Summary of the Supplemental Draft Environmental Impact Statement

BPA / Puget Power Northwest Washington Transmission Project

BONNEVILLE
POWER ADMINISTRATION

DISCLAIMER

BPA/PUGET POWER
NORTHWEST WASHINGTON TRANSMISSION PROJECT

SUMMARY OF THE SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENT

In November 1993, Bonneville Power Administration (BPA), and Whatcom County (Washington) published a draft environmental impact statement (DEIS) for the proposed Northwest Washington Transmission Project. In order to present some shifts in need for the project and to permit additional review, BPA and Whatcom County have elected to issue a Supplemental Draft EIS. This Summary presents background material, explains project needs and purposes, and then focuses on alternatives and the possible effects.

PROPOSED ACTION

BPA and Puget Sound Power & Light (Puget Power) are proposing to upgrade the existing electric transmission power system in the Whatcom and Skagit County area of northwest Washington to increase the capacity of the U.S. - Canada Intertie transmission system.[1] (See Figure S-1.) The project would satisfy the need to provide more ability to store and return energy with Canada, would provide additional capacity on the Intertie for anticipated increases in power transactions, and would increase flexibility in operation of the U.S. and Canadian hydroelectric system. It would protect Puget Power's local system against thermal overloads, and improve local reliability.

BACKGROUND

Whatcom and Skagit Counties lie within the extreme northwest corner of BPA's transmission service area. BPA owns and operates about three-quarters of the bulk transmission capacity in the Pacific Northwest. The rest is owned and operated by utilities such as Puget Power.

The Pacific Northwest transmission system is used to transport power from a wide variety of energy resources to utilities' customers. Because it is interconnected with the Canadian and Southwestern U.S. transmission systems, it is also used to transport surplus power between the U.S., Canada, and the Southwestern U.S.

1 In Canada, British Columbia Hydro and Power Authority (B.C. Hydro) would improve its transmission system in stages to facilitate increased transfers of power produced in Canada. Accordingly, BPA and B.C. Hydro have proposed to increase the transfer capability of the west-side Northern Intertie beginning October 1996.

BPA and the Intertie System. This project concerns the *west side* of the Northern Intertie linking BPA's transmission system to Canada's transmission system: two parallel 500,000-volt (500-kV) BPA transmission lines from the U.S. - Canada border at Blaine, Washington, to BPA's Custer Substation, and continuing south past Bellingham and Puget Power's Sedro Woolley Substation, on to BPA's Monroe Substation. (See Figure S-2.) These 500-kV lines allow the U.S. to import, export, store, and exchange power with Canadian utilities.

The most power the west-side Intertie can currently carry safely when all parts of the system are operating (rated transfer capability or RTC) is 2000 megawatts (MW). The most power that can be delivered throughout the entire year from Canada, during peak load conditions, *and* when a major facility is out (single-contingency rating or SCR) is about 230 MW north-to-south (from Canada into the U.S.).

The Local System and the Interconnected Area Network. The local system is the interconnected network of 230-kV and 115-kV transmission lines and substations within Whatcom and Skagit counties. Interconnections allow utilities to avoid duplicating facilities. However, under circumstances such as outage, power can move from the higher-capacity intertie lines into the local system. If too much power shifts, these lower-capacity lines can become thermally overloaded, which would result in still more outages.

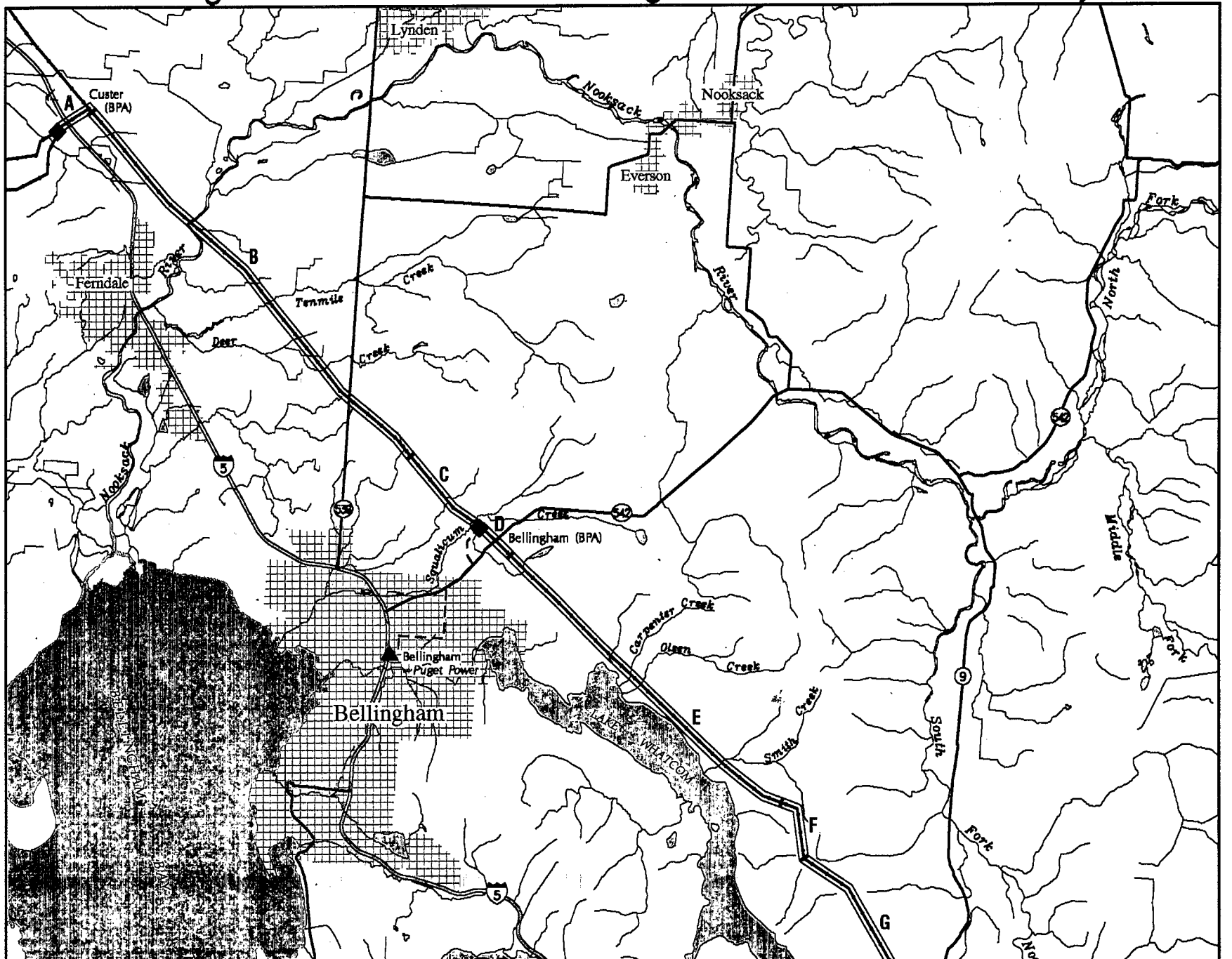
Seasonal Exchange of Power. The interconnections of utility systems on the West Coast can provide a special benefit to power users. In winter, when air conditioning needs are low, Southwest utilities have extra power they can send north to heat homes in Oregon, Washington, and Idaho. In summer, when Northwest utilities do not need power for heating, they can send extra power south.

Canadian utilities can also transfer and exchange power with utilities in the western United States. They already market power and services in an assortment of power sales exchanges, storage agreements, and treaties with different entities (both Federal and private) in the United States. There are also opportunities for Canadian utilities and U.S. Northwest utilities, including BPA and Puget Power, to combine surplus power products and market these products in the Southwest.

NEED AND PURPOSES

BPA (beginning in 1996) and Puget Power (beginning in 1995) propose to upgrade the existing electric power transmission system in the Whatcom and Skagit County area. Puget Power's part of the project is mainly in Bellingham, Washington, and within Whatcom County, with minor substation work in Skagit County. BPA's part of the project extends from Sedro Woolley in Skagit County, into Whatcom County, by Lake Whatcom and Bellingham, continuing towards Custer, Washington.

BPA/Puget Power NW Washington Transmission Project



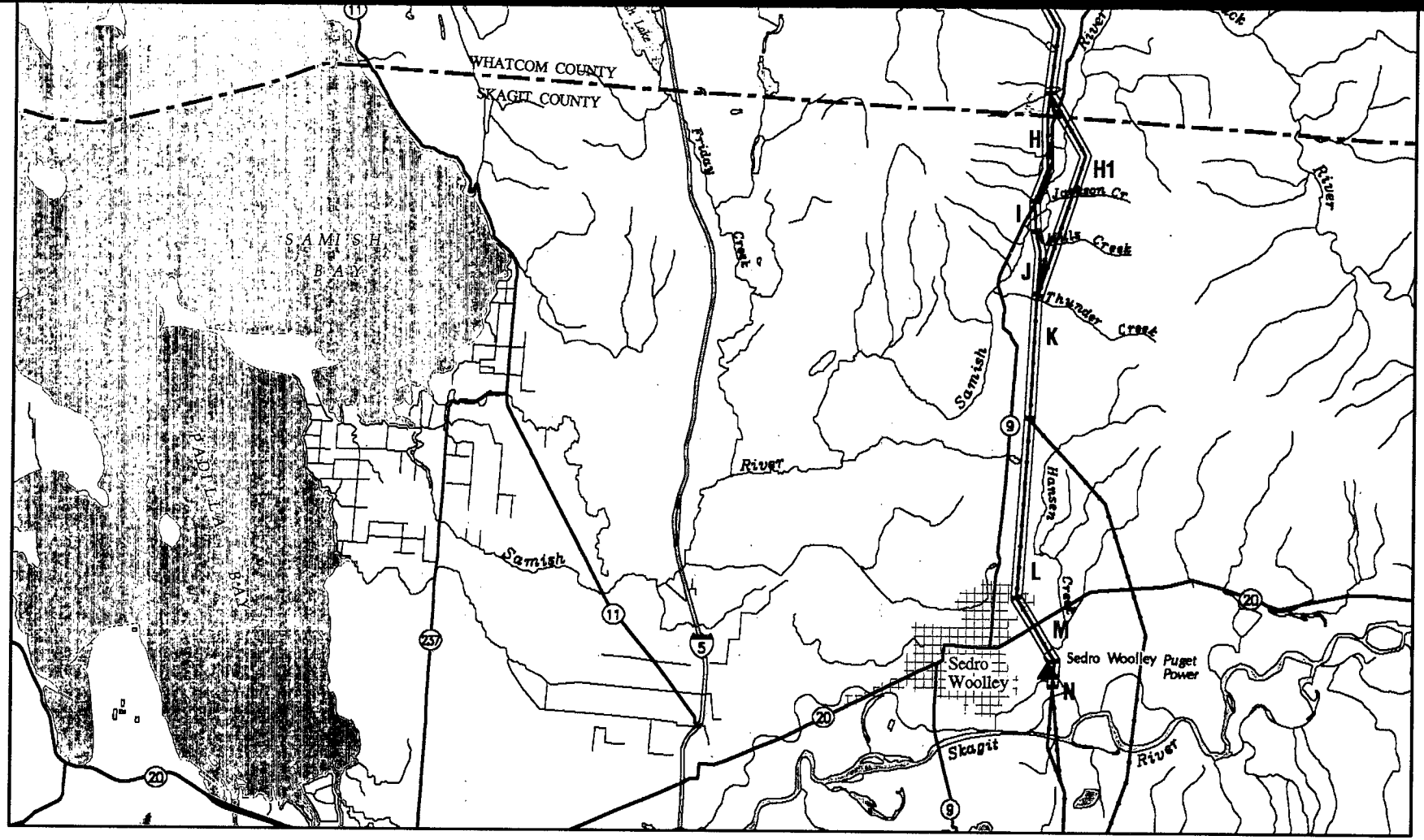


FIGURE S-1 PROJECT AREA and CORRIDOR SEGMENTS

LEGEND

- BPA Transmission Line
- Puget Power Trans. Line
- BPA Substation
- Puget Power Substation
- (5) Interstate Route
- (9) State Route
- G Corridor Segment

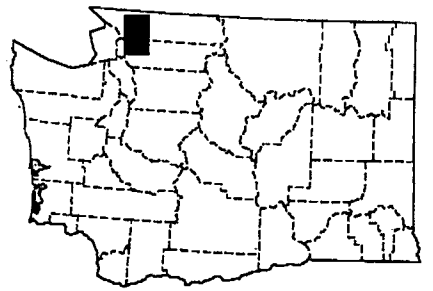
N W E S

Scale 1:173,500

0 1 2 3 4 5 6 MILES

0 1 2 3 4 5 10 KILOMETERS

Project Location



BPA Engineering Services, Geographic Analysis Group

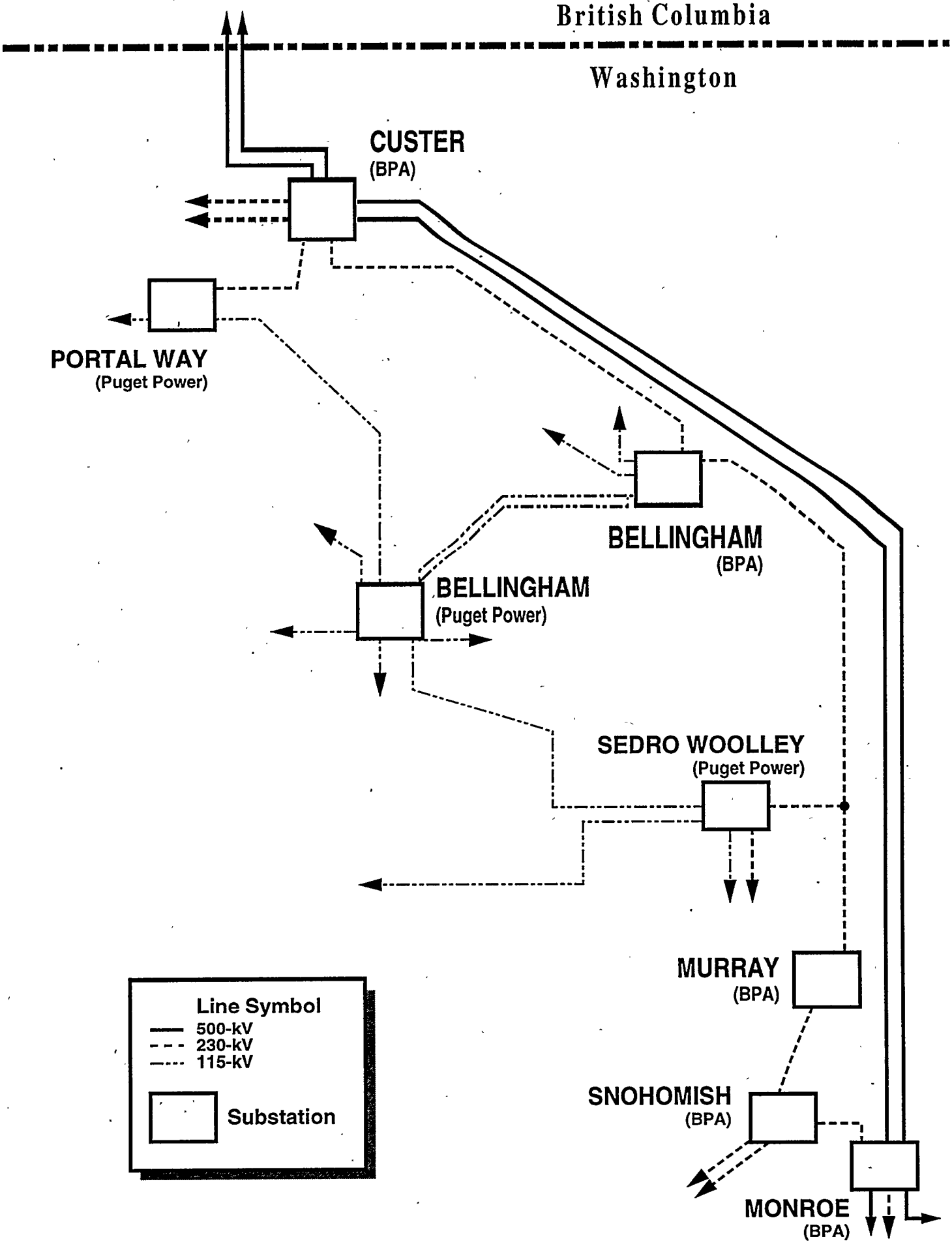

British Columbia
Washington
CUSTER
(BPA)
PORTAL WAY
(Puget Power)
BELLINGHAM
(BPA)
BELLINGHAM
(Puget Power)
SEDRO WOOLLEY
(Puget Power)
MURRAY
(BPA)
SNOHOMISH
(BPA)
MONROE
(BPA)
Line Symbol
500-kV
230-kV
115-kV
Substation

Figure S-2

Need. The project would increase the west-side Northern Intertie's north-to-south RTC and SCR by 850 MW. This increased capacity will enable several types of power transactions (see below). Puget Power will also be better able to move power through and out of Whatcom and Skagit counties, and the reliability of the local system would be better supported.

These results are discussed in detail below.

The project would increase the ability to store and return energy with Canada. Most of BPA's firm electricity comes from generators in dams on the rivers of the Pacific Northwest. During times of *low* river flow (late summer, fall, and winter), the agency can buy power at market rates from other sources such as California thermal generating plants. In times of *high* river flow (early spring), the agency can generate extra power and send it to Canada over the Northern Intertie rather than sell it at lower prices. Canada saves water behind its dams for generation later in the year, when it returns the "stored" energy to the U.S. over the Northern Intertie.

The project would respond to anticipated increases in Northern Intertie usage. Technical studies by BPA and Puget Power (1990; 1994) found that more transmission capacity was required to import more power from Canadian utilities. (The 1994 study also revealed that the local reliability problem cited in the DEIS had substantially diminished as a result of other actions.)

This project would allow for increased Canada-Pacific Northwest sales and exchanges of power to support increasing loads. It would defer the need to build new energy resources in the region, and maximize use of British Columbia Hydro and Power Authority (B.C. Hydro) and BPA transmission systems. The ability to contract directly with B.C. Hydro or its affiliates for future power purchases was identified as a priority in Puget Power's least-cost plan, on file with the Washington Utilities and Transportation Commission.

The project would allow for increased flexibility in operation of the hydroelectric system. Sometimes, when BPA needs stored energy returned, the Northern Intertie does not have enough capacity and B.C. Hydro sales take priority. The water stored behind Canadian dams must either be spilled (sent over or around dams with no energy generated and a consequent loss of economic value) or saved, and BPA must purchase power at the market rate from elsewhere--often at higher cost.

With increased Northern Intertie capacity, BPA could increase power transfers, better managing the return of stored energy and increasing the flexibility for operating the hydroelectric system. Resources could be used more efficiently and overall costs would be reduced. Increased capacity would provide regional benefits of cost-efficient power and more stable rates.

The project would meet strategic business objectives. Both BPA and Puget Power expect to use the added capacity from this project to fulfill strategic business objectives. Both entities expect beneficial contractual arrangements with Canada. BPA

would be able to sell power that otherwise might not be salable. Puget Power expects to acquire power from Canada at lower rates than are available elsewhere.

The project would provide benefits to improve local reliability. The DEIS anticipated that local reliability would play a major role in the need for this project. Since that time, Puget Power has upgraded its 115-kV system in the Whatcom Skagit county area. New local cogeneration plants have also been built and energized. Recent power flow studies showed that local reliability problems have diminished. However, the proposed project would increase the capability of the local transmission system to move power through and out of the local area, and Puget Power's 115-kV system would be better protected against thermal overloads during outage conditions.

Purposes. Purposes, as distinguished from needs, are goals, or ends to be attained. The following purposes were defined for the project:

- minimize environmental impacts;
- save energy by reducing energy losses on the existing system;
- improve the existing level of reliability for increased power transfers between the Pacific Northwest and Canada;
- minimize costs;
- achieve consistency with other national policies; and
- maximize the use of existing corridors.

DECISIONS TO BE MADE

The Bonneville Power Administration is to decide:

- Whether to build this project.
- If so, which design options to choose for the proposed transmission facilities.
- If so, which route to select.

Whatcom County/City of Bellingham are to decide:

- Whether to grant Puget Power local permits in order for Puget Power to build new 115-kV transmission facilities in Whatcom County/City of Bellingham.

SCOPING AND MAJOR ISSUES

Scoping meetings were held in Sedro Woolley (February 5, 1992) and Bellingham (February 6, 1992), and comments taken. Major issues within the scope of this project are: potential soil erosion; electric and magnetic field (EMF) effects; property values; noise from lines and substations; and land use/management. Public comments on the DEIS in November 1993 are summarized and responded to in the Supplemental DEIS.

DESCRIPTION AND COMPARISON OF ALTERNATIVES

The major alternatives are (1) to upgrade BPA's 230-kV transmission line in Whatcom and Skagit counties (the Construction Alternative); or (2) to decide not to take any additional action at this time (No Action). Within BPA's upgrade action alternative, there are four options for design and three alternatives for location of the line upgrades. The chapter also discusses alternatives (such as Conservation) which were considered but eliminated from detailed review. Puget Power proposes to rebuild its existing 115-kV transmission line between the BPA Bellingham Substation on Dewey Road and the Puget Power Bellingham Substation. There are two design options and two location choices, as well as minor alternatives for line access into Puget Power's Bellingham Substation.

THE PROPOSED ACTION

BPA proposes to undertake Option 1: to *rebuild* to double-circuit its wood-pole single-circuit 230-kV line between its Custer Substation and Puget Power's Sedro Woolley Substation. This proposal would increase the rated transfer capacity and the single contingency rating of the Northern Intertie by 850 MW. BPA proposes to share the resulting increased capacity of the Northern Intertie with Puget Power. Puget Power proposes to rebuild its existing line.

1. NO ACTION

The No Action alternative means just that: no actions would be taken to increase intertie capacity. There would be no construction impacts on the environment. Capital expenditures, materials, labor, and other resources would not be committed to this project. The BPA corridor would remain as it is. Intertie transfer capability would not increase from its present rating. Puget Power's 115-kV system would be subject to overloads during high import times from Canada. None of the benefits listed under **Need**, above, would be realized through this project.

Utilities would have to obtain additional power from Pacific Northwest suppliers or from elsewhere. If replacement energy were generated by additional combustion turbines and cogeneration facilities, air and water quality impacts could increase; costs could be higher.

With no additional access to Canadian power over the Intertie, Puget Power could decide to reopen its suspended application for a Presidential Permit to construct a transmission line to the Canadian border (see **Alternatives Eliminated from Detailed Consideration**). BPA could also study independent actions to increase its access to Canadian power over the

Northern Intertie. Any such actions would be covered by a separate environmental document and separate decisionmaking process.

2. THE PROPOSED PLAN

INTERTIE USE ACTION

The DEIS described three intertie use alternatives, under which the arrangements for access to increased Intertie capacity varied. However, alternatives which proposed joint sponsorship but not shared access to the benefits of the project did not make sense. Therefore, the Supplemental DEIS proposes a single course of action (joint sponsorship and use of increased intertie capacity). Under this arrangement, each party would individually be able to enter into/expand existing power exchange agreements (a combination of firm and non-firm power) up to an individual maximum of about 425 MW allocated transfer capability. The total 850-MW increase is only an estimate; the proposal is, in any case, to share in the actual increase. (If No Action were selected, either party might elect to pursue independent sponsorship and sole control of allocation for access created by independent projects (see No Action, above.)

BPA'S PART OF THE PROJECT: CONSTRUCTION ACTION

BPA would rebuild its existing single-circuit, wood-pole H-frame 230-kV transmission line between its Custer Substation and Puget Power's Sedro Woolley Substation (a distance of about 61 kilometers (km)[2] or 38 miles (mi.)) beginning in 1996. Existing poles, wires, and insulators would be removed and replaced with equipment for a double-circuit, lattice-steel line. The new line would be built at 230 kV (proposed) or 500-kV (see below). There would be overhead groundwire on each circuit for at least 1.6 km (1 mi.) outside of the substations.

A terminal position would be added at the BPA Bellingham Substation for Puget Power's proposed 115-kV rebuilt transmission line. The substation yard would be expanded to incorporate an area about 15 meters (m) by 76 m (50 feet (ft.) by 250 ft.) on the south side. A new deadend structure would be built and a new power circuit breaker with associated bus work would be installed.

The different design options and location alternatives are described and compared below. (More detail is available in the Supplemental DEIS; see also the matrix tables at the end of this discussion.)

BPA's part of the project offers two kinds of choices: design options and location alternatives. Table S-1 and Figure S-1 show the segments (units of line) and associated geographical landmarks. Figure S-3 shows potential replacement structures.

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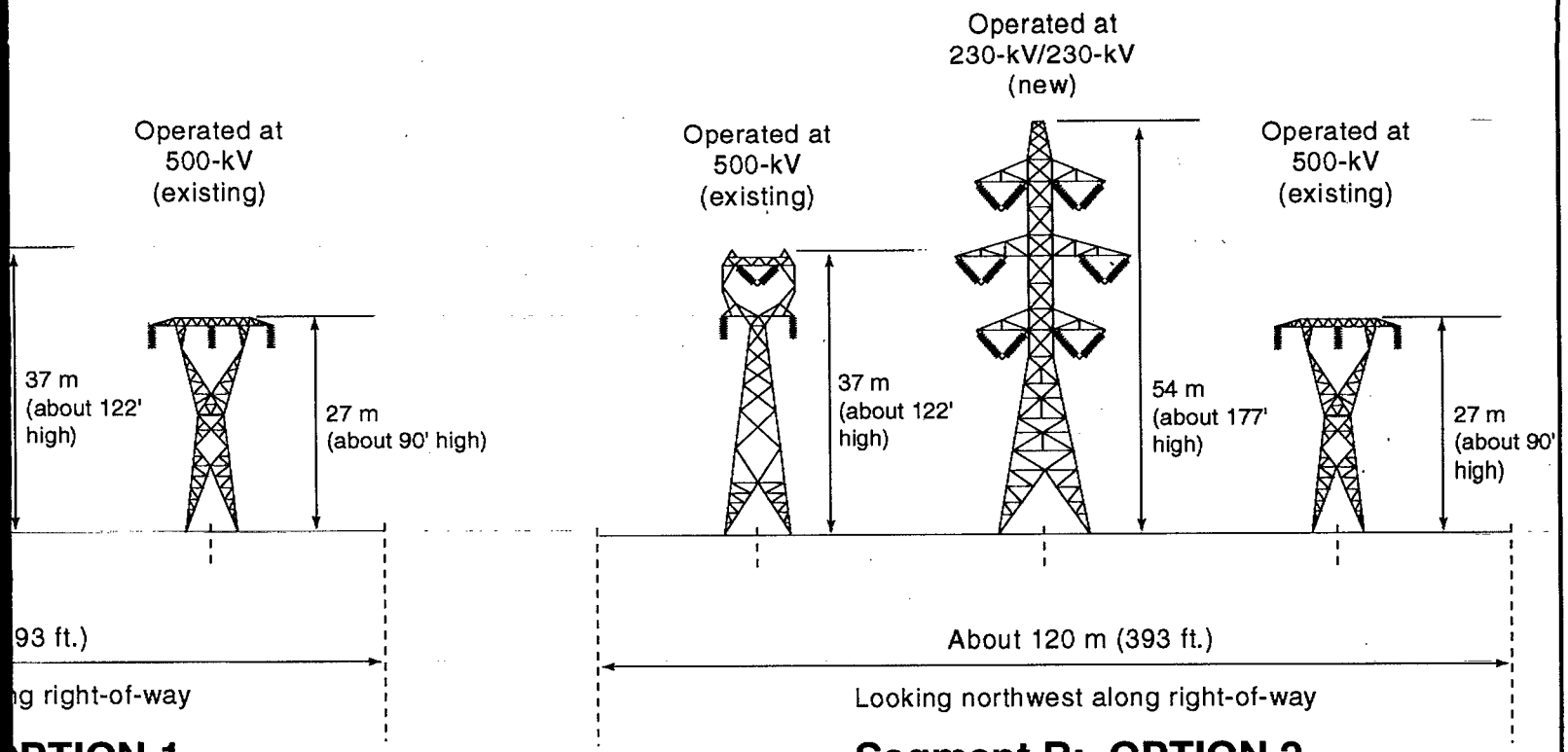
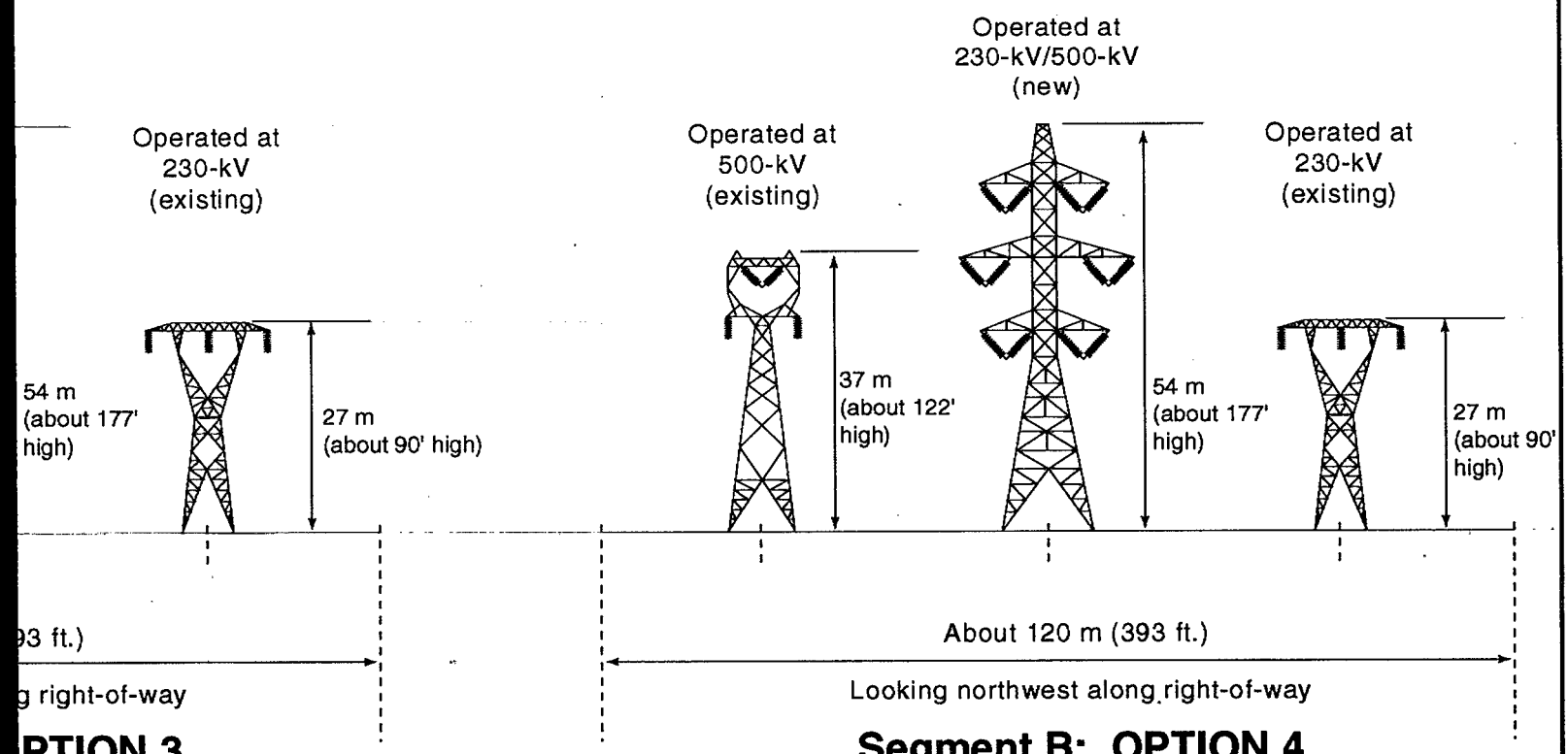
[2] BPA is using metric measurements to comply with Public Law 100-418.



PTION 1
ROPOSED

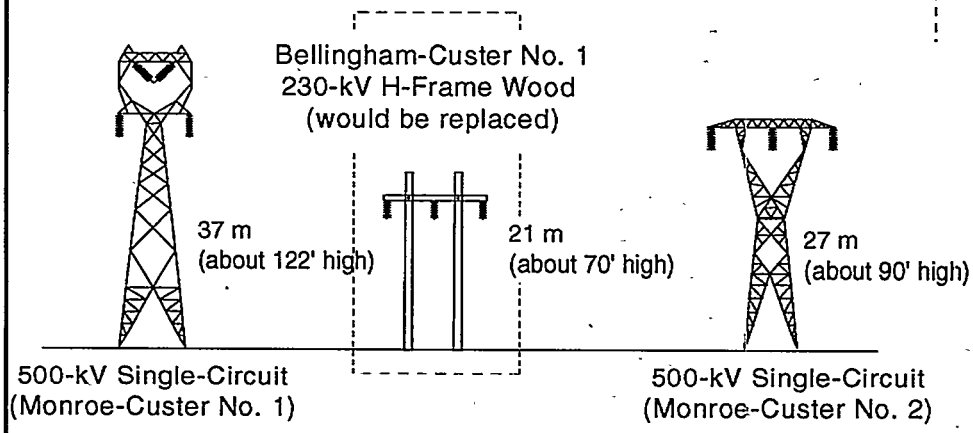
Segment B: OPTION 2



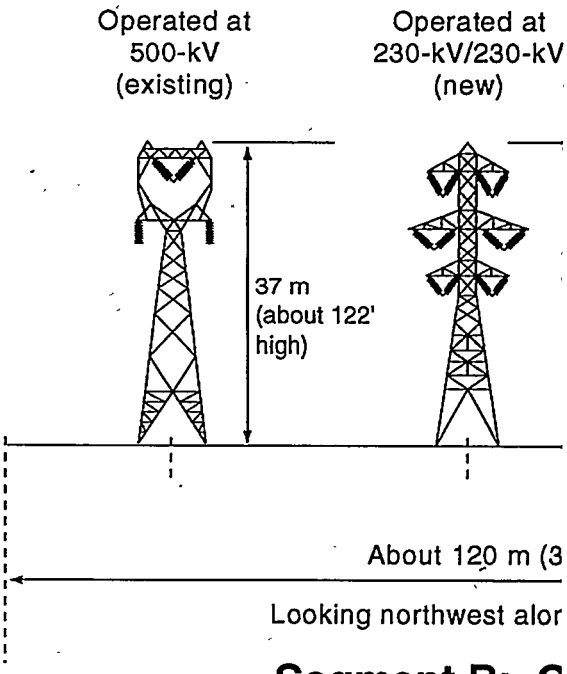
PTION 3

Segment B: OPTION 4

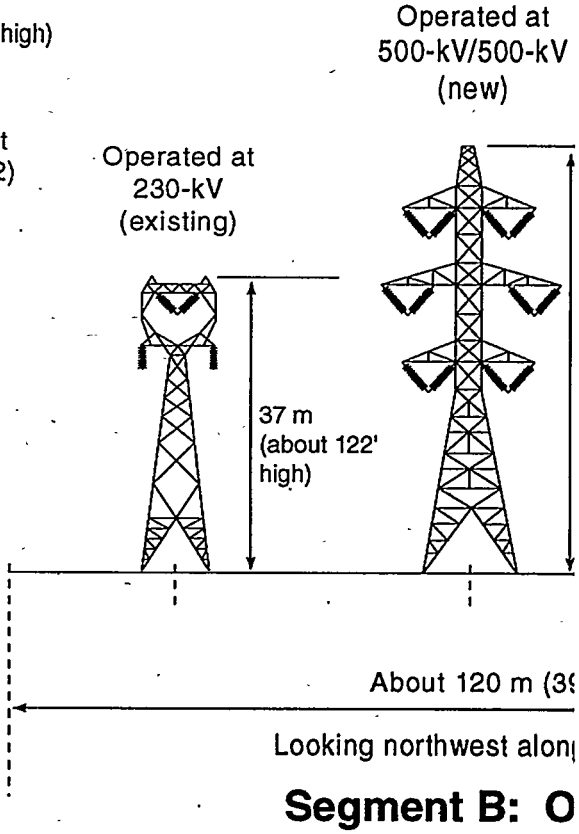
Figure S-3
BPA Design Options



Existing Custer-Bellingham Corridor
Typical Example
(Segment B)



Segment B: O
P



Segment B: O

Table S-1: BPA Corridor Segments

SEGMENT	ENDING TOWER # ON MONROE-CUSTER # 2[a]	LANDMARK
A	87/1	Intersects main corridor after crossing I-5
B	77/1	Between Kelly and Kline Roads
C	75/3	BPA's Bellingham Substation at Dewey Road
D	73/5	At Britton Road & Emerald Lake Way
E	66/3	East of Lake Whatcom
F	65/1	East of Lake Whatcom
G	60/2	Just north of County line
H	58/2	Highway 9 crosses under lines
H1	[rejoins at 56/4]	[Leaves main corridor at 60/2]
I	57/4	Just south of Samish River
J	56/4	Near Upper Samish Road
K	54/3	Near Fruitdale Road
L	51/2	Southwest of Northern State Hospital
M	50/1	South of Minkler Road
N	49/4	At Puget Power's Sedro Woolley Substation

a BPA's portion of the project has been divided into segments, beginning at the BPA Custer Substation and continuing to the Puget Power Sedro Woolley Substation. The Monroe-Custer # 2 500-kV line was used to reference tower numbers, since it is the constant through the main corridor. (Monroe-Custer # 1 creates the H1 route.) The segments were identified to mark places where the arrangement of towers in the corridor changes. Some landmarks have been provided above to help the reader locate these transition points.

BPA Design Options

Description. Four options have been identified for design. Options 1 and 2 keep the existing 500-kV lines in the corridor in their original configuration. Options 3 and 4 were developed to considerably reduce the noise associated with one of the existing 500-kV BPA lines in the corridor. **Design Option 1 is proposed.**

1. BPA Option 1 (proposed): 230-kV Structure Design.

The existing 230-kV wood-pole H-frame structures would be removed and replaced with 230-kV double-circuit lattice-steel structures. This option would cost about $19.8 million.

The new line would be on the same alignment as the existing 230-kV line. The new structures would be 37 m (122 ft.) tall; this is about the height of the taller existing adjacent 500-kV structures or 16 m (52 ft.) taller than the existing H-frame structures. The new line would have longer spans (about 350 m or 1150 ft.) than the one it replaces

(213 m or 700 ft.); the new structures would mostly be located next to the existing 500-kV structures. Along Segments A - D, existing access rights along the right-of-way would be used.

Between BPA's Bellingham Substation and Puget Power's Sedro Woolley Substation (Segments D-N), vehicular access for this section would be through existing access rights. In areas where there is an established access road system, new road construction would be limited to short spurs to new structure sites, and to places where they are needed for stringing/tensioning equipment. In agricultural areas, temporary roads would be used to construct the line; these would be removed later to allow agricultural uses to continue.

2. BPA Option 2: 500-kV Structure Design, with Operation at 230 kV.

This alternative would replace the existing line, but with 500-kV double-circuit lattice structures. This Option would cost about $36 million.

The new structures would be about 54 m (177 ft.) tall; this is about 17 m (55 ft.) taller than the taller of the structures on the two existing 500-kV lines in the right-of-way (see Figure S-3). Access and structure placement would be like Option 1's. The new line would still be operated at 230 kV. If BPA were to convert the line to 500-kV operation, additional 500-kV transformers/equipment would be needed at the substations, and BPA would prepare a separate environmental document.

3. BPA Option 3: Construct as in BPA Option 2, with Operation of the *Rebuilt* Line at 500 kV and of the *Existing* 500-kV lines at 230 kV.

This option is physically very similar to BPA Option 2, but would be operated differently. It was developed to reduce noise from one of the existing lines in the corridor. Both new circuits would be operated at 500 kV. The two *existing* 500-kV lines would be operated at 230 kV. This Option would cost about $40 million.

A few more structures would be required near three substations (Custer, BPA Bellingham, and Sedro Woolley) as well as at a location about 8 km (5 mi.) north of Sedro Woolley. Minor amounts of additional right-of-way would be needed at a few locations where the lines cross one another.

With this option, two 500-kV circuits would be placed together on the *same* towers. This configuration would reduce the reliability of the intertie lines (if a tower should fail, both circuits might undergo an outage).

4. **BPA Option 4: Construct as in BPA Option 2, with Operation of the *Rebuilt* Line at a Combination of 230 and 500 kV, and Operation of One of the Existing 500-kV Lines at 230 kV.**

This option is also very similar physically to BPA Options 2 and 3, but would be operated differently. One of the new circuits would be operated at 230 kV; the other at 500 kV. The older existing (flat-configuration) 500-kV line would be operated at 230 kV. The other 500-kV circuit would remain on the existing 500-kV single circuit structures in the same corridor. Minor amounts of additional right-of-way might be needed where Segment A ends, as well as near the Samish River crossing. This Option would cost about $41 million.

Option 4 was developed in response to concerns over the reliability and maintainability of the existing 500-kV lines under Option 3. Option 4 addresses these concerns by operating one side at 230-kV and the other at 500-kV, and by assigning the other 500-kV circuit to existing structures. The 500-kV lines would then be on two separate structures, maintaining existing reliability levels.

Comparison of Major Environmental Issues. See also Table S-2 at the end of this section.

Noise. Under all four options, the new line would be designed to operate at or below the existing State of Washington noise standard of 50 dBA at night. Under Options 1 and 2, however, noise levels of the *existing* lines would not be reduced. Overall noise would not increase along the corridor. Under Options 3 and 4, the Monroe-Custer #2 line would be operated at 230 kV instead of at 500 kV, reducing noise levels so that they would be at about the State noise standards at the edge of the right-of-way

Land Use/Management. All design options use the existing right-of-way for its entire length, land which has already been committed for this use. Land next to the right-of-way has been designated by local governments and developed in conjunction with the right-of-way. There are no differences among the four options.

Social and Economic Considerations. Economic impacts would be low. Construction would cause short-term impacts on agriculture (e.g., soil compaction, damage to existing crops, and proliferation of noxious weeds); these would all be mitigated.

Social impacts would range from low to moderate, due in part to public concern over property values, as expressed during scoping.

There would not be any appreciable differences among design options.

Geology/Soils. Moderate, short-term impacts would occur from soil surface disturbance in erosion-prone areas and from impaired soil productivity in Segments A - J. (Segments K-N would have low, short term impacts associated with a slight increase in

erosion and associated temporary sedimentation.) There would be no notable difference in impacts among options. Sensitive areas occur in segments B - H, where rivers and creeks or steep slopes near water bodies are crossed.

Health and Safety (Focus on EMF). Because the state of scientific evidence relating to EMF has not yet established a cause-and-effect relationship between electric or magnetic fields and adverse health effects, specific health risks or specific potential level of disease cannot be predicted in relation to EMF exposure. However, exposure assessments of magnetic fields from transmission lines (field levels to which people are potentially exposed) can be carried out in order to provide some comparison of alternatives. Magnetic field calculations for all options were made for those homes and businesses along the transmission corridor that could experience increases in magnetic field levels (as compared to the No Action alternative).

The number of buildings expected to experience an increase or decrease in magnetic field levels of more than 1 mG (based on estimated 1997 annual average loading information) are shown on Table S-2.

BPA Location Alternatives

Description. As the existing right-of-way heads south of Bellingham, towards Sedro Woolley, three route locations are possible.

1. Segments H, I, J.

The proposed line (Segments H, I, J) would stay on the original existing route.

2. Segment H1.

The line could take a dogleg east (Segment H1). A new double-circuit line would be built parallel to an existing 500-kV single-circuit line east of the Segment H-I-J right-of-way. This alternative would acquire about 34 m (112 ft.) of new right-of-way width along the west side of the existing 40-m (130-ft.) right-of-way; clear about 34 ha (84 ac.) of trees; build new spur access roads to structure sites; and remove one or two homes where Segment H1 rejoins Segment J.

3. North Shore Road Alternative.

This alternative was developed in response to DEIS comments by some residents near Lake Whatcom along part of Segment E; they suggested that BPA build the new double-circuit line parallel to and on the *easterly* (rather than westerly) side of the existing BPA corridor. Commenters sought a way to move the proposed line away from homes between the corridor and North Shore Road (westerly side). BPA identified the part of Segment E from just north of Agate Bay to Smith Creek (to the south) as the area where the line could be placed next to the opposite side of the existing corridor. This alternative

would require at least 38 m.(125 ft.) of new right-of-way width. New double-circuit 500-kV structures would be used.

If a 230-kV design option were used, the new line would have to cross *two* BPA 500-kV lines, seriously reducing reliability. All options would use 500-kV structures so that the lines could be shifted to the new structures on the east side of the corridor. (Options would thus differ only in how the existing 230-kV and 500-kV circuits are shifted from one transmission line to another.) At each end of the North Shore Road Alternative, a number of larger dead-end (angle) structures would be added to the existing line(s) in order to shift the circuits. About 28 ha (70 ac.) of trees would be cleared; new spur roads would be built to structure sites; and a home would be removed near Carpenter Creek.

Comparison of Major Environmental Impacts. See also Table S-3 at the end of this section.

Noise. For all three alternatives (Segment H1; H, I, J; North Shore Road Alternative) there would be no significant increase in audible noise. The new line would be within State noise standards. Total noise levels at the edge of the right-of-way would be reduced with Options 3 and 4 for H, I J; for Option 4 only for the North Shore Road Alternative.

Land Use/Management.

Segments H, I, J. The existing right-of-way would be used, land which has been committed for electrical transmission line right-of-way since the corridor was established in the 1940's.

Segment H1. The new route would permanently remove about 1.4 ha (3.5 ac.) of rural residential land from such use and would temporarily remove about 2 ha (5 ac.) of rural residential land from use during construction. That is considerably less than 1 percent of Whatcom or Skagit County's supply of rural residential land. One parcel would become unbuildable. Impacts would be local, direct, but slight. There would be no difference among the four design options.

North Shore Road Alternative. This alternative would cause land use impacts beyond those existing. This alternative would cross about 5.4 km (3.4 mi.) of land. Over half is in forestland; over one-third is rural residential land; about one-tenth is public park land. All of that land (total of 6 ha or 15 ac.) would be permanently removed from forest, residential, and recreational use. These amounts are less than 1 percent of Whatcom County's total supply of forest, rural residential, or park land.

Social and Economic Considerations.

Segments H, I, J. Economic impacts on agriculture would be low, direct, and both short- and long-term. Options would remove less then one-tenth of an acre; Option 1 would remove least. Social impacts would range from low to moderate, and would be direct and

long-term due to the physical presence of the line; there would be no appreciable differences among the four design options.

Segment H1. Economic impacts on the forest resource would be moderate, direct, and long-term. There would be no differences among the four BPA design options. Any would require about 20 ha (51 ac.) of forestland to be cleared, plus an additional 13 ha (33 ac.) selectively cut.

One or two residential housing units would have to be moved or demolished to accommodate this route option (Section 18, 36 N 5E, near where Segment H1 intersects Segment J). This would be a considerable, direct and long-term impact for those occupants. However, the taking of one or two housing units would not significantly affect the area's housing supply; therefore, the overall impact rating would be low to moderate. No appreciable difference would exist among the design options.

North Shore Road Alternative. With the widening of the corridor, one residential building would be removed (on Agate Lane), and about 28 ha (70 ac.) of private forestland (including danger trees) would be removed from production for the life of the line. The new right-of-way would be located within 152 m (500 ft.) of six residences on the east side of the corridor. However, this alternative would be considered a benefit to the 39 homes located within 52 m (500 ft.) of the west side of the corridor. On balance, impacts would be local and direct, but overall impacts would be slight.

Geology/Soils.

Segments H, I, J. Impacts here would be low to moderate. Short-term impacts would be most intense; intensity of long-term impacts would be partially reduced through mitigation. There would be no appreciable differences among the design options.

Segment H1. Direct, moderate impacts would be caused by construction and clearing; they would be mainly short-term, resulting in disturbance of soil surface, increased erosion, run-off, sedimentation, and impaired revegetative capacity. There would be no appreciable differences among design options.

North Shore Road Alternative. Impacts along the alternative and at the specific locations of concern (the lower east slope of Squalicum Mountain and from new Olsen Creek to the Smith Creek drainage; Segment E) would be direct and moderate. A 38-m (125-ft.) width of right-of-way plus an additional width for danger trees would be established, which might involve clearing up to 61 m (200 ft.) in width. New access road spurs would be built to new structure sites. These activities would increase erosion and the likelihood of sediment entering streams and Lake Whatcom. Additional clearing and road construction within the Smith Creek drainage (susceptible to damaging debris flows and torrents) would be particularly sensitive. Clearing and road construction could inadvertently initiate slope failures, allowing significant quantities of sediment to reach Smith Creek. Impacts could be severe if such an event were to occur. Increased clearing

and soil disturbance would result in greater overall impacts than would occur with the other options.

Health and Safety (focus on EMF).

It is not possible to determine specifically what level of health-related consequences might be associated with exposure to EMF. The number of buildings expected to experience an increase in magnetic field levels of more than 1 mG (exposure assessment) for the specified segments are shown in Table S-3. :

PUGET POWER'S PART OF THE PROJECT

Puget Power would rebuild its 6.9-km (4.3-mi.) existing 115-kV transmission line between the BPA Bellingham Substation on Dewey Road, and the Puget Power Bellingham Substation. (See Figure S-4.) Poles, insulators, and conductors would be replaced. Wood, laminated wood, and steel are three types of poles being considered for the rebuild line. Two design options are being considered. (See Figure S-5.) The new poles would be about 20 m (65 ft.) high, and would stand about 1.5 m (5 ft.) taller than the existing poles; they would be placed at about the same locations as the existing poles. The rebuilt transmission line would still be energized at 115 kV, and would look very similar to the existing 115-kV transmission line.

Puget Power's Bellingham Substation is located at the intersection of Carolina and Nevada Streets, and next to Interstate 5. The new 115-kV power circuit breaker and line bay, including foundations, would be installed in the substation. All new equipment would be within the existing fenced substation site. (See Figure S-6.)

Puget Power's Sedro Woolley Substation is located on Minkler Road, east of the city of Sedro Woolley. An additional power circuit breaker would be installed at the Sedro Woolley Substation to terminate the new 230-kV line between the BPA Bellingham Substation and Puget Power's Sedro Woolley Substation. The new BPA Bellingham-Sedro Woolley 230-kV line would enter the substation from the east side. One termination structure and foundation would be installed to extend and interconnect the new 230-kV line inside the substation. The improvements would occur within the existing fenced substation site.

Improvements to Puget Power's system would cost about $3 million.

Puget Power Line Rebuild

Description. There are two alternative locations for the line rebuild (see Figure S-4) , and two design options which could apply to either location choice (see Figure S-5).

1. Existing 115-kV Transmission Line Location

Puget Power would rebuild the existing BPA-Bellingham #2 115-kV transmission line between the BPA Bellingham Substation and the Puget Power Bellingham Substation, a distance of about 6.9 km (4.3 mi.).

2. Pipeline Alternative

This location alternative was developed in order to keep the line farther from Mt. Baker Highway, which is scheduled to be widened. It would follow (above ground) an existing pipeline for part of the route. The Pipeline Alternative would start where the existing line intersects Mr. Baker Highway. Instead of following the highway (which is scheduled to be widened), the line would extend north for about 670 m (2200 ft.) to the abandoned Chicago, Milwaukee, St. Paul & Pacific Railroad (Milwaukee Road) right-of-way, paralleling a Trans Mountain Oil Pipeline corridor which is cleared and maintained free of trees and shrubs. An additional easement of about 21 m (70 ft.) would be required alongside the pipeline corridor.

The line would continue northeast to the transmission line corridor at Dewey Road. The new 115-kV transmission line would be located on the north side of a newly installed Cascade Natural Gas access road. The properties along this alternative are largely undeveloped and are expected to remain so, as Squalicum Creek and other wetland areas are located near by.

After initial construction, the existing 115-kV transmission line between St. Clair St. and Dewey Road and along the Dewey Road between Sunset Drive and Ross Road would be removed. The poles would be cut off about 14 m (45 ft.) above the ground; the other aerial facilities (i.e., Puget Power distribution lines, telephone, and cable television) would remain.

Design would be as discussed above. The pipeline alternative would have single poles and horizontal post insulators, except at the top and bottom of a steep hill, where three-pole wood dead-end structures or steel structures would be installed so that the transmission line might span the entire elevation change without intermediate structures.

If this alternative were selected, Puget Power would obtain sufficient easements for the new 115-kV transmission line. Additional vegetation clearance rights might also be needed for danger trees outside the transmission line easement.

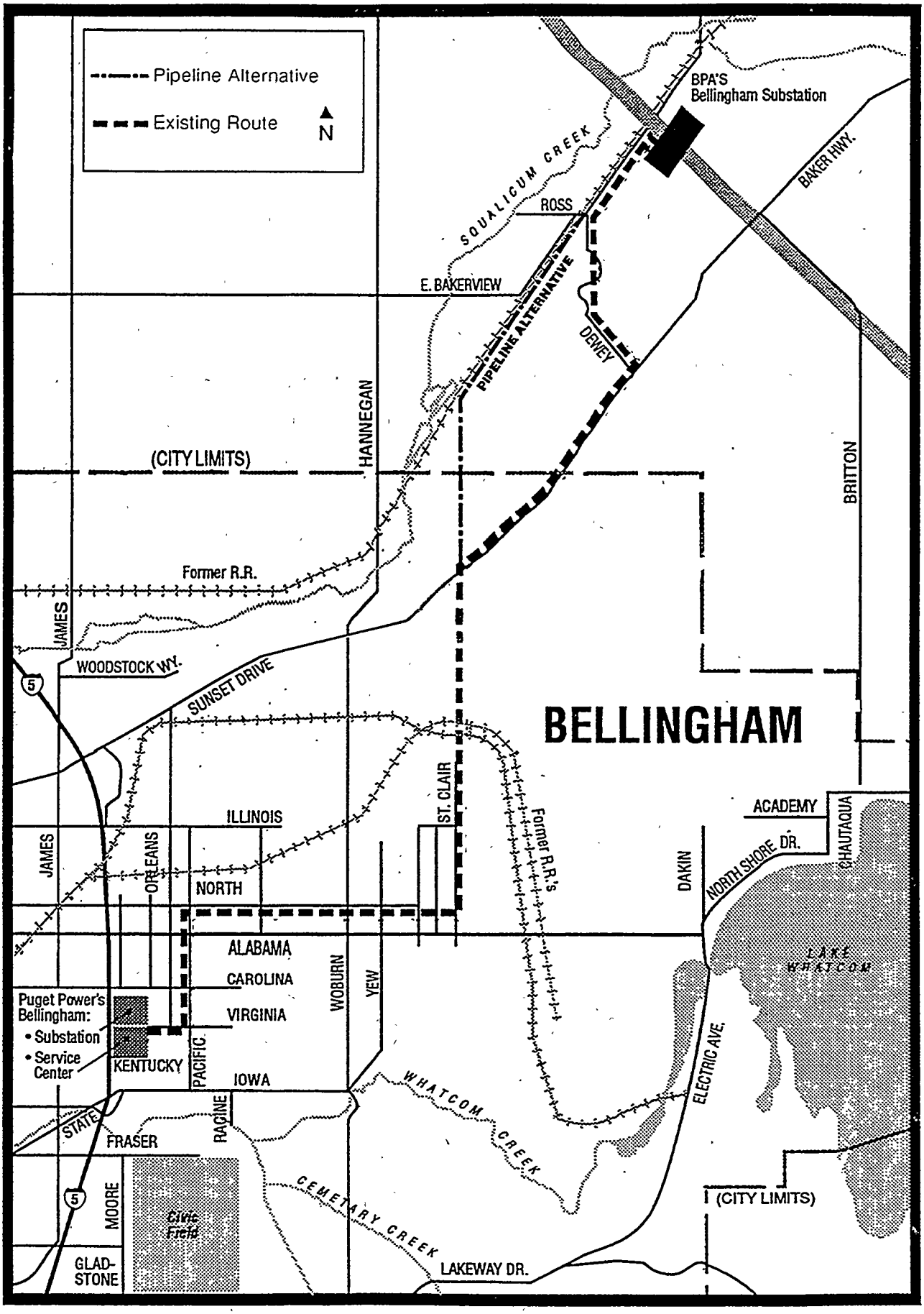

Pipeline Alternative
Existing Route
N
BPA'S
Bellingham Substation
SQUALICUM CREEK
ROSS
BAKER HWY.
E. BAKERVIEW
PIPELINE ALTERNATIVE
DEWEY
HANNEGAN
(CITY LIMITS)
BRITTON
Former R.R.
JAMES
WOODSTOCK WY.
SUNSET DRIVE
BELLINGHAM
ILLINOIS
ST. CLAIR
Former R.R.'s
ACADEMY
NORTH SHORE DR.
CHAUTAQUA
DAKIN
JAMES
ORLEANS
NORTH
ALABAMA
CAROLINA
VIRGINIA
KENTUCKY
PACIFIC
IOWA
WOBURN
YEW
Puget Power's
Bellingham:
• Substation
• Service
Center
LAKE WHATCOM
ELECTRIC AVE.
STATE
FRASER
RAGINE
WHATCOM CREEK
CEMETARY CREEK
MOORE
Civic Field
GLAD-
STONE
LAKEWAY DR.
(CITY LIMITS)

Figure S-4

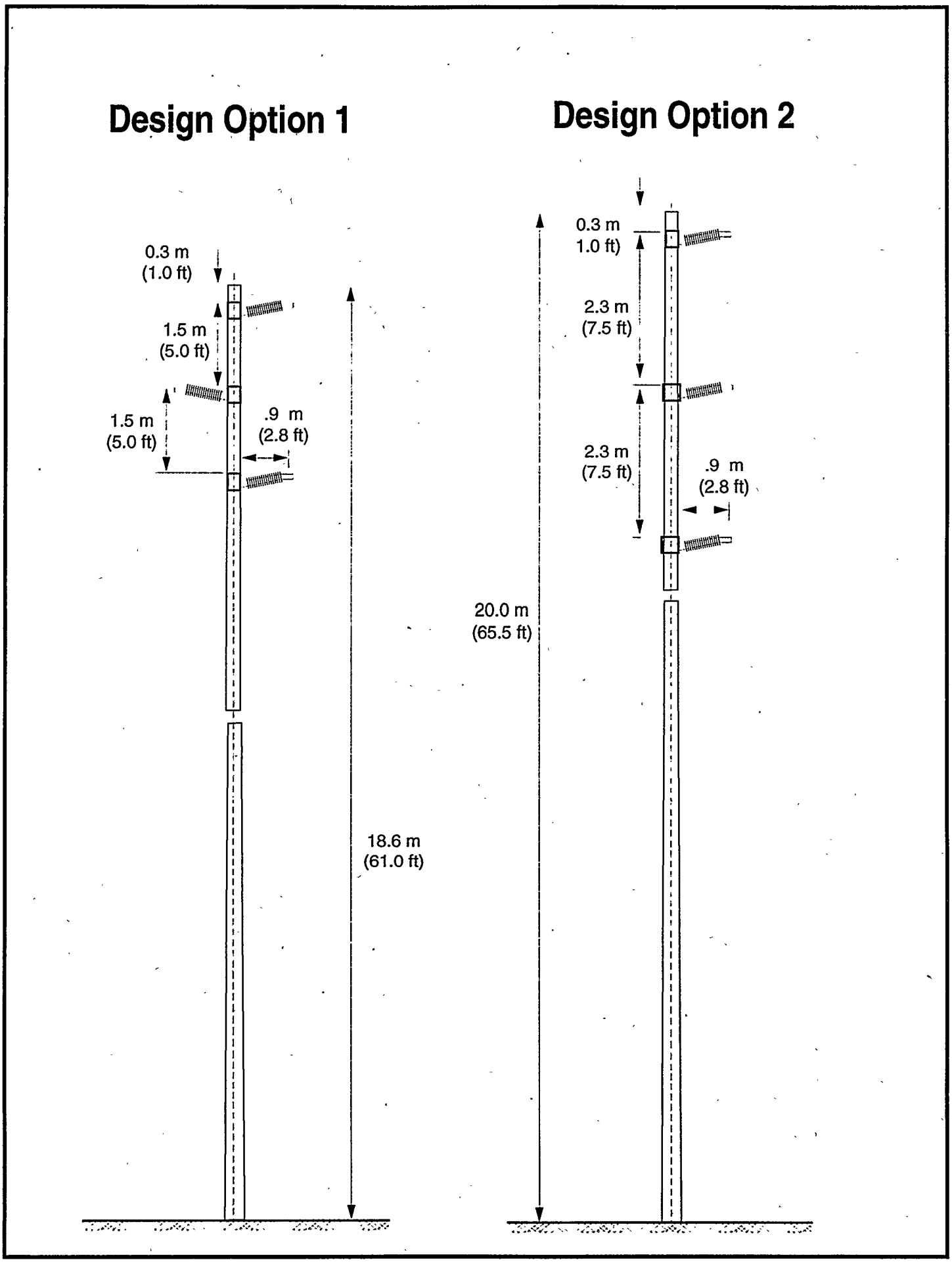


Figure S-5

Puget Power: Typical Structure Types For Rebuild

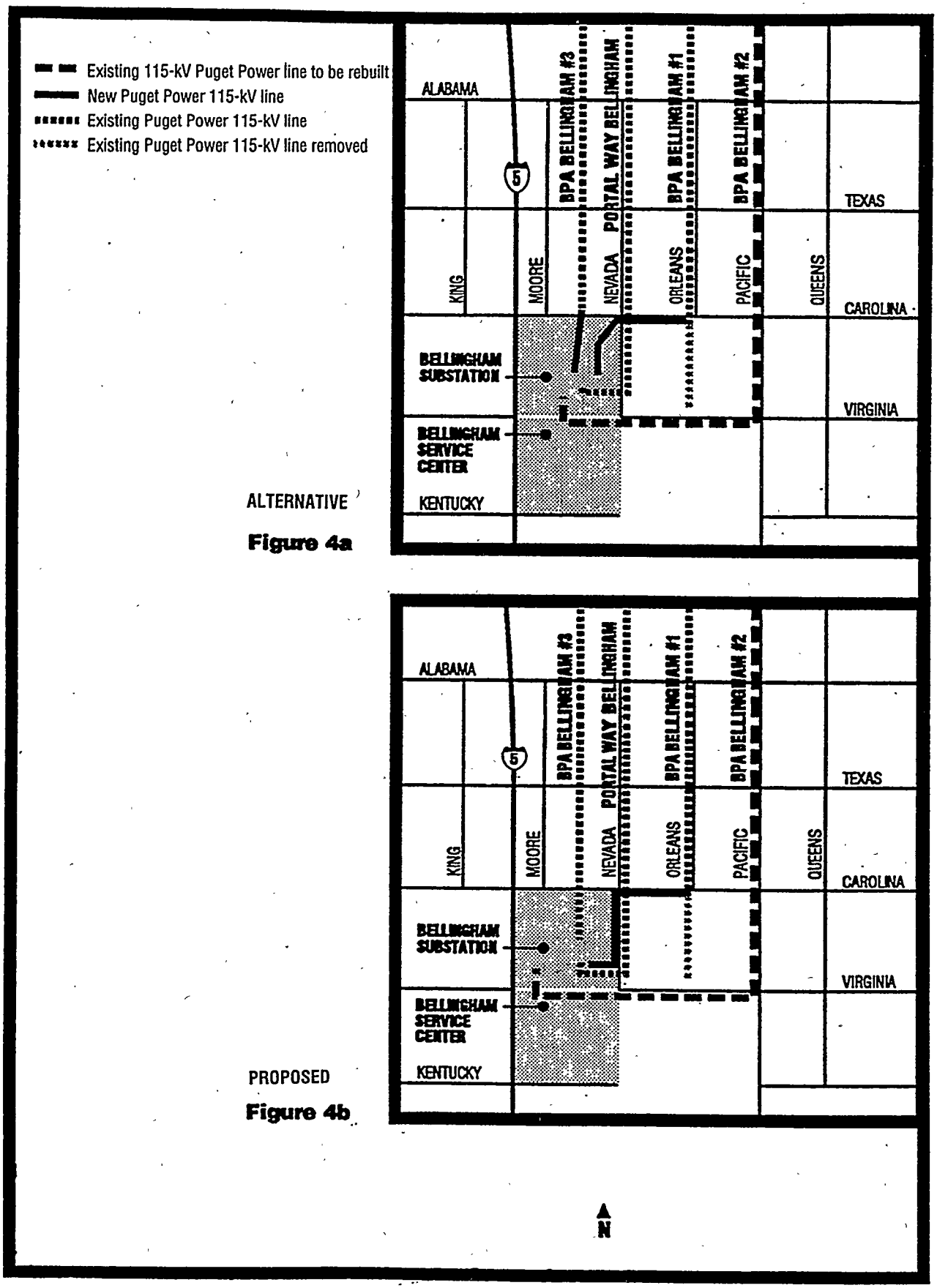


Figure S-6
Puget Power Bellingham Substation Improvements

Comparison of Major Environmental Impacts. Comparisons of impact are provided for the five major issues. See also Table S-4, at the end of this section.

Noise. Based on the preliminary design, audible noise levels would be significantly below the State noise standards for lines for either options. Audible noise levels would be approximately 12 dBA at a distance of 8 m (25 ft.) from the line at the ground (worst case). Given existing background noise, the noise associated with the line is expected to be inaudible.

Land Use/Management. The proposed rebuild would occur in areas of existing utility-line, public right-of-way, or new easements. No change in these conditions is anticipated. For the pipeline alternative, the new line would be located parallel to an existing 115-kV line and underground pipeline routes, and in areas covered by the Whatcom County and Bellingham comprehensive plans. This route would be consistent with existing land use and considered conditionally permitted in the zones identified in those plans. Normal clearing would occur; if appropriate, wetland permits would be obtained.

Social and Economic Considerations. Impacts are expected to be temporary: the proposed rebuild would occur "in place" (although largely in a populated area) and would not involve a large workforce over an extended period. Impacts would be associated primarily with increased construction activity and visual impacts from slightly increased pole heights. For the pipeline alternative (an unpopulated area), no change in existing land use is anticipated.

Geology/Soils. Field observations did not reveal any erosion problems directly under or next to the existing line. Proposed pole replacement would not constitute enough land clearing to encounter/create erosion problems. Access to pole locations in localized potential erosion areas might require regrading the right-of-way and using erosion control measures.

The City of Bellingham has mapped a potential landslide hazard area north of the intersection of St. Clair Street and Sunset Drive, in the Trans Mountain Oil Pipeline right-of-way and wooded area adjacent to the proposed transmission line right-of-way. There are no apparent geologic failures or earth movements at the site.

Construction of the transmission line would require clearing about a 10-m-wide (30-ft-wide) right-of-way down the slope. Clearing might be done by hand, with trees and debris yarded off and mulched. No access road would be required for clearing or constructing the transmission line at the hillside. Revegetation of the cleared area and preventive measures would minimize erosion; impacts would be moderate and short-term. No other sites within the pipeline right-of-way represent landslide or erosion hazards.

Health and Safety (Focus on EMF). As indicated above, it is not possible to determine specifically what level of health-related consequences might be associated with

exposure to EMF. Approximate numbers of buildings that might experience an increase in magnetic field levels of up to 4 mG are shown on Table S-4.

Puget Power Loop Line Alternatives (Dropped)

This action and its associated alternatives have been dropped from consideration since the DEIS.

Options for Line Access into Puget Power Bellingham Substation

The Puget Power Bellingham Substation is located at the intersection of Carolina Street and Nevada Street and next to Interstate 5. The project would require a new 115-kV power circuit breaker and line bay to terminate a 115-kV transmission line between BPA's and Puget Power's Bellingham substations. The power circuit breaker would protect the 115-kV line in the event of a system fault.

Puget Power has considered location options for entrance/exit of the BPA Bellingham lines into/from the substation before they leave the substation property. These options mostly occur on substation property and are very short. Very short portions would be extended within public right-of-way. Because they are mostly within the substation, do not involve adding oil-filled equipment or hazardous substances, and so on, these options are not evaluated in this section.

Tables S-2 through S-4, following, present in a matrix a close comparison of the differences among the various options.

3. MITIGATION

Mitigation measures can often reduce or eliminate many adverse impacts from construction, operation, and maintenance of transmission facilities. These measures are actions taken before, during, and/or after construction to ease natural resource and social impacts. "Mitigation" can include avoiding an impact altogether, minimizing impacts by limiting the magnitude of an action, rectifying an impact by repairing or restoring, reducing or eliminating the impact over time by preservation or maintenance, and compensating for the impact by replacing or providing substitute resources or environments. Mitigation measures would comply with all federal and state laws, as applicable, regulations, and standards. Specific actions would be taken to stabilize the revegetate slopes and to protect water resources. A detailed list if provided in the Supplemental DEIS.

TABLE S - 2. COMPARISON OF BPA DESIGN ALTERNATIVES

Environmental Issues/Factors with Possible Influence on Choice of Alternatives	Option 1			Option 2			Option 3			Option 4		
Major Issues	Segs A-D	Segs E-J	Segs K-N	Segs A-D	Segs E-J	Segs K-N	Segs A-D	Segs E-J	Segs K-N	Segs A-D	Segs E-J	Segs K-N
• Noise from Lines & Substations	No Increase			No Increase			Overall Decrease			Overall Decrease		
• Land Use/Mgt.	No Change			No Change			No Change			No Change		
• Geology/Soils	Mod Ero-sion	Mod Ero-sion	Low Ero-sion	Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Social/Economic: Economic	Low	Low	Low	Similar to Option 1			Similar to Option 1			Similar to Option 1		
Social	Low/ Mod	Mod	Low/ Mod	Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Public Health - EMF (Buildings w/greater than 1 mG change)	50 (I)/17 (D)			42 (I)/21 (D)			9 (I)/106 (D)			15 (I)/57 (D)		
Other Factors/Issues												
• Agricult. Impacts	Low/ Mod	Low	Low/ Mod	Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Visual/Recreation	Mod	Mod	Low/ Mod	Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Vegetation	Low/Moderate			Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Water Quality	Moderate			Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Floodplains/ Wetlands	Mod	Mod	Low	Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Fish & Wildlife: Wildlife	Mod	Mod	Mod	Similar to Option 1			Similar to Option 1			Similar to Option 1		
Fish	Mod	Mod	Mod	Similar to Option 1			Similar to Option 1			Similar to Option 1		
• Cultural Resources	Mod	High	High	Similar to Option 1			Similar to Option 1			Similar to Option 1		

I = Increase
D = Decrease

TABLE S-3. COMPARISON OF BPA LOCATION ALTERNATIVES[a/]

Environmental Issues/Factors with Possible Influence on Choice of Alternatives	BPA Segs. H, I, J (Proposed) (Design Options)				BPA Segment H1 (Design Options)				North Shore Road Alternative (Design Options)			
Major Issues	Opt. 1	Opt. 2	Opt. 3	Opt. 4	Opt. 1	Opt. 2	Opt. 3	Opt. 4	Opt. 1	Opt. 2	Opt. 3	Opt. 4
• Noise from Lines & Subs.	No Increase		Decrease		No Increase				No Increase			Decrease
• Land Use/Management	No Change				Change -- Low, Direct Impact				Change -- Low, Direct Impact			
• Geology/Soils	Low/Moderate				Moderate				Moderate			
• Social/Economic												
Economic	Low				Low/Moderate				Low			
Social	Low/Moderate				Moderate				Low			
• Public Health - EMF (Buildings w/greater than 1 mG increase)	3	3	0	0	0	1	1	1	3 (1[b/])	2 (1)	0 (0)	3 (0)
Other Issues (Ratings from Chapter 4)												
• Agriculture	Low				Low				Low			
• Visual/Recreation	Moderate/Low				Low				High			
• Vegetation	Low/Moderate				Moderate				Moderate			
• Water Quality	Low/Moderate				Moderate/High				Moderate/High			
• Floodplains/Wetlands	Moderate				Moderate				None			
• Fish & Wildlife:												
Wildlife	Low				Moderate				Moderate			
Fish	Moderate				Moderate				Moderate			
• Cultural Resources	High Concern				Moderate Concern				High Concern			

a/ Rating/characterizations are based on recommended mitigation.

b/ Numbers in parenthesis represent buildings with greater than 1 mG increase on comparable segment on existing route.

TABLE S-4. COMPARISON OF PUGET POWER ALTERNATIVES

Environmental Issues/Factors with Possible Influence on Choice of Alternatives	Puget Power's 115-kV Bellingham-Bellingham Line Rebuild	Puget Power's "Pipeline" Alternative
Major Issues		
• Noise from Lines & Subs.	No Change	No Notable Change[c]
• Land Use/Management	No Impact	Consistent[d]
• Geology/Soils	Low	Low
• Social/Economic:		
Economic	Low	Low
Social	Low	Low
• Public Health - EMF (Buildings w/magnetic field levels from 1.6 mG to 4 mG)	98	85
Other Issues (Impact ratings based on Chpt. 4)		
• Agriculture	Low	Low
• Visual/Recreation	Low	Low
• Vegetation	Low	Low
• Water Resources/Wetlands	Low	Moderate
• Fish & Wildlife:		
Wildlife	Low	Low
Fish	Low	Low
• Cultural Resources	Low	Low

[c/] Due to lower existing background levels.

[d/] Subject to review by Whatcom County and City of Bellingham.

ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED DISCUSSION

Seven alternatives were considered but eliminated from detailed discussion. Three of these were covered thoroughly in the DEIS: Puget Power's original proposal for two new 37-km (23-mi.) 230-kV lines to be built across the U.S.-Canadian border; a proposal for accomplishing the need through building 115-kV lines only (less adequate electrically); and a proposal that would require Puget Power to build new 230-kV lines (an option rendered infeasible through the Whatcom County ordinance of 1990. The other four alternatives are summarized briefly below. Detailed discussions are available in the Supplemental DEIS.

CONSERVATION (BPA/PUGET POWER)

The Northwest Power Act prioritizes new resources to be acquired for the region and gives highest priority to cost-effective conservation. In an April 22, 1993, Resource Programs Record of Decision, BPA committed to acquiring all cost-effective conservation and efficiency improvements in the region. While these conservation programs help reduce peak loads, they would not satisfy the increased capacity needs of the U.S. - Canada Northern Intertie transmission line. The need for improved reliability for increased power transfers would exist despite the acquisition of all cost-effective conservation. Therefore, conservation is not a reasonable alternative to this Project and is eliminated from detailed study.

UNDERGROUNDING

Burying transmission lines underground is technically feasible, and has been done in some areas. However, undergrounding means a costs of 5 to 12 times as much for underground as for overhead construction. Substation-like facilities are needed at either end of the underground portion where the conductors would go from overhead to underground; extensive trenching is required; and the materials used for the cables are expensive. If the dielectric fluid required for insulation were to be released accidentally, effects and cleanup requirements would be very similar to those for oil spills. Outage times also increase considerably for underground lines, as any breaks or damage are hard to locate.

ROUTING THROUGH DEPARTMENT OF NATURAL RESOURCES (DNR) LANDS

Both individuals and the Families Against Increased Risk (FAIR) group proposed locating the line farther to the east along Lake Whatcom, "up the hill" on State Department of Natural Resources (DNR) land. The goal was to move the new line well away from the residences, particularly in Segment E where the lines run close to homes.

BPA identified and studies an alternative that would meet this proposal. However, impacts were more considerable for this alternative. The terrain east of the existing BPA corridor is extremely rugged and steep, so that it would be very difficult to build transmission lines and associated roads there. The study route would need a new right-of-way, with vegetation clearing, new roads and road improvements. The alternative would be inconsistent with existing land use plans and with the Whatcom County initiative of 1990. It would also be inconsistent with BPA's commitment to use existing corridors wherever possible. This alternative would require up to five more heavy angle structures. This route would cost about $4,000,000 to $5,000,000 more than the proposed option.

Much of the area crossed would be of moderate-to-high soil erosion susceptibility, as well as moderate to mostly poor soil revegetation potential. As new clearing and access road construction would occur in these areas, there would be a moderate-to-high potential for soil movement and loss. Effective mitigation to lessen impacts in most of this area would be difficult. Both short and long-term increases in siltation and turbidity in tributaries of Lake Whatcom would be highly likely.

Wildlife habitat would be eliminated, and resident fish populations in Lake Whatcom tributaries (such as Smith Creek) could be affected as the new line crossed in a new corridor. The transmission line route would be visually unavoidable, as would close-up to mid-range viewing opportunities of the line from existing homes. It would likely be visible from various locations along North Shore Road, and more visible from the west shore of Lake Whatcom.

Given the increased costs, increased environmental impacts associated with opening of a brand new right-of-way, crossing of land zoned *Rural Residential,* inconsistency with the existing County ordinance, and commitments of BPA and local land use planners to use existing transmission line corridors, this rerouting proposal will not be considered further.

ROUTING THROUGH THE EASTERN CORRIDOR

Two commenters asked that the project avoid populated area (in particular the L, M, and N corridor segments), and that the changes all be routed through the eastern corridor with a new short tie-line to the Sedro Woolley Substation. However, BPA found no location that, from an overall perspective, had advantages over replacing the existing 230-kV line. The new line would need additional right-of-way, additional clearing width, and additional roads in nonagricultural areas; it would be on a hillside, creating additional visual impacts, and would increase erosion potential. This location would still be near residences. The alternative is longer than the western corridor, and would cost about $3,500,000 more for a double-circuit 230-kV line. Because this proposal would cost considerably more and would still be near residences, it was dropped from further consideration.