Vegetation Management EIS presently being updated by BPA in cooperation with the Forest Service. If required, additional site-specific NEPA environmental work (categorical exclusion or environmental assessment) would be completed at that time and would tier off of the Vegetation Management EIS.

S.2.2 Single-Circuit Line Alternative

The Single-Circuit Line Alternative has all the components of the Agency Proposed Action except the entire line would be supported by the single-circuit wood pole H-frame structures. There would be no double-circuit structures. The entire line would be located on the north side of the existing ROW and would require about 23 m (75 feet) of additional ROW width. About 73 hectares (181 acres) of forestland would be cleared. This alternative does not include the Pine Creek Routing Options.

This alternative would cost about the same as the Agency Proposed Action ($14,200,000 [1997 dollars]). The cost including all potential future planning actions is estimated to be about $19,100,000 (1997 dollars) over 30 years.

For Your Information

Tap *- The point at which a transmission line is connected to a substation or other electrical device to provide service to a local load.*

S.2.3 Short Line Alternative

The Short Line Alternative has all the components of the Single-Circuit Line Alternative from Targhee **Tap** to Teton Substation. BPA and LVPL would construct the new line from Targhee Tap near Victor in Teton County, Idaho 29 km (18 miles) east to Teton Substation (see Map 1). Like the Single-Circuit Line Alternative, all new structures would be single-circuit and the new ROW would be located on the north side of the existing ROW.

BPA would also construct a new switching station on or close to the existing ROW near Targhee Tap. Targhee Tap would then be removed. Two potential station sites are shown on Map 1.

Preferred Site on the ROW — This site would be located between structures 18/3 and 18/4 just west of Targhee Tap in timberland. The new switching station would require about 0.4 hectare (1 acre), which includes the existing ROW, and would be similar to Teton Substation, but with one additional ***bay***.

*A **bay** is an area set aside in a substation for special equipment.*

Site off the ROW — This site would be located between structures 18/3 and 18/4, north of Targhee Tap in agricultural land. The new switching station would also cover about 0.4 hectares (1 acre) but BPA would acquire about 1-2 hectares (3-5 acres) of land for the agricultural site. A parking area, substation entrance road, electrical service, and a small control house would also be needed. These are described below.

This alternative would cost about $11,100,000 (1997 dollars). The cost including all potential future planning actions is estimated to be about $19,300,000 (1997 dollars) over 30 years.

S.2.4 Static Var Compensation Alternative

*A **var** is a unit of measurement of reactive power in a circuit.*

BPA would install a Static **Var** Compensator (***SVC***) at Teton or Jackson substations. (See Map 1.) An SVC is a group of electrical equipment placed at a substation to help control voltage on a transmission system. Equipment includes a transformer, capacitors, reactors, **thyristor** valves, a cooling system, and computer controls. Some components are housed together in a small building at the substation and others remain outside in the substation yard.

***Thyristors** are semiconductor switches.*

Teton Substation is the preferred location for the SVC because it is BPA-owned, easier to access and maintain, has existing communication facilities, and can house the SVC without BPA buying additional property. Jackson Substation is owned by LVPL and would need to be expanded about 0.2 hectare (0.5 acre) to house the new facility.

This alternative would cost about $6,200,000 (1997 dollars). The cost including all future planning actions is estimated to be about $20,100,000 (1997 dollars) over 30 years.

A portion of the west fence line at Teton Substation would be moved on existing BPA property for the new equipment, which would require about 46 m x 46 m (150 feet x 150 feet) of added space. If chosen, Jackson Substation would require the same equipment.

S.2.5 No Action Alternative

The No Action Alternative assumes that no new transmission line is built, and no other equipment is added to the transmission system. The existing transmission line and substations would be operated and maintained as they are now.

S.2.6 Alternatives Considered and Eliminated from Detailed Consideration

BPA and LVPL studies a variety of alternatives to meet the need including conservation, other transmission plans including routing a line outside the Palisades Wilderness Area and using double-circuit structures in some locations, burying the transmission line, local generation, and other substation locations. After study, the alternatives were eliminated from further consideration because they either could not meet the need for the project or they were considered unreasonable.

S.3 Affected Environment

The project area is in the uppermost reaches of the Columbia River Basin, within the Snake River watershed. It is part of the Greater Yellowstone Ecosystem, centered around Yellowstone and Grand Teton National Parks and includes the national forests, wilderness areas, wildlife refuges, and other federal, state, tribal, and private lands that surround these parks.

The landscape is scenic. Dominant features include mountain ranges over 3,660 m (12,000 feet) high, alpine valleys, rivers, broad flat plateaus, picturesque farmlands, and the special features of the national parks. The region is known for its variety of wildlife, unequaled elsewhere in the continental United States. Species present in large numbers include bighorn sheep, pronghorn antelope, moose, mule deer, elk, and black bear. Wolverines, grizzly bears, and reintroduced wolves are present as well.

Visitors and local residents enjoy sightseeing, hiking, backcountry skiing, snowmobiling, camping, backpacking, horseback riding, mountain biking, snowboarding, parasailing, hunting and fishing.

S.3.1 Land Use

About 84 percent (52 km [30 miles]) of the existing ROW is on the Targhee and Bridger-Teton National Forests. The existing ROW crosses about 6.4 km (4 miles) of productive cropland on the west end of the ROW in Bonneville County, Idaho, and about 1.6 km (1 mile) of dryland and irrigated pasture at the east end of the ROW in Teton County, Wyoming. Three existing substations are in rural (timberland), residential and mixed use (residential and commercial) areas.

S.3.2 Visual Resources

The area's visual character and quality are recognized as an important resource at national, state, and local levels, and tourists from around the world come to see nearby natural features.

The existing ROW begins at Swan Valley Substation and runs for about 6.4 km (4 miles) through rural, rolling open agricultural lands with scattered ranches.

The ROW then follows the general contours of the land in most cases instead of cutting a straight swath through rolling and mountainous terrain. No long stretches of line follow the top of a ridgeline where the line would be dominant. In general, the existing ROW is well sited on the landscape about one-third of the way up forested slopes, with a buffer of vegetation between the ROW and roadways.

Near Teton Substation, the ROW descends into the scenic Wilson Valley, an area of rural-residential and scattered, resort-like developments.

S.3.3 Recreation Resources

In most cases the existing ROW follows roads that are a common route for tourists traveling through the region and visiting national parks and monuments.

Tourists and sightseers commonly travel along State Routes 31 and 33, portions of which are designated Idaho Scenic Byways. The existing transmission line is currently visible from these roads in many locations. The ROW is noticeable in the middleground and background of most views but is not at any time a dominant feature.

Sightseers travel to the top of Teton Pass and spend time at pullouts next to the road viewing vistas across the mountains and down into Jackson Valley. The existing ROW is noticeable in the middleground and background of the view but is not the dominant feature.

Motorists, hunters, anglers, parasailers, snowmobilers, and mountain bikers use USFS roads that access or are within the existing ROW.

Nine trailheads are close to the existing ROW. In all areas except Teton Pass, hikers, backpackers, horseback riders, mountain bikers, and backcountry skiers cross under the existing line briefly as the trail leads away in a perpendicular direction from the line. In some cases hikers and backpackers use the existing ROW access roads for hiking.

Teton Pass is a high recreation use area. Hikers and backpackers have access to a number of backcountry trails.

Five developed campgrounds were inventoried within sight of the existing ROW. Campers use tents, pop-up trailers, and RVs at these campgrounds.

Backcountry skiers, and snowboarders also use natural bowls on both sides of Teton Pass. On the eastern side of the pass, skiers ski down the face of the mountain, under the transmission line, then follow the abandoned State Route 22 roadbed to the bottom of the hill.

S.3.4 Wilderness, Wilderness Study Areas, Recommended Wilderness, and Roadless Areas

The Targhee and the Bridger-Teton National Forests contain areas with highly intact wild natural systems. These areas attract a high level of scientific, conservation, education and recreation interest because they provide natural features and native plants and animals that people value. Many areas have been or are being considered for preservation as wilderness or roadless areas and are managed by the Forest Service to ensure that special characteristics are not lost or overused. Some special areas are crossed by the existing transmission line and ROW, or are close to the ROW.

S.3.4.1 Designated Wilderness

Both designated wilderness areas on the Targhee National Forest are north of the existing ROW. Winegar Hole Wilderness is about 59 km (37 miles) north of the ROW. Jedediah Smith Wilderness is adjacent to the existing ROW in the Teton Pass area. The existing transmission line does not cross into the wilderness.

Three designated wilderness areas on the Bridger-Teton National Forest are far from the existing transmission line. The Bridger Wilderness Area is about 68 km (42 miles) north of the ROW; the Teton Wilderness Area is about 39 km (24 miles) north of the ROW; and the Gros Ventre Wilderness Area is about 21 km (13 miles) east of the ROW.

S.3.4.2 Designated Wilderness Study Area

The Wyoming portion of the Palisades Roadless Area was designated by Congress as a Wilderness Study Area in 1984. The study area contains about 129,000 acres. About 80,000 acres are administered by the Bridger-Teton National Forest, and about 49,000 acres are administered by the Targhee National Forest.

BPA's existing transmission line was built before the passage of the Wyoming Wilderness Act of 1984. When the line was built, BPA and the Forest Service jointly decided on the existing route to meet long-range plans for forest and recreational development and aesthetics, and to avoid difficult terrain such as avalanche areas (Williams, August 30, 1966).

About 0.8 km (0.5 mile) of the line and ROW crosses into the WSA administered by the Bridger-Teton National Forest. There are existing trunk and spur roads to access the structures (29/1 and 29/ 2) in this area.

S.3.4.3 Recommended Wilderness

The existing transmission line does not cross any areas that the Forest Service has classified as recommended wilderness.

S.3.4.4 Roadless Areas

The existing transmission line is just south of the Garns Mountain Roadless Area and the West Slope Tetons Roadless Area of the Targhee National Forest. The existing line crosses the Palisades Roadless Area of the Targhee National Forest in the Pine Creek area. The short stretches of ROW (from structures 12/1-12/7 and from structures 13/5-15/2) where the existing line crosses the Targhee's Palisades Roadless Area have existing roads to structure sites. In other stretches (from structures 18/5-19/4 and from structures 21/5-22/1) the transmission line is just within the boundary of the Palisades Roadless Area. These areas are in Management Prescription 8.1 (Concentrated Development Area) and have existing roads to structure sites.

The Phillips Ridge Roadless Area of the Bridger-Teton National Forest is bounded on the east by BPA's ROW. The existing transmission line and roads are adjacent to, but do not cross into the roadless area.

S.3.5 Public Health and Safety

Transmission facilities provide electricity for heating, lighting and other services essential for public health and safety. These same facilities can potentially harm humans. Contact with transmission lines can injure people and damage aircraft.

Transmission lines, like all electrical devices and equipment, produce electric fields and magnetic fields (EMF). The strength of magnetic fields depends on the design of the line and on distance from the line. Field strength decreases rapidly with distance.

For Your Information

***Corona** is a discharge, often glowing, at the surface of a conductor or between two conductors of the same transmission line.*

Audible noise can be produced by transmission line **corona**. It is usually associated with higher voltages.

Teton Substation is surrounded by a residential neighborhood and agricultural land. As a result, the site is relatively quiet, as quiet as a normally quiet office.

Jackson Substation is located on a busy road and surrounded by mixed use residential and commercial businesses.

The Targhee National Forest has had significant timber harvest activities and both national forests have maintained aggressive wildfire suppression activities within non-wilderness lands. Because of this, most forested stands are mature and vulnerable to large fires, disease problems, and insect infestations.

S.3.6 Water Quality, Soils and Geology

The surface water in the area is of sufficient quality to support a number of uses including fish and wildlife habitat, agriculture, and recreation. Groundwater quality is generally good to excellent throughout the area. Groundwater is a source for irrigation water in the region.

Diverse landforms and geologic features exist within the project area. From Swan Valley Substation, at an elevation of 1700 m (5600 feet), the existing ROW crosses a broad level slope extending from the base of the Snake River Range. Known as the Pine Creek Bench, the deep soils are used extensively for dryland farming.

The Snake River Range is characterized by long parallel ridges trending to the southeast that are cut or separated by valleys and canyons. These mountains are made of folded sedimentary rock that has been pushed eastward upon low angle fault planes. Erosion has worn away the less resistant rock layers, leaving the harder rocks standing as ridges. Soils have formed in materials derived from these sedimentary rocks, including limestone, dolomite, sandstone and shale.

The Tetons, one of the youngest ranges in the Rocky Mountains, abuts the Snake River Range near Teton Pass. Sedimentary rocks are exposed on the western slopes, forming cliffs of stratified rocks.

Much of the landscape in the Jackson Hole area reflects the impact of past glaciation. Geologic hazards include landslides, avalanches, seismic risk, steep slopes and erosion.

S.3.7 Floodplains and Wetlands

The existing ROW crosses areas that have been identified as 100-year floodplains on Flood Insurance Rate Maps. The 100-year floodplains crossed by the existing ROW and/or existing access roads are:

- Pine Creek: T2N, R43E, Sec. 14; T2N, R44E, Sec. 6; T3N, R44E, Sec. 31; T3N, R44E, Sec. 29; T3N, R44E, Sec. 28
- Trail Creek, Idaho: T3N, R46E, Sec. 30
- Fish Creek: T41N, R117W, Sec. 2
- Lake Creek: T41N, R117W, Sec. 2.

Two major drainages support riparian wetlands: Pine Creek, which drains into the Snake River; and Trail Creek, which drains into the Teton River. These wetlands are characterized by *Salix* (willow) species and have an understory dominated by sedges and grasses. Wet mountainside meadows characterized by *Carex* (sedge) species are also found in the project area.

There are also wetlands associated with Fish Creek and Lake Creek by Teton Substation.

S.3.8 Vegetation

The vegetation in the region is a diverse mix because of topography, climate, aspect, and soils. Most of the existing ROW is mountainous with steep slopes. Disturbances such as fire, disease, grazing, and clearing (for roads, timber harvest, campgrounds, etc.), as well as natural disturbances such as avalanches and landslides, have helped determine vegetation cover types.

Forests of mixed conifer cover types are dominated by Douglas fir and lodgepole pine, with Engelmann spruce, subalpine fir, and whitebark pine mixed in at upper elevations. Cottonwoods and quaking aspens are the most common deciduous species. Open areas with juniper and rock outcrops are also in the area.

Shrubland includes both upland and riparian scrub/shrub cover types.

Grasses, forbs, and short shrubs make up much of the existing ROW because of maintenance practices to keep the ROW free of trees and tall shrubs.

S.3.9 Wildlife

Open cropland near Swan Valley Substation supports many birds, most notably a number of hawks (Northern harriers and red-tails) and owls.

The Pine Creek area could be used by nesting raptors and other wildlife associated with riparian zones such as breeding songbirds, amphibians, and reptiles. The lower Pine Creek basin is used as transitory range during spring and fall for deer and elk. The Pine Creek benches of Swan Valley and the Rainey Creek feeding ground are wintering areas for deer and elk. Sandhill cranes may travel into Pine Creek drainage during mid-to-late summer with their young. Both bald eagles and peregrine falcons occasionally use Pine Creek drainage, and the area could be used as a flyway by trumpeter swans and other waterfowl between Swan Valley and the Teton Basin. There are no trumpeter swan nests near the existing ROW.

Occasional rock outcrops near the ROW could contain habitat for hawks and other birds to nest and perch, roosting habitat for bats, and habitat for other birds, mammals, and reptiles.

Fire suppression has created a large proportion of dense stands of mature lodgepole pine and Douglas fir. This habitat is used by many species including cavity-nesting birds, such as woodpeckers and nuthatches. Northern goshawk, a USFS sensitive species, could forage and nest in these surrounding forests.

The ROW crosses northwest to southeast-oriented ridges and hilltops with open juniper and aspen shrubland on their southwest slopes and along ridgetops. A few small areas on south facing slopes provide winter habitat for deer and elk. These open areas also provide good deer and elk summer habitat, and habitat for birds favoring open habitats, including ravens, great horned owls, and red-tailed hawks.

Teton Basin is important waterfowl habitat, including wintering habitat for trumpeter swans and breeding and migratory habitat for sandhill cranes. The habitat near the ROW is at a transition point between forest and agricultural habitat types and may be used by many species.

Alpine habitats near Teton Pass are known habitat for boreal owl, pika, and wolverine (a rare species reported at Teton Pass). The eastern portion of the pass is a USFS-designated wildlife viewing area.

Going east from Teton Pass the habitat is potentially suitable for boreal and great gray owls, and other mountain birds, including Clark's nutcracker, rosy finch, white-crowned sparrow, and broad-winged hummingbird.

The area near Fish Creek and associated tributaries are suitable for willow flycatchers, sparrows, warblers, American white pelican, Barrow's and common goldeneye, common merganser, and bufflehead. Waterfowl including Canada goose, trumpeter swan, green-winged teal, and American widgeon and bald eagle and osprey use the agricultural fields and the associated wetlands and riparian habitats. Moose also winter here but in general, are more widely dispersed along the ROW during winter.

Forested groves next to Teton Substation are habitat for many birds and mammals. Swainson's and red-tailed hawks nest in this habitat in the valley.

Forested portions of this section of the ROW are suitable for northern goshawks (Oechsner, 1997).

Bald eagles are federally listed as threatened in Idaho and Wyoming and state-listed as endangered in Idaho. Bald eagles are more likely to occur in the vicinity of the existing ROW during October through March because resident breeding pairs are more likely to wander during winter, and migrating or wintering eagles move into the Swan Valley area. The eagles are mostly found along the Snake River, and occasionally venture into its tributaries, including Pine and Rainey creeks.

Peregrine falcons are listed as endangered in Idaho and Wyoming on federal and state lists. No peregrine falcon nests occur within or next to the existing ROW. The closest peregrine nest site is in Swan Valley, Idaho, on the south side of the Snake River, about 3 km (2 miles) south of the Swan Valley Substation.

The most likely places for peregrine falcons to occur are in the Swan Valley and Jackson areas especially near the Snake River, where waterfowl and other potential prey are concentrated.

S.3.10 Fisheries

The only indigenous trout in the streams and rivers of the project area is the fine-spotted form of the Yellowstone cutthroat trout, which is a USFS sensitive species. Other trout, including rainbow, German brown, and brook trout, have been introduced to

many of the drainages in the region. Other fish species in the region include mountain whitefish, bluehead suckers, Utah sucker, redside shiners, longnose dace, and mottled and Paiute sculpin.

S.3.11 Cultural Resources

There has been prehistoric and historic activity in the project area. A cultural survey of the ROW and access road system was completed during 1997 to determine if any cultural resources, including traditional cultural property, are present and would be impacted. No prehistoric sites were found during the survey in 1997.

Two historic sites were found during the survey. One site is an historic wagon road that also served as a stock trail between Jackson Hole, Wyoming and Teton Basin, Idaho. The second site is a ditch just south of Pine Creek, northeast of the Pine Creek Bench in Swan Valley. Both sites are eligible for the National Register of Historic Places.

S.3.12 Socioeconomics

The socioeconomics of the project area are influenced heavily by its geography and geology, particularly the spectacular beauty of the world renowned public lands, and the industries that exist because of it. Agriculture, mining, ranching, lumber and wood products, recreation, and tourism all are important industries in the region that result from the physical characteristics of eastern Bonneville County, Idaho and western Teton County, Wyoming.

S.3.13 Air Quality

The Swan Valley airshed has no significant air quality problems. The Teton Valley airshed has little trouble with air pollution problems because frequent southwest airflow prevents pollution buildup.

For Your Information

Particulate matter *is airborne particles including dust, smoke, fumes, mist, spray, and aerosols.*

During January through April, the Jackson airshed can become inverted and suspended **particulate matter** can negatively affect local air quality. The Department of Environmental Quality has concluded that the particulate matter problem in downtown Jackson is primarily due to road dust.

There are several protected airsheds in the vicinity of the project area. These airsheds include national parks and wilderness areas.

S.4 Impacts

This section compares all the alternatives using the project purposes and the predicted environmental impacts.

S.4.1 Environmental Impacts

S.4.1.1 Land Use

The Agency Proposed Action proposes double-circuit structures in some sensitive locations, which decreases the need for land disturbance and new ROW. Single-circuit steel poles proposed in some locations also require less land taken from production. Agricultural land and timberland would be taken out of production. Low to moderate impacts would occur. Rangeland, and residential and commercial land would not be impacted.

The Single-Circuit Line Alternative would take slightly more land out of production than the Agency Proposed Action because only single-circuit structures would be used.

The Short Line Alternative would impact less land than the Agency Proposed Action and the Single-Circuit Line Alternative. A new switching station would be built. If the new switching station is built on agricultural land, it would permanently remove some land from production. If the new switching station is built at the preferred location under the existing ROW just west of Targhee Tap, no land would be taken out of agricultural production but additional clearing of timberland would be needed.

The SVC Alternative concentrates impacts in the residential and commercial areas that surround the substations under consideration.

The No Action Alternative would have no immediate impacts to land use beyond what is occurring from operation and maintenance of the existing transmission line.

S.4.1.2 Visual Resources

The Agency Proposed Action responds to public concerns about and emphasizes decreasing impacts to visual resources. It proposes using double-circuit structures in sensitive areas to decrease visual impacts. The addition of double-circuit structures near Pine Basin Lodge, through Teton Pass, and just below Phillips Ridge to Teton Substation makes the Agency Proposed Action more responsive to these concerns than other alternatives. Impacts to

visual resources would generally be low or moderate, but high impacts would occur to visual resources at Teton Pass and from Fish Creek Road to Teton Substation.

The Single-Circuit Line Alternative uses single-circuit structures in the areas identified as sensitive and emphasizes reliability over concern for visual resources.

The Short Line Alternative includes a new switching station that would be located to minimize visual impacts.

The SVC Alternative would create high impacts to residents surrounding Teton Substation. Visual impacts would be low around Jackson Substation because the substation is in a mixed use (residential and commercial) area.

The No Action Alternative has no visual impacts.

S.4.1.3 Recreation Resources

The Agency Proposed Action makes the same trade-offs in recreation areas as for visual resources. Double-circuit structures have fewer impacts to recreation. Impacts would be low to moderate. Construction could interfere with recreation temporarily, and some roads open to the public could be gated and closed after construction.

The Single-Circuit Line Alternative uses single-circuit structures in the areas identified as sensitive and emphasizes reliability over concern for recreation resources.

The Short Line Alternative includes a new switching station, but no impacts are expected at the switching station.

No impacts are expected to recreation from the SVC Alternative.

The No Action Alternative has no recreation impacts beyond what is occurring now from operation and maintenance of the existing line.

S.4.1.4 Wilderness, Wilderness Study Areas, Recommended Wilderness and Roadless Areas

The existing utility corridor and associated access roads had lost all wilderness character when wilderness, wilderness study areas, recommended wilderness and roadless areas were designated. The Agency Proposed Action would rebuild the existing line to double-circuit on existing ROW in the Palisades Wilderness Study Area and would not change its potential for future designation as wilderness. The Agency Proposed Action would not affect the future designation of the Palisades Roadless Area as wilderness. The Single-Circuit Line Alternative and the Short Line Alternative would

require more ROW and clearing for the single-circuit line and roads. Expanding the ROW could compromise the character of the Palisades WSA and affect its future designation as wilderness. The SVC Alternative and the No Action Alternative would not affect these areas.

S.4.1.5 Public Health and Safety

The Agency Proposed Action uses some double-circuit structures, which could decrease the transmission line magnetic field levels near Teton Substation relative to the No Action Alternative. Substation magnetic field levels are not expected to increase to residences near Teton Substation.

For the Single-Circuit Line Alternative, transmission line magnetic fields would decrease on the south side and increase on the north side of the ROW relative to the No Action Alternative.

Both the Single-Circuit Line and Short Line Alternative (structures would look the same as what is there now) would result in somewhat lower field levels on the south side of the ROW compared to the No Action Alternative. Since the new line would be located north of the existing line, field levels would be higher than the No Action Alternative on the north side of the ROW.

Since no new transmission line is included in the SVC Alternative, no change to the magnetic field level is expected when compared to the No Action Alternative.

None of the transmission line alternatives are expected to increase the magnetic field environment at the residences near Teton Substation.

If the SVC Alternative is selected, the specialized SVC equipment would result in an additional, and somewhat unique, magnetic field source within Teton or Jackson substations. Increases to nearby residences are possible, and the amount of any potential increase at either site would depend on the design, location and operating modes of the SVC equipment. Like the transmission line alternatives, the SVC is proposed to be located on the far side of the substation away from residences. Magnetic field increases to nearby residences are possible and the amount of any increase would depend on the design, location and operating modes of the SVC equipment. Noise would increase depending on background noise and equipment operation, but would stay within local standards.

S.4.1.6 Water Quality, Soils and Geology

The Agency Proposed Action uses some double-circuit structures in sensitive areas. Building these structures would disturb less soil and cause fewer impacts to water quality and soils. Some original footings may also be used which would disturb less soil. Impacts to water quality and soils range from no impact to high impacts and the degree is dependent on the type of soil affected and the success of erosion control measures.

Slightly more land would be disturbed where single-circuit structures are used instead of double-circuit structures for the Single-Circuit Line Alternative and the Short Line Alternative.

The SVC Alternative would disturb the area of the substation only.

No impacts are expected from the No Action Alternative except those already occurring from operation and maintenance of the existing line.

S.4.1.7 Floodplains and Wetlands

The transmission line alternatives would have similar impacts to floodplains and wetlands. Wetlands would experience no to high impacts from construction but these could be minimized with prudent placement of erosion control measures. The SVC Alternative would have no impacts to floodplains and wetlands. No impacts are expected to floodplains and wetlands from the No Action Alternative except those already occurring from operation and maintenance of the existing line.

S.4.1.8 Vegetation

The Agency Proposed Action would disturb about half of the vegetation compared with the Single-Circuit Line. Impacts to vegetation would be low to high depending on the amounts cleared and the ability of an area to revegetate. Using double-circuit structures would decrease the area and vegetation disturbed. The Short Line Alternative is half the length of these alternatives and would disturb less vegetation.

The SVC Alternative would only disturb any existing vegetation at existing substation sites.

The No Action Alternative would create no impacts to vegetation except those already occurring from operation and maintenance of the existing line.

S.4.1.9 Wildlife

Impacts to wildlife from the Agency Proposed Action range from none to moderate. Less vegetation would be disturbed because this alternative would use double-circuit structures in some locations. The potential to impact threatened and endangered species is also less because in some locations the existing structure bases and footings would be used. Less shrub area would be converted, which could impact some species negatively. Bird collisions could be increased if ***mitigation*** measures are not used.

For Your Information

Mitigation *lessens the impacts predicted for each resource. Mitigation may include reducing or minimizing the impacts, avoiding it completely, or rectifying or compensating for the impact.*

The Single-Circuit Line Alternative would disturb more vegetation and wildlife using the vegetation.

The Short Line Alternative would have fewer impacts to wildlife because it is half as long.

The SVC and No Action Alternatives would create no impacts to wildlife except those already occurring from operation and maintenance of the existing line.

S.4.1.10 Fisheries

The Agency Proposed Action would follow best management practices, would disturb less soil and vegetation because it would use double-circuit structures in some locations, and would have fewer impacts to water quality and to local fisheries. Impacts to fish range from low to moderate and depend on impacts to stream turbidity.

The Single-Circuit Line Alternative would disturb more soil because single-circuit structures would be used for the entire line.

The Short Line Alternative would have similar impacts as the Single-Circuit Line Alternative east of Targhee Tap.

The SVC and No Action Alternatives would have no impacts to fisheries except those already occurring from operation and maintenance of the existing line.

S.4.1.11 Cultural Resources

Two historic resources were found that are eligible to the National Register of Historic Places. BPA has made a determination of no adverse effect as portions of these sites could be affected by construction but the effect would not be harmful. BPA has coordinated this determination with the State Historic Preservation Office and the Advisory Council on Historic Preservation. Mitigation in the form of recordation is proposed. Tribes were consulted and no traditional cultural property was identified in or near the ROW. These sites are located in areas

affected by the Agency Proposed Action, Single-Circuit Line Alternative and Short-Line Alternative. The resources would not be affected by the SVC and No Action Alternatives.

S.4.1.12 Socioeconomics

Construction would create a positive impact on employment for the local economy for all the action alternatives. No impacts are expected for the No Action Alternative.

S.4.1.13 Air Quality

Impacts from vehicle emissions and construction dust are expected to be low for all action alternatives. No impacts are expected for the No Action Alternative except those already occurring from operation and maintenance of the existing line.

S.4.2 Reliability

The Agency Proposed Action is less reliable than the Single-Circuit Line Alternative because double-circuit structures would be used and separate lines on separate structures are safer in avalanche and slump prone areas. Steep terrain and extreme weather conditions in the project area combine to increase avalanche hazard and the certainty that both lines would go out of service if a double-circuit structure goes down. However, this alternative meets BPA's standards of providing power to LVPL with a high probability that power would be available when LVPL needs it.

The Single-Circuit Line Alternative is the most reliable of all the alternatives. It meets BPA's standards of providing power to LVPL with a higher probability that the power would be available when LVPL needs it. Separate lines on separate structures are safer in avalanche and slump prone areas.

The Short Line Alternative is not as reliable as the Agency Proposed Action or the Single-Circuit Line Alternative. Some reliability is compromised if the existing Swan Valley to Teton line goes down because power would need to flow north to Drummond and back down to Jackson. It is more reliable than the SVC Alternative.

The SVC Alternative would be a short-term solution to the problem. This alternative may not be as reliable as the transmission line alternatives. Because the SVC Alternative consists of electrical equipment, there are more switching mechanisms and moving parts. This may require more emergency

maintenance compared to a line that has more routine, scheduled maintenance. As a result, the line is more likely to be available when it is needed.

The No Action Alternative is the least reliable alternative and would lead to voltage collapse if a critical line is lost on the system. Collapse of the system could continue over a long period (hours or even days) if outages occur in winter when deep snows make access to the existing transmission system difficult.

For Your Information

Line loss *is the power lost during the transfer of power from one place to another. More power moved over a smaller number of lines increases line loss.*

S.4.3 Costs

The Agency Proposed Action has fewer transmission ***line losses*** than most alternatives. This helps make the line more economical to build over the long term. There is an estimated $300,000 difference in both up-front and long-term costs between the Agency Proposed Action and the Single-Circuit Alternative. Higher material and labor costs associated with double-circuit structures would make the up-front costs higher. The margin of error present in the calculations to do the 30-year costs essentially makes the long-term costs about the same. Also, over a 30-year period this alternative would cost about the same to build as the Short Line and would be slightly cheaper to build than the SVC Alternative.

The Single-Circuit Line Alternative also has fewer transmission line losses than most alternatives. This helps make the line more economical to build over the long term. Like the Agency Proposed Action, this alternative would be initially more expensive to build but over a 30-year period, it would cost about the same to build as the Short Line and would be slightly cheaper to build than the SVC Alternative.

The Short Line Alternative is a short-term fix to the problem. Though up-front construction costs are less than the Agency Proposed Action or the Single-Circuit Line Alternative, over the 30-year planning period it costs about the same to build the Short Line Alternative because by 2020, the line would need to be extended from Targhee Tap to Swan Valley Substation. Over 30 years, costs are less than the SVC Alternative.

The SVC Alternative has more line losses than the other alternatives. It has significantly lower up-front costs than other alternatives but over the 30-year planning period it becomes the most expensive alternative because of the need to build a transmission line from Swan Valley to Teton Substation in 2007.

Depending on the frequency, duration, and extent of blackout conditions in the area, the No Action Alternative could be the most costly in the long run.