between lines and a tower, or between lines and the ground. Such occurrences can pose a threat to the safety of personnel in the vicinity, such as firefighters, and can result in line outages.

To prevent fires and other hazards, safe clearances are maintained between the tops of trees and the existing lines in the corridors. Electricity can arc from the conductor to a tree top. Generally, trees are not allowed to grow over 20 feet high on the ROW. Trees that need to be cleared from the ROW or that could cause such an arc are removed. BPA also prohibits storage of flammable materials on its ROWs.

➲ For Your Information

Corona *— Corona occurs in regions of high electric field strength on conductors, insulators, and hardware when sufficient energy is imparted to charged particles to cause ionization (molecular breakdown) of the air.*

S.3.12.5 Radio/TV Interference

Corona on transmission-line conductors can generate electromagnetic noise in the frequency bands used for radio and television signals. The noise can cause radio and television interference (***RI*** and ***TVI***). However, correct design of a line can mitigate corona generation and keep radio and television interference at acceptable levels.

S.3.13 Air Quality

King County, inclusive of the project area, is designated as a marginal ozone maintenance area, a moderate carbon monoxide maintenance area, and a moderate particulate matter maintenance area. A maintenance area designation means that King County is not currently but was previously listed as a non-attainment area for these three pollutants but had not exceeded the National Ambient Air Quality Standard (**NAAQS**) for the three years prior to its designation as a maintenance area. Alternatives B and D cross over the Cascade Mountains and would be located in Kittitas County as well as King County. Kittitas County is an attainment area; the NAAQS are met for all criteria pollutants in Kittitas County.

S.4 Impacts

To analyze potential impacts from construction, operation and maintenance of the alternatives, resource specialists analyzed actions using a scale with four impact levels: **high, moderate, low** and **no** impact. The impact discussion also lists ***mitigation*** that could reduce impacts and cumulative impacts of the alternatives.

S.4.1 Land Use Impacts

The **Proposed Action —** would cross each of the main land uses in the area: forest production, watershed protection, and rural residential. The majority of land crossed would be forestland, where

impacts would be low. It would parallel the ROW of the existing transmission line, converting only negligible amounts of forestland to utility use. It would require 2.9 miles. However, where it would traverse the communities of Kangley and Selleck, it would displace two residences and a small barn and prevent the development of one lot of a proposed four-lot subdivision. Land-use impact: **moderate**.

Alternative 2 — would cross forestland and, because it shares most of its route with the Proposed Action (paralleling an existing line), would convert only negligible amounts of forestland to utility use. It would require 2.7 miles of new access roads. Land-use impact: **low**.

Alternative 3 — would require clearing a separate new ROW, but would cross only forestland, converting negligible amounts to utility use. It would come within 650 feet of two residences on its north end, but placement of the line in the eastern portion of the corridor could minimize this impact. It would require 6.4 miles of new access roads. Land-use impact: **low**.

Alternative 4A — would cross only forestland and, because it shares most of its route with the Proposed Action (paralleling an existing line), would convert only negligible amounts of forestland to utility use. It would require 2.7 miles of new access roads. Land-use impact: **low**.

Alternative 4B — would cross only forestland and, because it shares most of its route with the Proposed Action (paralleling an existing line), would convert only negligible amounts of forestland to utility use. It would require 2.2 miles of new access roads. Land-use impact: **low**.

Alternative A — Location of the transmission line outside existing BPA-owned land around Covington Substation would affect as many as 25 homes and two tax lots in the subdivision located at the corner of SE Wax Road and Covington Way. Alternative A would require 6.6 miles of new access roads. Alternative A would be considered to have a **high** land use impact.

By comparison, Option A1 would displace up to three homes located on private property just east of the substation. It may also occupy an area where BPA was planning to construct a new large maintenance headquarters building. Land-use impact: **moderate**.

Alternative B — would require rebuilding the existing transmission facility within existing ROW, allowing less ground disturbance and vegetation clearing than construction in new ROW. This alternative crosses predominantly land zoned for forest use and some limited rural residential land and would not displace any dwellings. Alternative B requires 2 miles of new access roads. Alternative B would be considered to have **low** land use impact.

Alternative C, Option C1 — the north-south segment of Alternative C, which is common to both Options C1 and C2, would

require clearing of new ROW. It runs almost entirely through rural residential land and would displace between 23 and 28 dwellings. The rest of Option C1, also requiring newly-cleared ROW, runs across more rural residential and some forestland. This option could displace an additional seven dwellings (total of 30 to 35 homes for this option). Option C1 would require 8.7 miles of new access roads. Overall, Option C1 would have a **high** land use impact. In all, the 10.1-mile length of Option C1 could cross 128 tax lots, at least 54 of which are developed.

Alternative C, Option C2 — Option C2 does not displace any additional homes beyond the 23-28 displaced along the north-south portion. Along its 10.6-mile length, it would cross mainly rural residential land (including 134 tax lots, of which 56 are developed), but also some forestland zoned for mineral extraction. It would require 8 miles of new access roads. Option C2 would have a **high** land use impact.

Alternative D, Option D1 — Option D1 would require acquisition of additional ROW across land predominantly zoned forest, but also some rural residential areas. Clearing of these new ROWS would conflict with National Forest land management goals outlined for the area by the Northwest Forest Plan and Snoqualmie Pass Adaptive Management Area Plan. Specifically, clearing of vegetation would not meet the intent of managing for late-successional habitat and maintenance of connectivity emphasis areas on National Forest lands. Aquatic conservation strategy objectives are also not likely to be met. In addition, Option D1 would displace between 11 and 14 homes and possibly prevent development on up to five additional unused tax lots as a result of easement expansion south of the existing line. Along its 35.6-mile length, this alternative would cross more than 134 tax lots, at least 32 of which are developed. Clearing of danger trees would impact tax lots adjacent to the new ROW. Additional land use concerns along this option include potential impacts to existing cabins and lots at Roaring Creek, a development west of Lake Keechelus. The new line would also directly conflict with the new North Bend Gravel Mine that is proposed by Cadman on Weyerhaeuser land east of North Bend. Option D1 would require 13.6 miles of new access roads. This option would likely have a **high** land use impact.

Option D2 — land use impacts related to Option D2 would be similar to Option D1, although less new ROW would be required since a portion of the ROW already has sufficient width to accommodate an additional transmission line near the ski areas at Snoqualmie Pass. It would cross a minimum of 121 tax lots, at least 22 of which are developed. Clearing of danger trees would impact tax lots adjacent to the new ROW. Option D2 would displace about eight homes. It requires 13.2 miles of new access roads. It would have a **high** land use impact.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on land use.

S.4.2 Transportation Impacts

Most alternatives: **No** impact. Because of tower locations and height clearances for lines spanning roadways, none of the alternatives would restrict future expansion or acquisition of public road or railway ROW. Alternative A, however, would have a **low** impact on the urbanized area of Covington as a result of converting a portion of easement (now covered by paved ingress and egress routes in the Covington Square Shopping Center area) to transmission line use.

S.4.3 Recreation Impacts

The **Proposed Action** and **Alternatives 2, 4B, A, B, C and D2 —** would have **no** to low impact on recreation. Option D1 would have a moderate experiential impact because it crosses several recreation areas.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on recreation.

S.4.4 Geology and Soils

The **Proposed Action, Alternatives 2, 4A, 4B, B, and C —** would have a **low** impact. Alternatives 3, A and D would have moderate to high impacts because they cross soils with more potential for erosion.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would

be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on soils.

S.4.5 Floodplains

All alternatives — **No** to **low** impact. No towers or roads would be built in designated floodplains. Construction activities above stream channels could cause more peak runoff, but only in the short term.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on floodplains.

S.4.6 Water Quality — Streams

Most **transmission alternatives,** except Alternatives 3, B and D would have **low** impacts to streams.

Alternative 3, B and D — would have **low** to **moderate** impacts because of the erosion potential of soil crossed and vegetation removal.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on stream water quality.

S.4.7 Water Quality — Groundwater

Most **transmission alternatives,** except Alternatives 3, B and D would have **low** impacts to water quality.

Alternative 3, B and D — would have **low** to **high** impacts because of the erosion potential of soil crossed and vegetation removal, and presence of well-head protection programs.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on groundwater quality.

S.4.8 Fisheries

All **transmission alternatives,** except Alternatives B and D**: low** to **moderate** impact with extensive mitigation. Construction of any line would necessitate careful steps to lessen potential impacts on fish. BPA would ensure that all actions potentially affecting fish habitat — riparian vegetation removal, road construction, culvert installation, bedrock blasting and other soil disturbances — would meet or exceed applicable regulations.

Alternatives B and D — would have **low** to **high** impacts. Impacts would be created by more clearing of riparian vegetation and erosion potential on upland areas.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on fisheries.

S.4.9 Wildlife

All **transmission alternatives,** except Alternatives B and D: **low** to **moderate** impacts from vegetation and tree clearing in ROWs, with extensive mitigation to preclude greater impacts. Impacts on specific species are:

- threatened/endangered/sensitive species — **moderate**. Any reduction in habitat for these species, however small, is considered to have relatively greater impact than reduction in habitat for non-threatened species.
- forest species — **low**. The relative amount of forest habitat that would be cleared is small and this habitat type is common in the project area.

- riparian species — **low** to **moderate**. As above, the relative amount of riparian habitat impacted would be small, but vegetation removal could result in a loss of productivity in adjacent aquatic habitat as well.
- aquatic species — **moderate**. Line construction could reduce the quantity and quality of both wetland and stream habitat.
- unique habitat species — **low**. Few if any of these species are likely present in the project area.
- early regeneration species — **no** to **low**. Construction would actually increase habitat for these species, particularly elk and deer, although the increase in foraging habitat would not appreciably benefit western bluebirds.

Alternatives B and D — would have **low** to **high** impacts. Clearing on National Forest lands would have a high impact on several sensitive Survey and Manage species.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on wildlife.

S.4.10 Vegetation

The **Proposed Action** would disturb 152 acres of vegetation. ROW clearing and soil compaction and movement in forested areas would create most impacts, which vary depending on vegetation type. The impact on individual vegetation communities would be **low**. The impact on coniferous forested communities would be **moderate**. A potentially high impact from noxious weed colonization in disturbed areas could be mitigated to have a **low** impact. Overall vegetation impact: **low** to **high**.

Alternative 2 would disturb 155 acres. Impact is the same as the Proposed Action.

Alternative 3 would disturb 187 acres. Impact is the same as the Proposed Action.

Alternatives 4A would disturb 164 acres. Impact is the same as the Proposed Action.

Alternative 4B would disturb 175 acres. Impact is the same as the Proposed Action.

Alternative A would disturb 397 acres. Impact is the same as the Proposed Action, except low impact on coniferous forest.

Alternative B would disturb 250 acres. Impact is the same as the Proposed Action.

Alternative C (Option C1) would disturb 195 acres. Impact is the same as the Proposed Action.

Alternative C (Option C2) would disturb 206 acres. Impact is the same as the Proposed Action, except low impact on coniferous forest.

Alternative D (Option D1**)** would disturb 769 acres. Impact is the highest of the alternatives.

Alternative D (Option D2**)** would disturb 776 acres. Impact is the highest of the alternatives.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on vegetation.

S.4.11 Wetlands

The **Proposed Action** would affect 14 acres of wetlands. Impacts vary depending on wetland type. The impact on forested wetlands due to ROW clearing would be **high**. The impact on scrub-shrub and open water wetlands would be **none** to **moderate**. Impacts on wetland water quality and wildlife would be **low**. Overall wetlands impact: **low** to **high**.

Alternative 2 would also affect 14 acres of wetlands. Impact is the same as the Proposed Action.

Alternative 3 would affect 6 acres of wetlands. Impact is the same as the Proposed Action.

Alternatives 4A would affect 14 acres of wetlands. Impact is the same as the Proposed Action.

Alternative 4B would affect 15 acres of wetlands. Impact is the same as the Proposed Action.

Alternative A would affect 17 acres. **No** impact on forested wetlands; **moderate** impact on scrub-shrub and open water wetlands, although mitigation could offset this.

Alternative B would affect 27 acres. **No** impact on forested wetlands; **moderate** impact on scrub-shrub and emergent wetlands, which could be offset with mitigation.

Alternative C (Option C1) would affect 10 acres. Impact is the same as Alternative B.

Alternative C (Option C2) would affect 8 acres. Impact is the same as Alternative B.

Alternative D (Option D1) would affect 18 acres. **High** impact on forested wetlands; **no** impact on scrub-shrub and emergent wetlands.

Alternative D (Option D2) would affect 16.5 acres. **No** to **high** impact. Same as Option D1.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on wetlands.

S.4.12 Visual Resources

The **Proposed Action** — **Moderate** to **high** impact on some Kangley area residents for whom the transmission lines would be dominant visual features. **Low** impact on occasional recreationalist, visitors, or employees in CRW. **Low** to **moderate** impacts on views from cars or aircraft in near vicinity.

Alternative 2 — **Moderate** impact on some Selleck residents. **Low** impact on occasional recreationalist visitors, or employees in CRW. **Low** impacts on local motorists' or aircraft views.

Alternative 3 — **Low** to **moderate impact** on some Kerriston Road residents. **No** to **low** impact on occasional recreationalist visitors, or employees in CRW. **No** to **low** impacts on local motorists' or aircraft views.

Alternatives 4A and **4B** — would have the same impact as Alternative 2. Overall visual resources, **low** to **moderate** impact.

Alternative A — **Moderate** to **high** impact on residents in and around Maple Valley and Covington, for whom taller towers would be dominant visual features. **Moderate** impacts on local recreationalists and motorists; **low** impact on aircraft views.

Alternative B — **Moderate** impact on limited number of residents along route due to slightly taller towers. **Moderate** impact on recreationalists at nearby ski/ wilderness areas and motorists on I-90. **Low** impact on aircraft views.

Alternative C (Option C1) — **Moderate** to **high** impact on some Ravensdale, Hobart and Landsburg/South Hobart residents, for whom new towers would be dominant visual features. **High** impacts on recreationalists along Cedar River and Tiger Mountain trails and on local motorists. **Low** impact on aircraft views.

Alternative C (Option C2) — **Moderate** to **high** impact on Hobart area (including Landsburg/South Hobart) residents, for whom new towers would be dominant visual features. **High** impact on recreationalists along Cedar River and Tiger Mountain trails. **Moderate** to **high** impact on local motorists. **Low** impact on aircraft views.

Alternative D (Option D1) — **Moderate** to **high** impact on residents near Twin Falls State Park, in the Edgewick area, and along Upper Yakima River, due to second set of towers. **Moderate** to **high** impacts on recreationalists at nearby ski/wilderness areas and on motorists on I-90 and local roads near North Bend and Twins Falls State Park. **Low** impact on aircraft views.

Alternative D (Option D2) — **Low** to **high impacts.** Same as Option D2.

Non-Transmission Alternative — Because no construction of the transmission line or related access roads would occur until the transmission line is needed, there would be no immediate construction-related impacts under the Non-Transmission Alternative. Impacts would be similar to the No Action Alternative. When it is determined there is a need for the new transmission line, then the impacts would be equivalent to those identified in this supplemental draft environmental impact statement.

No Action Alternative — **no** impact on visual resources.

S.4.13 Socioeconomics

All construction alternatives would have **no** to **low** impacts on the project area's socioeconomic features. There would be no impact on local lodging, employment, population or business access. Impacts would be low from minor increases in local spending by project workers and removal of a small amount of timberland from production. The

project is expected to have marginal impact on overall community values.

Alternatives A and C — **No** to **moderate** impact. Same as Proposed Action except for **low** to **moderate** impact on community values due to number of displaced homes and **no** impact on timber resources.

Non-Transmission Alternative — **Low** to **high** impact to area employment. If increased capacity were needed, it is unlikely the line could be built in time to avoid outages.

No Action Alternative — **High** impact due to the potential for transmission system collapse, brownouts and blackouts affecting not only the immediate Northwest, but regions to the south and north. Commerce and industry would be adversely affected as the quality and reliability of power decreased. Some businesses and their employees could decide to relocate to an area where the power supply is more reliable. Loss of businesses and an unstable power supply could influence whether some people move to the area.

S.4.14 Cultural Resources

The **Proposed Action** would not cross any inventoried or identified cultural resource sites. The potential for unknown sites is minimal due to steep terrain along the route. Cultural resources impact: **low**.

Alternative 2 would cross the western proposed site boundary of the Japanese Camp at Barneston townsite. It would also pass within one-half mile of the Selleck National Historic District. Cultural resources impact: **moderate**.

Alternative 3 would pass near flat land on which historic-period cultural resources are identified on archival maps. Cultural resources impact: **moderate**.

Alternatives 4A and **4B** would have low impacts along most of their routes (the portion shared with the Proposed Action). However, they would have moderate impacts where they would cross a highly sensitive landform north of the Selleck National Historic District. Overall cultural resources impact: **low** to **moderate**.

Alternative A has an estimated **moderate** to **high** impact. Two-thirds of route crosses relatively flat ground with high potential for culturally sensitive areas, both historic and prehistoric, particularly in Cedar River Valley.

Alternative B has an estimated **low** to **moderate** impact. Nearly half of route crosses steep terrain with little potential for culturally sensitive sites or resources. Further surveys would be necessary to confirm.

Alternative C (Option C1) has an estimated **moderate** to **high** impact. Has highest potential among alternatives for encountering cultural sites. Crosses flat land through Cedar River valley with potential prehistoric resources and crosses developed areas with potential historic-period resources.

Alternative C (Option C2) has an estimated **moderate** to **high** impact. Same as Alternative C1.

Alternative D (Option D1**)** has an estimated **moderate** impact. Substantially higher level of ground disturbance and vegetation clearing increase the risk of impacting cultural resources. Further surveys would be necessary to confirm.

Alternative D (Option D2**)** has an estimated **low** impact. Same as Alternative B.

The **Non-Transmission Alternative** and the **No Action Alternative** would have **no** impact on cultural resources.

S.4.15 Noise

All construction alternatives would have **no** to **low** impact. Incremental noise from the new line would not be discernible in most cases. Alternative 3, which does not parallel an existing line, may produce new, low-level audible noise, but in a largely unpopulated area.

The **Non-Transmission Alternative** and the **No Action Alternative** would have **no** impact on noise.

S.4.16 Public Health and Safety

All construction alternatives would have **no** to **low** impact. Incremental EMF generated by a new line would be minor because most of the land passed through is unpopulated. There would be no impact from toxic or hazardous substances, and only low impacts related to fire danger and radio/TV interference, both of which can be mitigated.

Non-Transmission Alternative —This alternative could create similar impacts as the No Action Alternative.

No Action Alternative — **High** impact due to the potential for transmission system collapse, brownouts and blackouts, which could affect public health and safety services, security devices, and other vital functions throughout the Northwest.

S.4.17 Air Quality

All construction alternatives would have **no** long-term impact. Minimal, short-term construction impacts would be limited to dust and engine exhaust. No burning of cleared vegetation would be allowed in most of the alternatives; some burning may be allowed along Alternative 3, if approved by the landowners.

Non-Transmission Alternative — This alternative could create more emissions due to greater use of wood stoves by residents or operation of new gas-fueled power plants in region.

No Action Alternative — **no** impact on air quality.