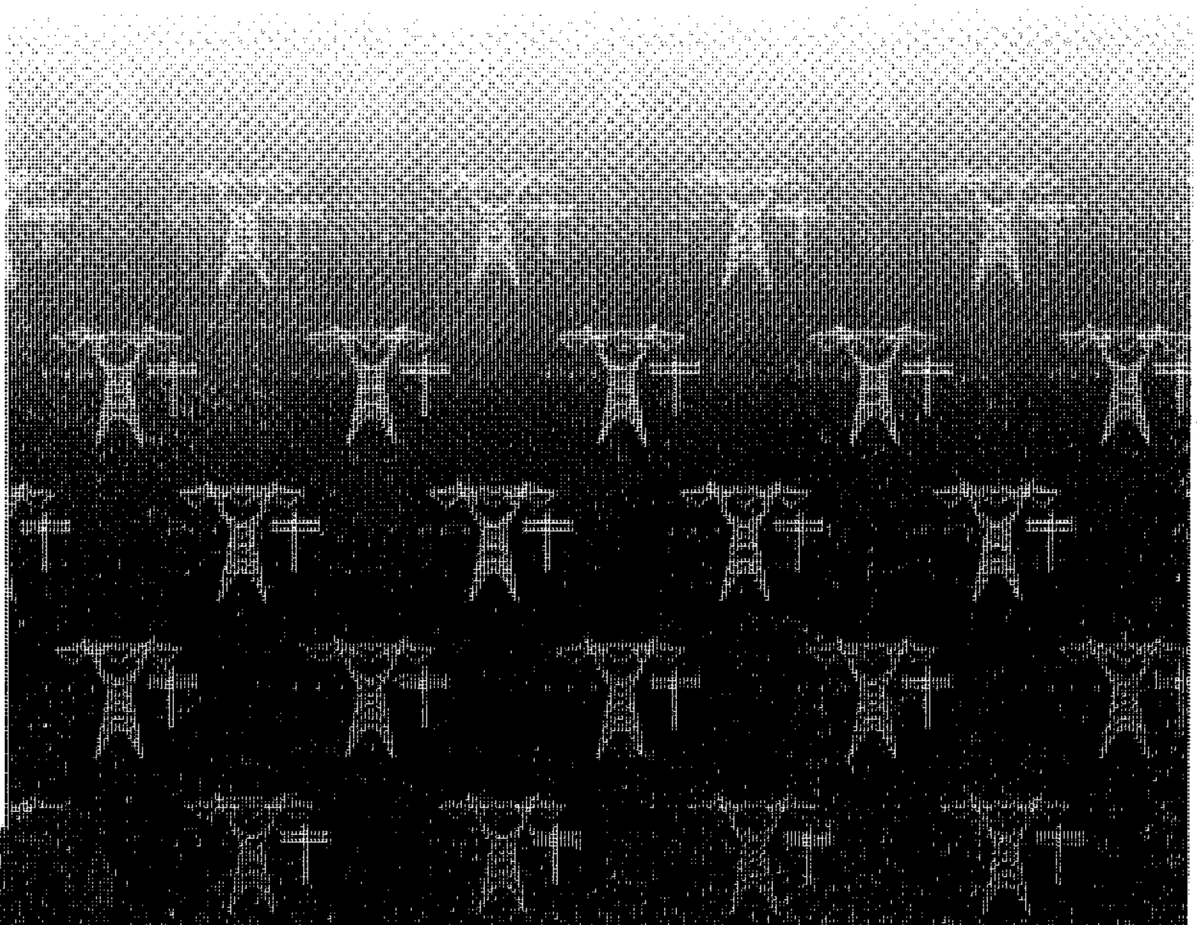
Draft Environmental Impact Statement

Eugene-Springfield Area Planning Project



DOE/EIS-0143

Bonneville
POWER ADMINISTRATION

October 1989

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Draft
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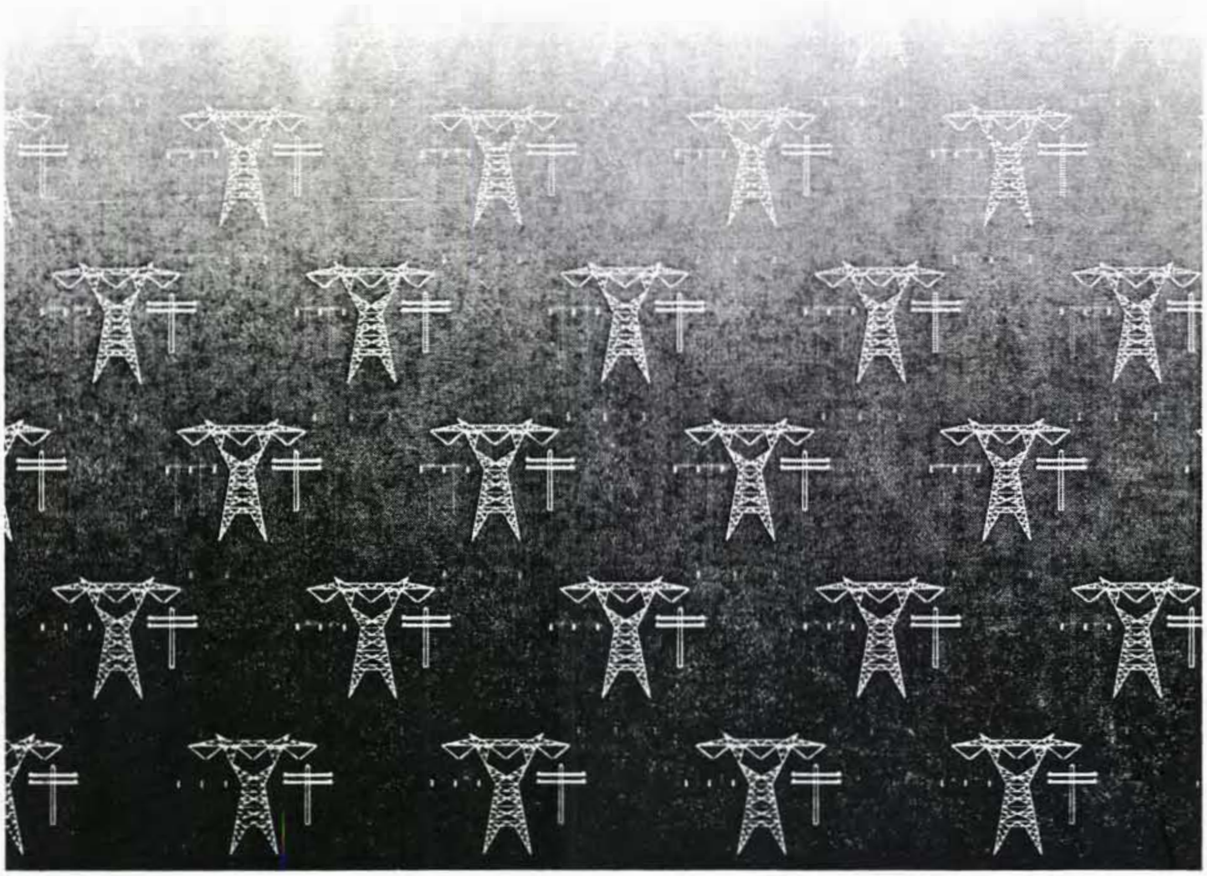

Bonneville
POWER ADMINISTRATION

Draft June 19, 1989

DRAFT ENVIRONMENTAL IMPACT STATEMENT

EUGENE-SPRINGFIELD AREA PLANNING PROJECT

Bonneville Power Administration
U. S. Department of Energy

Dear Reviewer:

Here are some suggestions to help you review the draft environmental impact statement (DEIS).

First, read through the DEIS. These questions may guide your review.

1. What is proposed? Chapter III describes alternatives for North Eugene-Springfield Reinforcement; Chapter V, for South Eugene.
2. Why? Chapter I describes the need for the projects.
3. Where? Figures 2 - 4 and 6 - 10 show where the facilities would be located.
4. How would the projects affect the environment? Appendix B describes how transmission facilities can affect the environment. Chapter II describes the area's environmental features. Specific effects are summarized in Tables 1 and 2 and Chapter III for North Eugene-Springfield; and in Table 7 and Chapter V, for South Eugene. Details on each are in Chapters IV and VI, respectively. Finally, Chapter VII covers additional impacts if both projects were built.
5. Have other ways to meet the need been looked at? Yes. See Appendix D.

Second, consider these questions.

1. Are there errors in the DEIS? What are they?
2. Is there some way to meet the need that is not in the DEIS? How would it work?
3. Can the environmental impacts be reduced? How?

Third, give BPA your comments. You can call, write, or testify at one of the public meetings that will be held in the Eugene-Springfield area.

To help BPA make best use of your comments:

- Be specific.
- List the page numbers where you see an error or a needed change.
- Give enough detail so your point will be made.

Be sure to comment in time--before the date listed on the DEIS cover sheet. Your comments will be evaluated with all others received. All comment letters and BPA's response will be published in the Final EIS. The decision on the proposed project will be made available in a Record of Decision.

If you need more information or would like any BPA publications mentioned in the DEIS, please call, toll free, from within Oregon (800) 452-8429; from other western states, (800) 547-6048; from elsewhere (not free) (503) 230-3478.

Thank you for your interest in this project.

Sincerely,

Anthony R. Morrell
Assistant to the Administrator - Environment
Bonneville Power Administration
P.O. Box 3621 - AJ
Portland, Oregon 97208

Draft Environmental Impact Statement

Responsible Agency: Department of Energy, Bonneville Power Administration (BPA)

Title of Proposed Action: Eugene-Springfield Area Planning Project

State and Counties Involved: Oregon - Lane County

Abstract: • BPA and the Cities of Eugene and Springfield and Lane County have agreed to coordinate long-range planning for major transmission facilities. • BPA's forecasts indicate the development of two operating problems during the next 20 years: one in the north Eugene-Springfield area; one in south Eugene. • BPA would like to develop solutions to both those problems now so that future facilities can be incorporated into local comprehensive plans. • For the North Eugene-Springfield area project, the BPA-preferred alternative would include tapping the Santiam-Alvey 230-kV lines northeast of Springfield and building a 230-kV line parallel to BPA's existing Cougar-Willakenzie line for 6 miles into a new substation in the McKenzie/Gateway area next to I-5. About 125 feet of additional right-of-way width would be needed. There are two alternative transmission paths and two alternative substation sites. There is no clear environmentally preferred alternative for this project. • For the South Eugene area project, the agency- and environmentally preferred alternative would be a new 500-kV line parallel to BPA's existing 13-mile-long, 230-kV Alvey-Lane line. An additional 125 feet of right-of-way width would be acquired for 9 miles. The three alternative routes would cost more, would perform less well electrically, and would not be environmentally preferred. • Environmental consequences for the two projects would be as follows. For the North Eugene-Springfield project preferred alternative, both transmission line and substation impacts on all resources would be none to low, except for visual, which would be high because of views from I-5. For the South Eugene project transmission line impacts on all resources would be none to low for each alternative, except for visual, soils, and cultural resources. The preferred alternative would have the lowest impact on all three resources (it is shorter; requires less clearing and access road construction; and avoids potential artifact areas). Only noise effects would be higher for this alternative (low). • Alternatives to construction were evaluated and found not to be feasible. Taking no action would put the area at risk for outages, and would violate operating criteria. • BPA plans to recommend that the local governments incorporate the preferred alternatives into local comprehensive plans. • The DEIS is being mailed to about 120 agencies, groups, and individuals. A summary and information on how to receive the entire DEIS is being sent to about 3000 others. There will be a 60-day public review period. Public meetings will be held in the area to receive comments. Comments may also be submitted in writing.

For additional information on the DEIS or a copy of the DEIS, call or write:
Anthony R. Morrell, Assistant to the Administrator-Environment
Bonneville Power Administration
P.O. Box 3621 - AJ
Portland, Oregon 97208

Mail Comments to:
Joann Scott
Public Involvement Manager
Bonneville Power Administration
P. O. Box 12999-ALP
Portland, Oregon 97212

From Oregon, toll free: (800) 452-8429
From other western states, toll free: (800) 547-6048
From elsewhere, not free: (503) 230-3478

Date by which comments must be received:

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SUMMARY

The Eugene-Springfield Area Planning Project identifies locations of future power facilities in the Eugene-Springfield, Oregon, area and proposes that those locations be incorporated into the planning documents for the local governments affected. The activity is being undertaken by Bonneville Power Administration (BPA) in cooperation with the governments of the Cities of Eugene and Springfield, and Lane County. The project consists of two potential actions, one in north Eugene-Springfield, and one in south Eugene.

PURPOSE OF AND NEED FOR ACTION

BPA has evaluated electrical system needs for the Eugene-Springfield area for the next 20 years. (See Figure S-1.) The forecasts indicate that there will be two operating problems.

In the **north Eugene-Springfield** area, existing transformers at Alvey and Lane Substations and existing 115-kV lines connecting those substations to the north Eugene-Springfield area **will overload by the mid- to late 1990's** because of expected development and population growth.

In the **south Eugene** area, the electrical system **will become less reliable and efficient by the late 1990's or early 2000's** when the loads from Eugene-Springfield, southern Oregon, and the Oregon coast increase. BPA could no longer serve those areas if one 500-kV line or one transformer were out.

If BPA were to wait to site these projects until they were needed, they would be more disruptive and costly because urban development would have continued in the interim. Siting them now means that they can be incorporated into the comprehensive plans of Eugene, Springfield, and Lane County, and so land use conflicts and costs can be kept to a minimum.

This planning project has six purposes.

- Maintain reliable electric service in the Eugene-Springfield, southern Oregon, and the Oregon coast areas.
- Minimize cost.
- Minimize environmental impacts.
- Meet BPA contractual obligations.
- Contribute to energy conservation.
- Comply with all applicable National policies.

AFFECTED ENVIRONMENT

The project area includes approximately 500 square miles of central Lane County, Oregon, in and near the Eugene-Springfield metropolitan area (est. population 211,400). The project area is located within the Willamette River drainage basin. The Willamette and McKenzie Rivers are the two dominant water

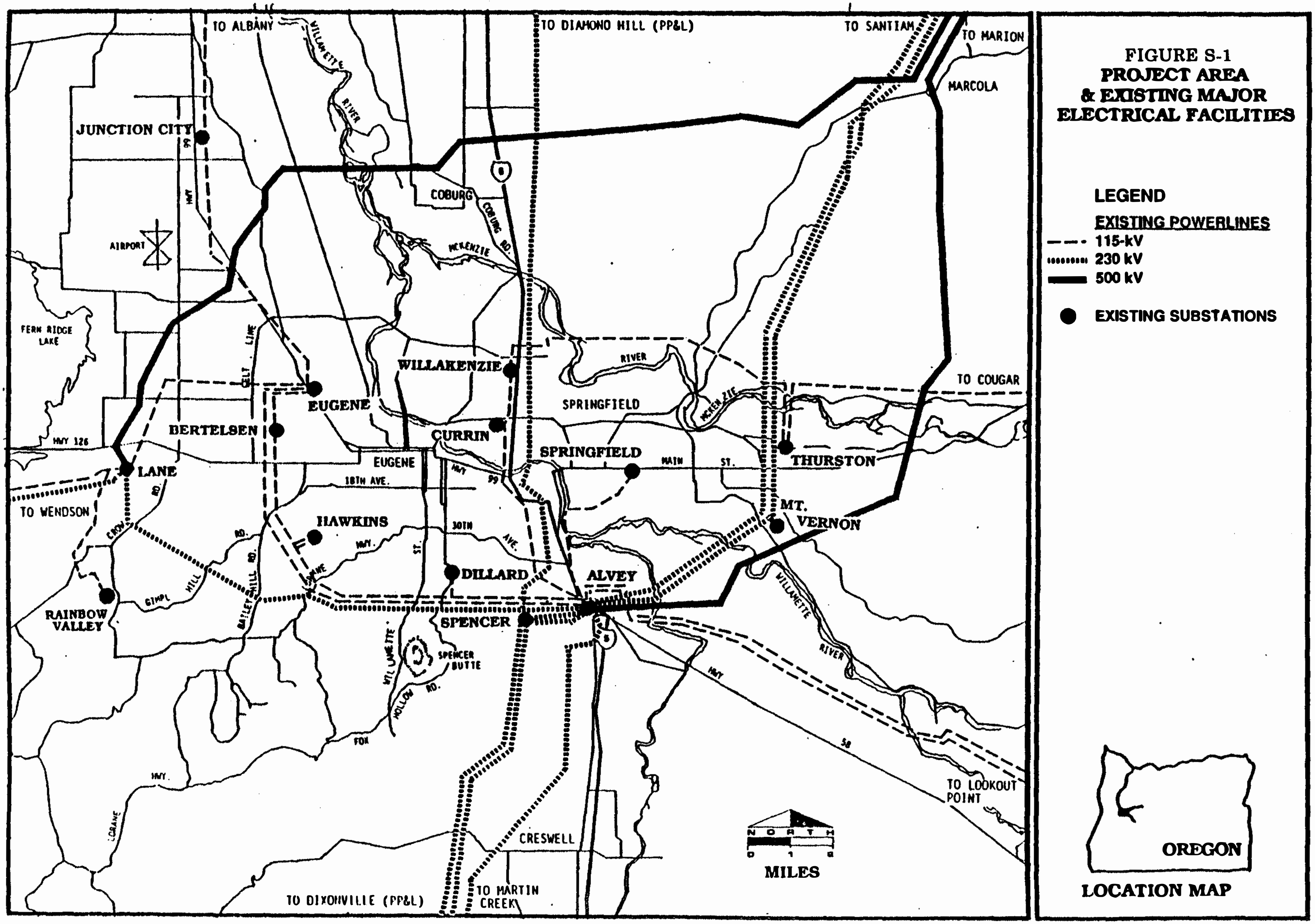


FIGURE S-1
PROJECT AREA & EXISTING MAJOR ELECTRICAL FACILITIES

features, but the area includes other rivers and creeks, and many small wetlands and floodplains. The Willamette Valley is generally flat and bounded on the east, west, and south by rolling hills.

Vegetation is primarily coniferous forest, oak forest, or grasslands. Many species of mammals, birds, reptiles, amphibians, and fish are found in the area.

Development within the project area is guided by the Eugene-Springfield Metropolitan Area General Plan, the Lane County Rural Comprehensive Plan, and the comprehensive plans for Coburg, Creswell, and Junction City. (None of the proposed actions are within the urban growth boundaries of Coburg, Creswell, and Junction City.)

Farming within the study area occurs mostly on the valley bottoms and lower foothills. Agricultural activity includes cash crops, grass seed, and fruit and nut orchards.

During summer, open burning of grass and forest slash contribute to short-term violations of ambient air quality standards. During winter, wood space heating, industrial processes, and motor vehicle emissions combine with poor dispersion conditions to produce high particulate concentrations.

The area is noted for its many miles of jogging and bike paths, and many recreation centers and parks. The area's rivers host boating, fishing, and other water sports.

Historically, the settling of the Willamette Valley holds particular value in its agrarian landscape elements. Several architectural structures and transportation features such as roadways, railroads, and bridges, are listed on the National Register of Historic Places.

METHODOLOGY

The DEIS uses 11 categories of environmental impacts to analyze substation and transmission facilities.

- Public health and safety, especially electric and magnetic fields
- Visual resources
- Land Use - agriculture, recreation, residential, forest, special industrial
- Water resources, including floodplains and wetlands
- Fish and wildlife, including threatened and endangered species
- Vegetation/timber
- Soils
- Air quality
- Noise/radio-TV interference
- Historic/cultural resources
- Socioeconomic considerations

The DEIS uses six possible environmental impact ratings.

- No impact
- Slight impact
- Low impact
- Moderate impact
- High impact
- Very high impact

PUBLIC INVOLVEMENT AND ISSUES

BPA initiated development of this planning project in close cooperation with the three affected governments: Eugene, Springfield, and Lane County. Meetings with local citizens, staff, utilities, the three planning commissions, and the city councils and County Commission influenced the basic design of the project and successive changes to it.

Areas of controversy include potential visual impacts and potential electric and magnetic field effects (an issue of controversy throughout the country). **Land use** also emerged as a significant issue, including potential conflicts with agriculture, forestry, and special light industry. **Issues to be resolved include considerations of how these concerns will be accommodated and/or balanced in reaching a conclusion as to a proposed action for each of the two projects.**

NORTH EUGENE-SPRINGFIELD REINFORCEMENT - DESCRIPTION OF ALTERNATIVES

Reinforcing the north Eugene-Springfield area would include (1) constructing a 230/115-kV substation, and (2) tying it into existing facilities with new transmission lines.

No Action Alternative

No power facilities would be built. This alternative would put the area at risk for periodic outages.

Transmission Alternatives

There are three transmission alternatives. Figure S-2 shows their location; Figure S-3 shows how they would look.

ALTERNATIVE I — Alternative I would build a new 4-mile H-frame wood pole 230-kV line from BPA's Lane-Marion 500-kV line near Coburg to a new 230/115-kV substation (common to all alternatives) in the McKenzie/Gateway area. It would also require a new 500/230-kV substation just south of the existing BPA 500-kV Lane-Marion line, north of Coburg and east of Interstate 5. For 2 miles, the line would occupy the vacant side of Pacific Power & Light Company's (PP&L's) double-circuit steel lattice towers.

ALTERNATIVE II — Alternative II would tap BPA's existing Santiam-Alvey 230-kV lines northeast of Springfield. The new line would proceed west for 6 miles, paralleling BPA's existing Cougar-Willakenzie 115-kV line to the new 230/115-kV substation.

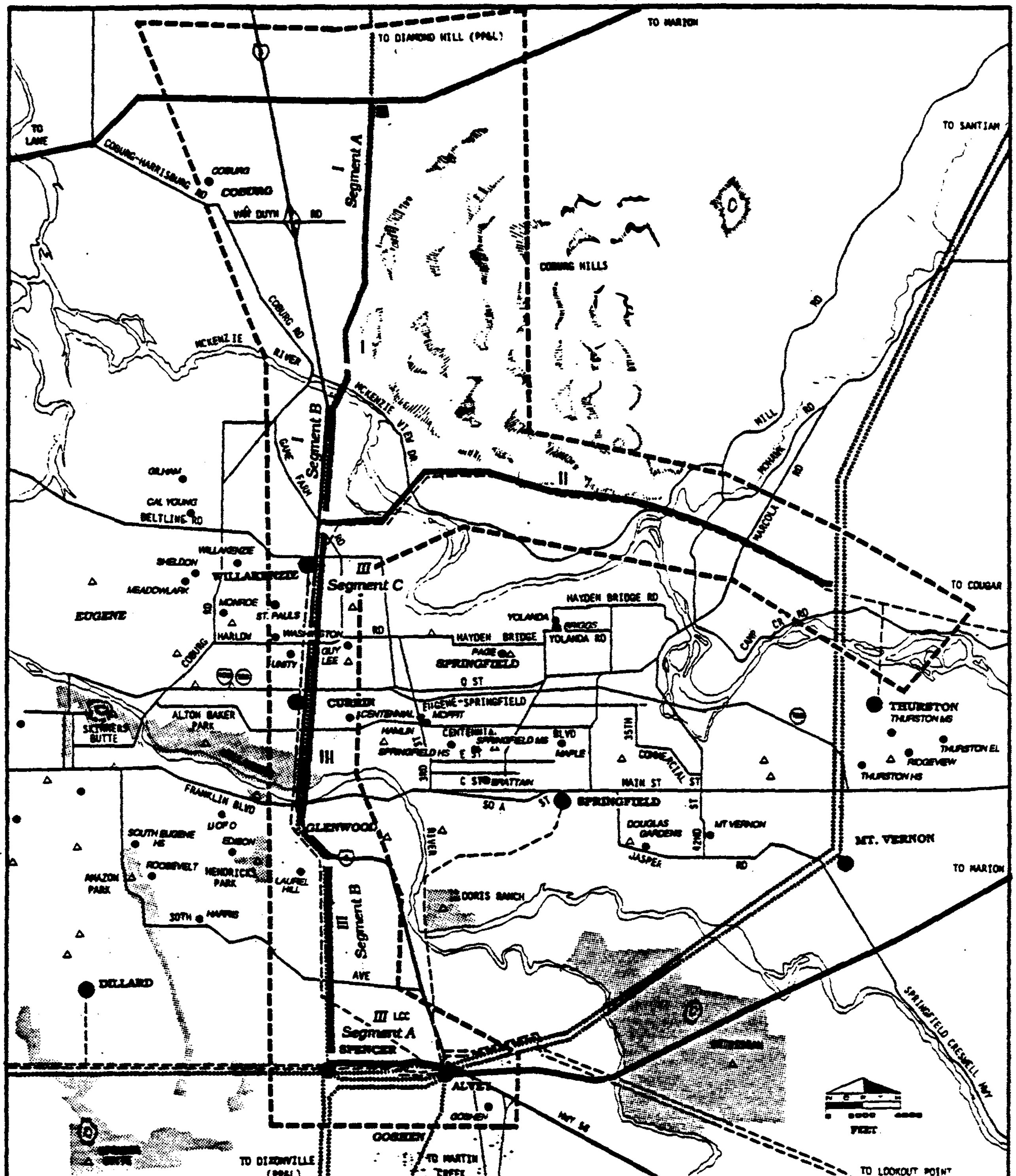


FIGURE S-2
TRANSMISSION ALTERNATIVES, NORTH EUGENE-SPRINGFIELD

LEGEND

STUDY AREA BOUNDARY

POWERLINES
115-kV
230-kV
500-kV

SUBSTATION

SCHOOLS

PARKS

WETLANDS

PROPOSED NORTH EUGENE-SPRINGFIELD TRANSMISSION ALTERNATIVES I, II, III

LOCATION FOR NEW ALTERNATIVE I SUBSTATION

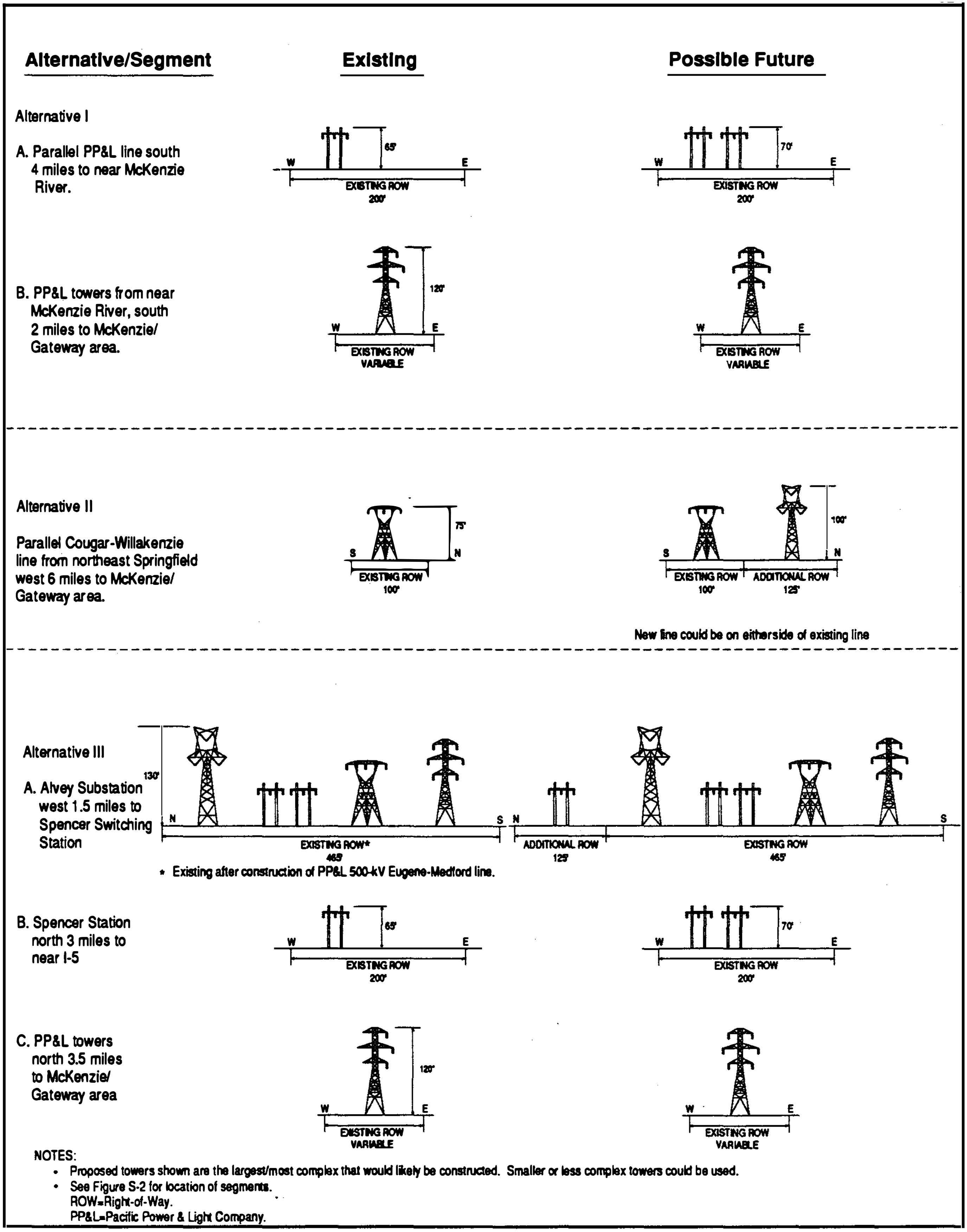


Figure S-3
Existing and Proposed Structures and Right-of-Way, by Alternative and Segment
North Eugene-Springfield

ALTERNATIVE III — Alternative III would connect into the 230-kV system at Alvey Substation, south of Eugene. It would require more right-of-way parallel to BPA's Alvey-Lane corridor for 1.5 miles, would parallel PP&L's Spencer-Diamond Hill line for 3 miles, and then occupy the vacant side of PP&L's existing towers for 3.5 miles to the new 230/115-kV substation.

Substation Alternatives

A 230/115-kV substation is necessary in the McKenzie/Gateway area to distribute the energy from the proposed 230-kV line. The new substation would be tied into the local distribution system. The substation would occupy about 5 acres. There are three alternative sites. (See Figure S-4.)

SITE 1 — Adjacent to and east of both Interstate 5 and PP&L's 230-kV double-circuit line.

SITE 2 — Adjacent to Eugene Water & Electric Board's (EWEB) existing Willakenzie Substation, adjacent and west of Interstate 5.

SITE 3 — At the point where Maple Isle Farm Road crosses BPA's 115-kV line on transmission right-of-way.

NORTH EUGENE-SPRINGFIELD REINFORCEMENT - CONSEQUENCES AND COMPARISON

The major environmental consequences of each alternative are summarized and compared below. Both substation and transmission alternatives are discussed under each heading. Table S-1 compares the three transmission alternatives. Table S-2 compares the three substation sites.

Public Health and Safety

Expected increases in magnetic field strengths for nearby residents would vary among the alternatives. Alternative II would incur the least increased exposure; Alternative III, the most. Impacts for Site 2 would be low; significant population growth is more likely here than at Sites 1 or 3, which would have only slight impacts.

Visual Resources

Visual impacts for Alternative I and its accompanying substation would be low because they are relatively isolated with few viewing opportunities and because the existing line has already established an impact. Alternative II crosses two rivers and two important rural highways used for scenic and recreational purposes. It would require extensive clearing, increasing corridor visibility. It would also cross along the edge of the Special Light Industrial site, for moderate impacts. Alternative III has the greatest exposure to residences, but would largely occupy the unused side of an existing line, for low impacts.

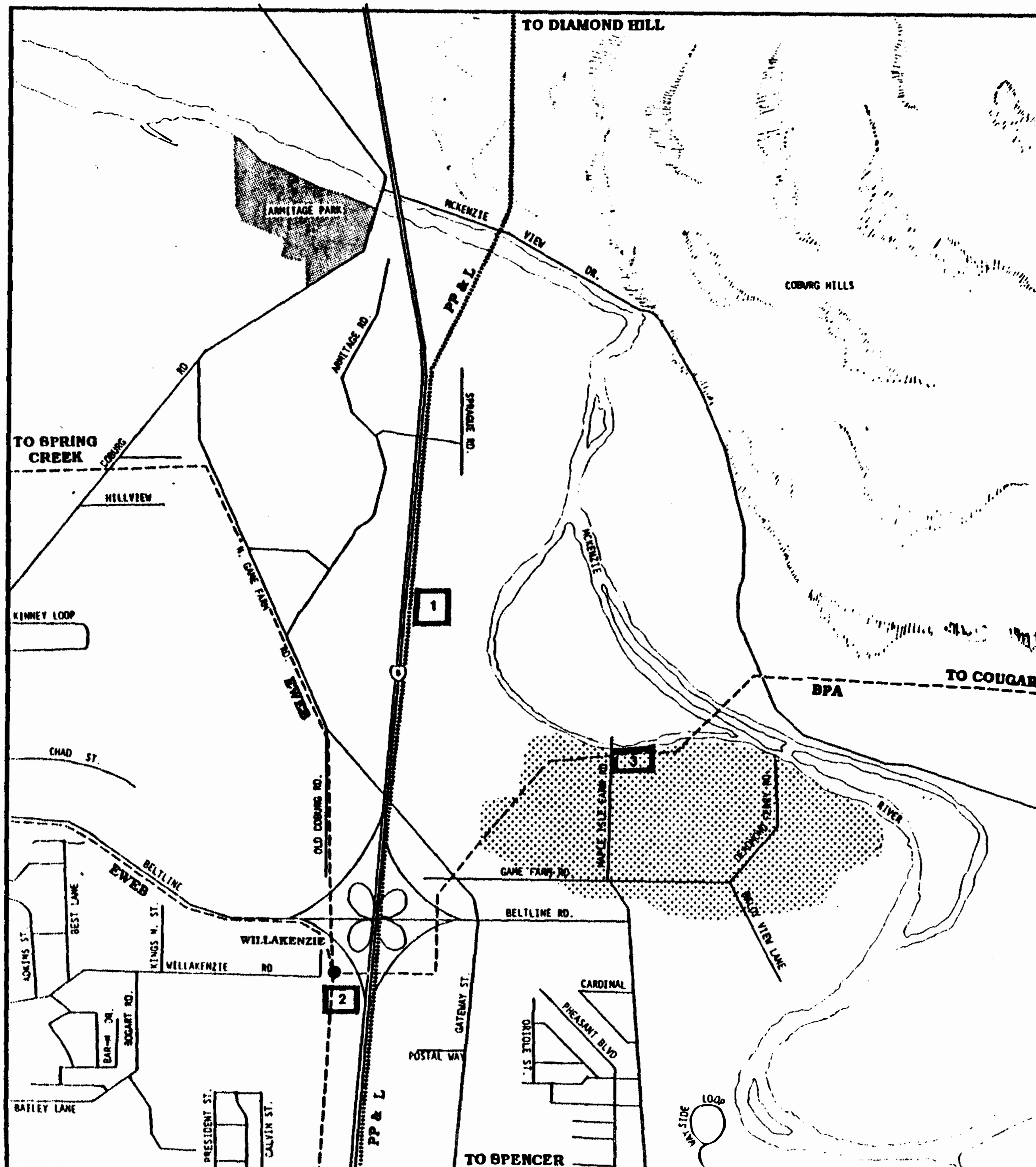


FIGURE S-4
SUBSTATION SITE ALTERNATIVES, NORTH EUGENE-SPRINGFIELD

LEGEND

EXISTING POWERLINES

- 115-kV
- 230-kV
- 1 SUBSTATION ALTERNATIVE
- EXISTING SUBSTATION

EWEB = EUGENE WATER & ELECTRIC BOARD

PPL = PACIFIC POWER & LIGHT COMPANY

BPA = BONNEVILLE POWER ADMINISTRATION

MCKENZIE/GATEWAY SPECIAL LIGHT INDUSTRIAL SITE

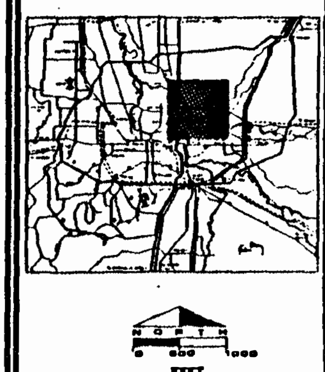


Table S-1. Comparison of Transmission Alternatives, North Eugene-Springfield.

Description[1/]	Alternative[2/] I	II	III
Length (miles)			
Parallel to existing line	4	6	4.5
On vacant side of double-circuit structure	2	--	3.5
Total	6	6	8.0
Area (acres)			
Additional Right-of-Way	0	91	0
500/230-kV Substation	10-20	0	0
New Access Roads (miles)	<1	<1	<1
Resource Lands Affected (acres)			
Timber	<5	60	22
Agriculture	10-20	<1	<1
Cost (millions)			
Transmission line[3/]	$1.2	$ 1.3	$ 1.6
500-kV/230-kV Substation	9.0	0	0
Total	$10.2	$ 1.3	$ 1.6
Environmental Criteria/Impact Rating[4/]			
Public Health/Safety[5/]	slight	0	low
Visual Resources	low	moderate	low
Agriculture	low	slight	slight
Recreation	0	0	0
Water Resources	slight	slight	slight
Fish	0/slight	0/slight	0/slight
Wildlife	slight/low	low	0/slight
Vegetation	slight	slight	slight
Timber	slight	slight	slight
Soils	slight/low	low	low
Air Quality	slight	slight	slight
Noise	0	0	0/slight
Historic/Cultural Resources	0/slight	slight/low	0/slight

1/ Each alternative would also require a 230/115-kV substation in the McKenzie/Gateway area. See Table 2.

2/ The No Action Alternative would result in a zero for each category on the table.

3/ Transmission line costs would vary slightly depending on which 230/115-kV substation site were selected.

4/ In order of increasing impact, the ratings are: 0, slight, low, moderate, high, and very high.

5/ Based only on potential increase in magnetic field exposure.

< = less than

Table S-2. Comparison of Substation Alternatives, North Eugene-Springfield.

Description	Alternative[1/] 1	2	3
Area (acres)	5	5	5
Resource Lands Cleared (acres)			
Timber	0	0	0
Agriculture	5	2-3	5
Cost (millions)[2/]	$8.0	$8.0	$8.0
Environmental Criteria/Impact Rating[3/]			
Public Health/Safety	slight	low	slight
Visual Resources	high	high	moderate
Agriculture	low	slight	slight
Recreation	0	0	0
Water Resources	slight	0/slight	slight
Fish	0	0	0
Wildlife	0/slight	0/slight	0/slight
Vegetation	slight	slight	slight
Timber	0	0	0
Soils	slight	slight	slight
Air Quality	slight	slight	slight
Noise	0	0	0
Historic/Cultural Resources	0	0	0

1/ The No Action Alternative would result in a zero for each category on the table.
2/ Does not include costs outside the substation, such as for relocating lines. Those costs cannot be determined until final designs are developed.
3/ In order of increasing impact, the ratings are: 0, slight, low, moderate, high, and very high.

Site 3 is the most isolated of the substation sites, and would not be visible from any sensitive viewpoints. Site 1 would change a previously undisturbed area from a pastoral to an industrial setting. Site 2 would also have high impacts from the transmission line crossing of Interstate 5 and the expansion of the substation which is already visible from Interstate 5 and Beltline Road.

Agriculture

None of the transmission alternatives would significantly affect agricultural production. None would remove from production more than 0.5 acre of prime farmland and additional farmland of local importance. The additional substation required by Alternative I would remove 10 to 20 acres of agricultural land from production.

All three substation sites would remove about 5 acres of prime farmland from production. Only Site 1 is zoned for agricultural use. Sites 2 and 3 are within the Urban Growth Boundary.

Recreation

None of the transmission or substation alternatives would affect recreation.

Water Resources

The impact on water quality would be slight and short-term (during construction) for each alternative. None of the substation sites would have more than a slight impact on water resources.

Alternatives I and III cross floodplains but both use existing structures. Alternative II crosses two floodplains (2250 and 5250 feet). In a worst case, about 10 structures and associated roads would be in floodplains. Sites 1 and 3 are in floodplains; Site 2 is not. Special requirements would be met if a floodplain site were selected.

Alternatives I and II each cross one wetland that can be spanned. Alternative III crosses two wetlands that can also be spanned. No wetlands occur at any of the substation sites.

Fish and Wildlife

Each alternative crosses streams and rivers, but each can be easily spanned. Alternative II crosses the most miles of big game habitat; Alternative III, the least. Fish would not be affected by any substation site; wildlife values would be minimally affected. No species listed as threatened or endangered are found in the project area.

Vegetation/Timber

Alternative I would clear no timber. Alternatives II and III would clear 60 and 22 acres, respectively. These amounts are not significant, as Lane County has approximately 2.5 million acres of forest resources. Only slight amounts of vegetation and no trees of commercial significance would be removed for any substation site. Impacts are slight but equal for any alternative.

Soils

Soil impacts would be localized and short-term for both transmission and substation alternatives. They would be slight-to-low for Alternative I (which would cross fewer miles of highly erosive soils), and low for Alternatives II and III. Alternative II requires three
III, with consequent impacts for highly erosive soils. All three substation sites are on level ground. Impacts would be slight for each.

Air Quality

With mitigating measures, air quality impacts for each alternative would be slight, localized and temporary (during construction).

Noise

Corona noise (associated with foul weather) would not increase more than 10 dB(A) for any alternative. Levels would be well below the State regulated level of 50 dB(A). Alternative III would have a slight impact due to the large number of housing units close to the lines. Audible noise at the substation boundary at any site is expected to be well below the state-regulated level of 50 dB(A).

Historic/Cultural Resources

Historic or cultural resources would not be affected visually by Alternatives I or III, due to distance. It is also unlikely that additional resources would be discovered. Visual and indirect impacts could occur for identified resources along Alternative II, with some possible direct effects on one identified site from construction surface disturbance. Potential exists for discovery of new sites, with possible construction disturbance.

No archaeologic sites have been recorded at the proposed substation sites. The risk of undiscovered sites is low.

Environmentally Preferred Alternative

There is no clear environmentally preferred transmission alternative. Overall, Alternatives I and III are slightly preferable to Alternative II. No alternative would have a high negative impact on any resource. Alternative II is preferred for public health/safety, but least preferred for visual impacts. Site 3 is the environmentally preferred substation alternative. It rates the same or slightly better than the other two alternatives in each resource category.

Agency Preferred Alternative

BPA prefers transmission Alternative II because it would give the best electrical performance at the least cost. Environmental impact ratings are zero, slight, or low for all categories except visual. It could affect the Special Light Industrial Site visually.

BPA prefers substation Site 1 because it would be easier and less costly to develop. Site 2 has intense adjacent development. Site 3 is already committed to special light industrial development.

SOUTH EUGENE REINFORCEMENT: DESCRIPTION OF ALTERNATIVES

Reinforcing the south Eugene area would involve connecting the Alvey Substation, south of Eugene, and the Lane Substation, west of Eugene, with a 500-kV transmission line.

No Action

No facilities would be built. This alternative would put the Eugene-Springfield area and Oregon's southern coastal area at risk for periodic outages.

Transmission Alternatives

There are four transmission alternatives. Figure S-5 shows their location; Figures S-6, S-7, S-8, and S-9 show how they would look.

ALTERNATIVE A — This alternative would use the existing Alvey-Lane corridor to construct a new 13-mile 500-kV line. Beginning at the Lane Substation and moving east, for the first 1.5 miles, it would parallel the existing 230-kV line on vacant right-of-way; no additional right- of-way would be required. The next 6 miles would require additional right-of-way 125 feet wide. The next 4 miles would build the new line in the center of the right-of-way, after relocating two existing 115-kV lines to double-circuit structures at the north edge of the right-of-way; no additional right-of-way would be required. For the last 1.5 miles, 125 feet of additional right-of-way would have to be acquired. A total of 112 acres of additional right-of-way would have to be acquired.

ALTERNATIVE B — This alternative was developed to avoid the more heavily populated section north of Spencer Butte between Dillard Road and Willamette Street. The first 7.5 miles would be identical to Alternative A. The next 7 miles would turn south, leaving the existing right-of-way, and requiring new right-of-way 125 feet wide. The next section would turn north for 4.5 miles, paralleling PP&L's existing 230-kV line. It would also require 125-foot-wide new right-of-way. For the last 1.5 miles, 125 feet of additional right-of-way would have to be acquired. A total of 286 acres of additional right-of-way would have to be acquired.

ALTERNATIVE C — This alternative seeks to avoid the same heavily populated area. The first 7.5 miles would be identical to A. For the next 5 miles, a new south-easterly route would be taken, requiring new 125-foot-wide right-of-way. Turning north and paralleling PP&L's line for 3 miles, the line would require new 125-foot-wide right-of-way. For the last 1.5 miles, 125 feet of additional right-of-way would have to be acquired. A total of 218 acres of additional right-of-way would have to be acquired.

ALTERNATIVE D — More than half of Alternative D is entirely new corridor, avoiding much of the Alvey-Lane corridor. The first 3.5 miles would require about 125 feet of new right-of-way parallel to the existing Lane-Rainbow Valley 115-kV line. For the next 12 miles, new corridor, with 125-foot-wide right-of-way, would be required. For 4.5 miles, the line would turn north, paralleling PP&L's existing line, requiring 125-foot-wide new right-of-way. For the last 1.5 miles, 125 feet of additional right-of-way would have to be acquired. A total of 327 acres of additional right-of-way would have to be acquired.

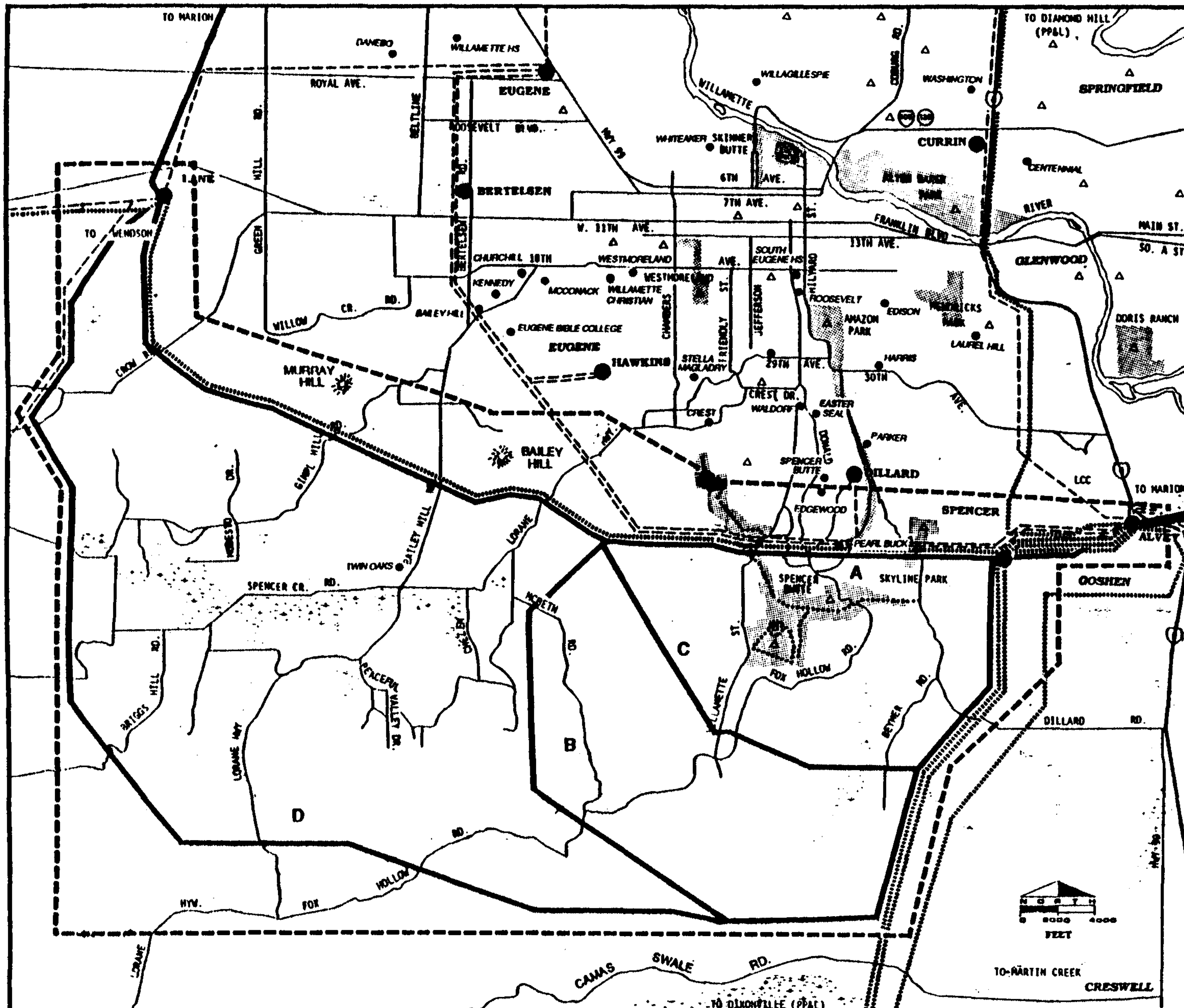
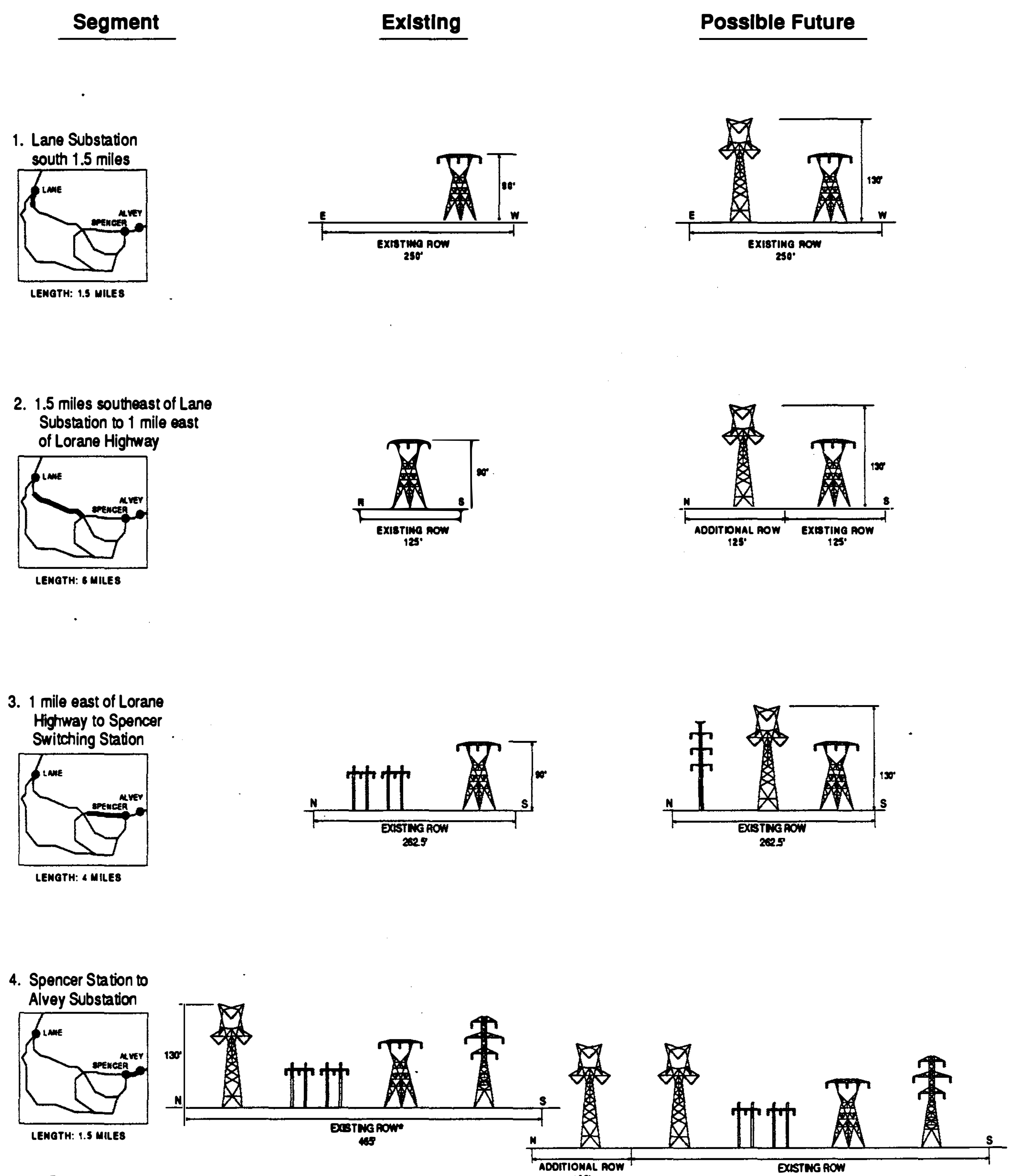


FIGURE S-5 TRANSMISSION ALTERNATIVES, SOUTH EUGENE

LEGEND

- STUDY AREA BOUNDARY
- POWERLINES
  - 115-kV
  - 230-kV
  - 500-kV
- SUBSTATION
- PROPOSED SOUTH EUGENE TRANSMISSION ALTERNATIVES A, B, C, D
- SCHOOLS
- PARKS
- WETLANDS
- RIDGELINE TRAIL

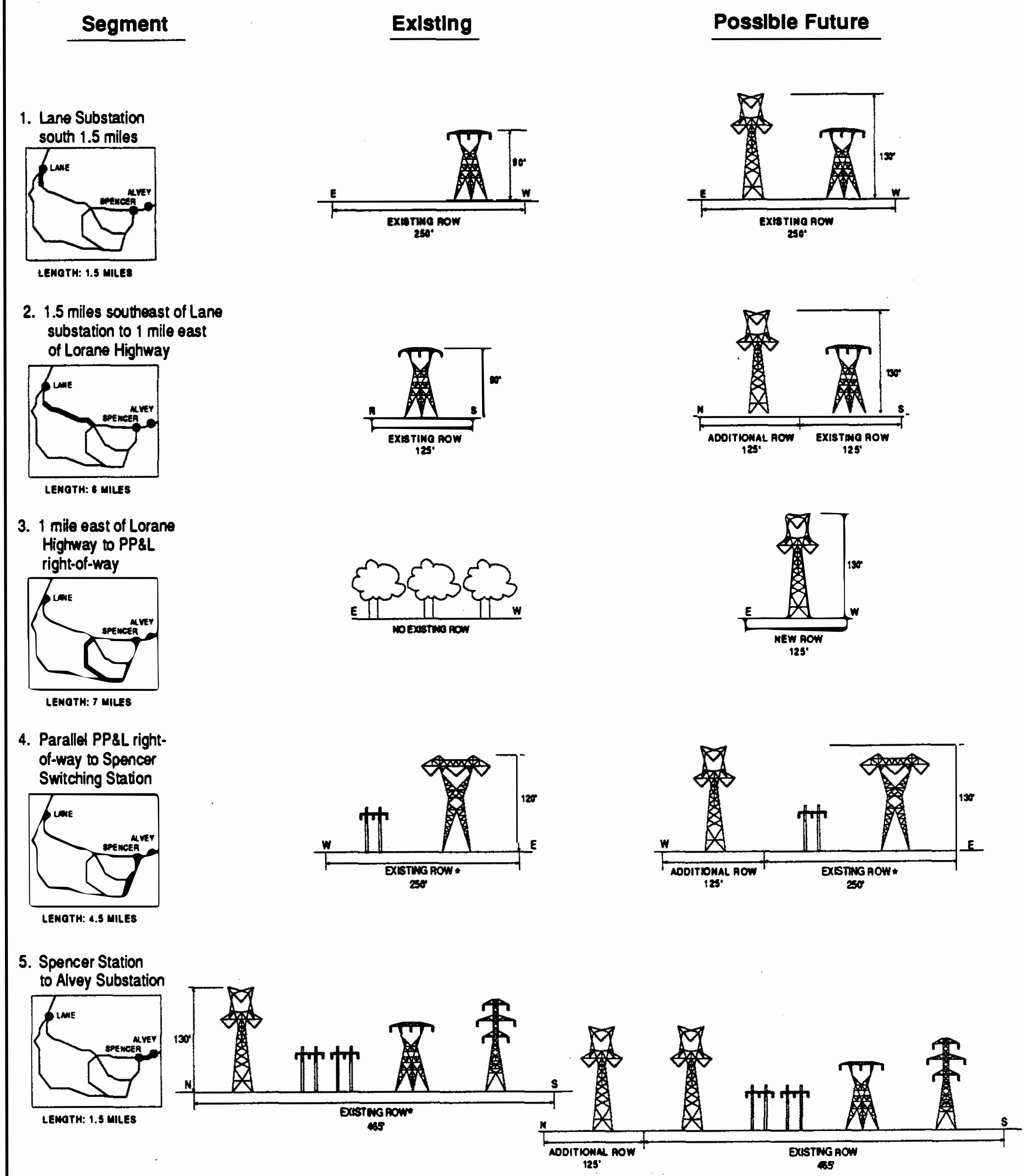


NOTES:

- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.

ROW=Right-of-Way.
PP&L=Pacific Power & Light Company.

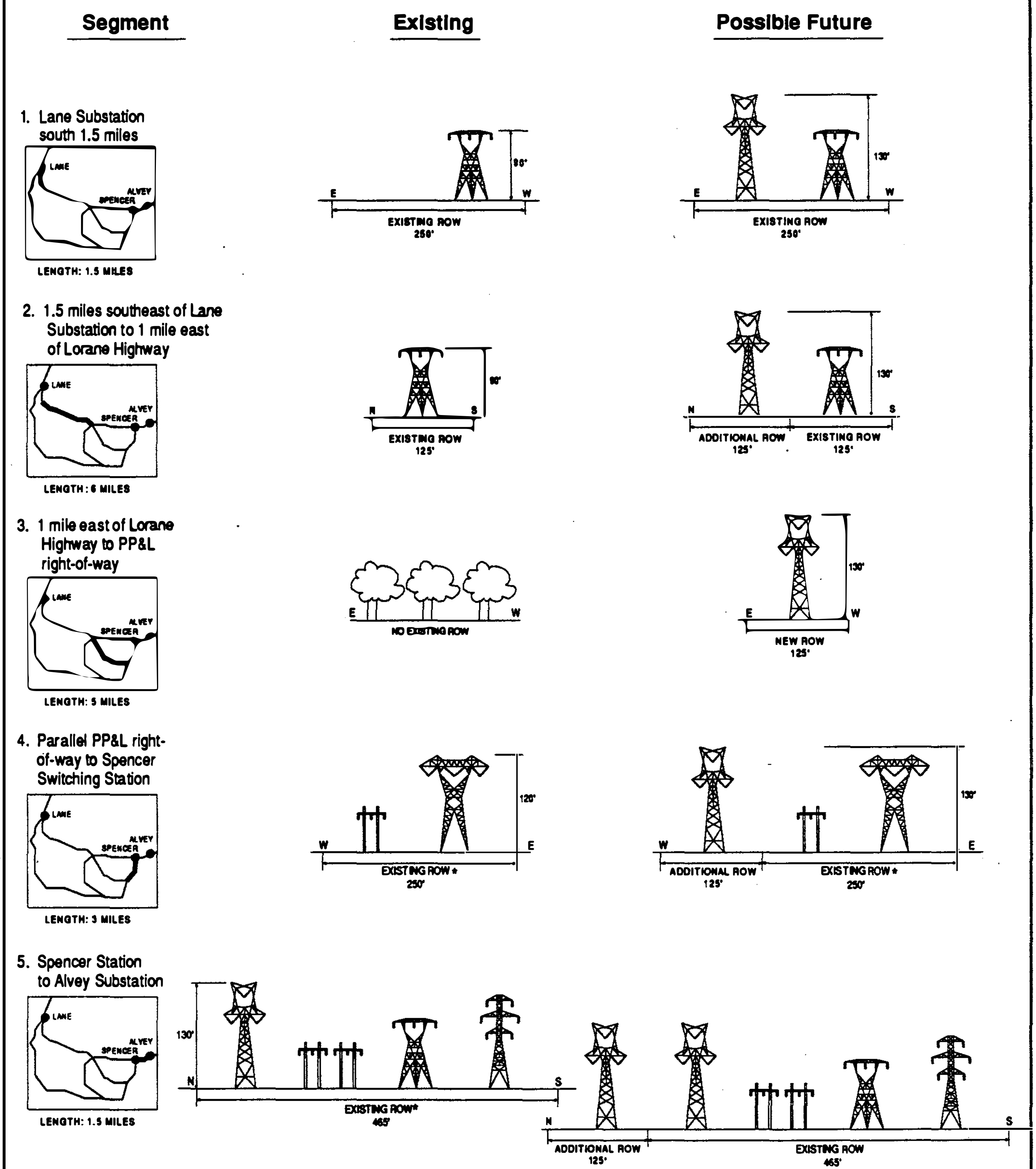
Figure S-6
Existing and Proposed Structures and Right-Of-Way, Alternative A South Eugene



NOTES:
- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- Existing after construction of PP&L 500-kV Eugene-Medford line.

ROW=Right-of-Way.
PP&L=Pacific Power & Light Company.

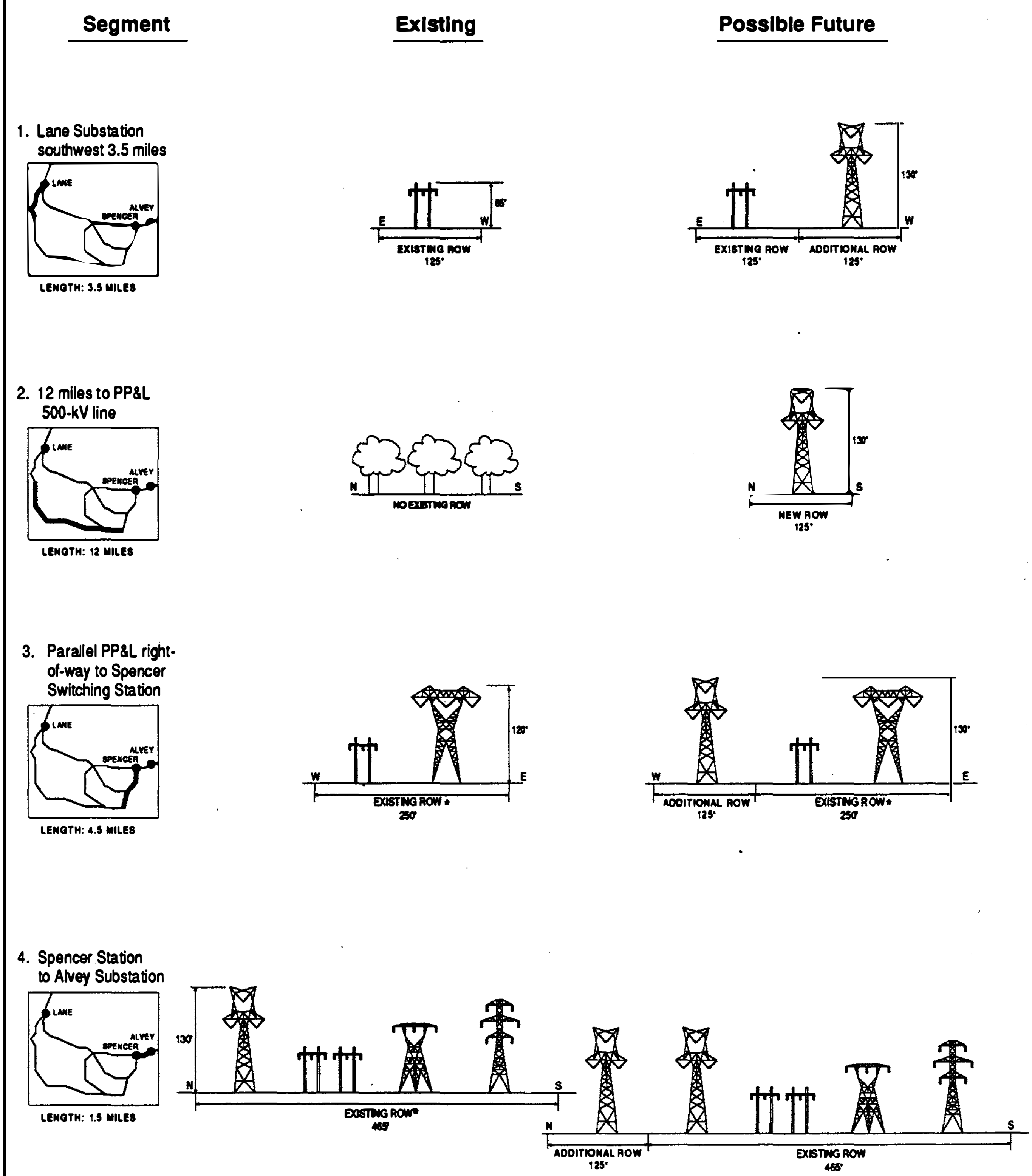
Figure S-7
Existing and Proposed Structures and Right-Of-Way, Alternative B South Eugene



NOTES:
- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.

ROW=Right-of-Way.
PP&L=Pacific Power & Light Company.

Figure S-8
Existing and Proposed Structures and Right-Of-Way, Alternative C South Eugene



NOTES:
- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.

ROW=Right-of-Way.
PP&L=Pacific Power & Light Company.

Figure S-9
Existing and Proposed Structures and Right-Of-Way, Alternative D South Eugene

SOUTH EUGENE REINFORCEMENT - CONSEQUENCES AND COMPARISON

The major environmental consequences of each alternative are summarized and compared below. Table S-3 compares the four transmission alternatives.

Public Health and Safety

Expected increases in magnetic field strengths for nearby residents would vary among the alternatives. For all alternatives, increases could occur on one side of a given segment of line, but not on the other. Increases combined with numbers of nearby residences shows that Alternatives A and D have smaller exposure indices than Alternative C. Alternative B has a considerably higher exposure index.

Visual Resources

Alternative A, which passes through the hills which form the south and west boundaries of Eugene, is close to many residents. However, its visual impacts would be much less than those of the other alternatives, because it is shorter and because it places a line on an existing corridor, where impacts have already been established. Many residences closer to the corridor have a tree screen between them and the line. Alternatives B and C are similar in visual impacts, except that B is longer. They would require extensive clearing and access road construction in an area of rural development. Alternative D would have the most severe impacts. Its location allows more open views from major roads. From some points, several towers could be seen.

Agriculture

Differences among alternatives are minimal. The overall impact on agriculture is slight, with negligible removal of land from production (less than 0.001 percent of total 1986 harvested acreage for Lane County) and minimal changes expected to agricultural practices.

Recreation

Impacts on recreation would be slight for all alternatives. Alternative A does not interfere with any recreational activities. B, C, and D would not directly affect any developed recreation sites.

Water Resources

All alternatives encounter steep terrain and erosive soils in the hills south of Eugene. Impacts could occur from construction-caused erosion and sedimentation into streams. Impacts for Alternative A are slight; for the other alternatives, low. Alternative D has the greatest amount of new clearing and new access roads; hence, the greatest affect on water resources.

Only Alternative D crosses floodplains. In the worst case, about four structures and associated access roads would need to be placed in floodplains.

Table S-3. Comparison of Transmission Alternatives, South Eugene.

Description	Alternative[1/] A	B	C	D
Length (miles)				
Parallel to existing line	9.0	13.5	11.0	9.5
Move/Relocate existing line	4.0	—	—	—
New right-of-way	—	7.0	5.0	12.0
Total	13.0	20.5	16.0	21.5
Area (acres)				
Additional/New Right-of-Way	112	286	218	327
New Access Roads (miles)	0	12	9	20
Resource Lands Affected (acres)				
Timber	110	163	150	206
Agriculture	1	1	1	1
Cost (millions)				
Transmission line	$ 6.2	$ 9.5	$ 7.5	$ 10.0
Substation Additions at Lane and Alvey	5.5	5.5	5.5	5.5
Total	$ 11.7	$ 15.0	$ 13.0	$ 15.5

Environmental Criteria/Impact Rating[2/]

Criteria	A	B	C	D
Public Health/Safety[3/]	slight	low	low	slight
Visual Resources	low	mod/high	mod/high	mod/high
Agriculture	slight	slight	slight	slight
Recreation	slight	slight	slight	slight
Water Resources	slight	low	low	low
Fish	slight	slight	slight	slight
Wildlife	slight	low	low	low
Vegetation	0	slight	slight	slight
Timber	slight	slight	slight	slight
Soils	low	low/mod	low/mod	moderate
Air Quality	slight	slight	slight	slight
Noise	low	slight	slight	slight
Historic/Cultural Resources	0	low	0	moderate

1/ The No Action Alternative would result in a zero for each category on the table.

2/ In order of increasing impact, the ratings are: 0, slight, low, moderate, high, and very high.

3/ Based only on potential increase in magnetic field exposure.

Alternatives A and B cross no wetlands. Alternative C crosses one wetland which can be spanned. Alternative D crosses four wetlands. In the worst case, as many as four structures and associated access roads would be placed in wetlands.

Fish and Wildlife

None of the alternatives would affect fish resources. No roads would be necessary across streams. Clearing effects account for the slight impact rating; thus, Alternative A is preferred, Alternative D least preferred.

Alternatives B and D cross the most big game major habitat; Alternative A considerably less. Alternative A has a slight impact rating; the others rate as low. There are no listed or proposed endangered species within the area of the project at this time.

Vegetation/Timber

Vegetation would be restricted to low-growing species, and timber would be permanently removed. Alternative A would remove the least timber (110 acres); Alternative D, the most (206 acres). These impacts are judged to be slight when compared to the amount of forest resources in the area. Clearing for new access roads is judged as a slight impact for each alternative.

Soils

Impacts would be low for Alternative A, low-to-moderate for B and C, and moderate for Alternative D. These ratings are related to the amount of clearing required for construction and for new access roads (which increases the risk of erosion and sedimentation). Impacts would be short-term.

Air Quality

Impacts would be slight, short-term, and localized for any alternative, primarily from construction activities. Alternative A would run through more residential area, but would require less construction activity; Alternative D would require the most construction.

Noise

Corona noise is associated with foul weather. Increses greater than 10 dB(A) would occur in some segments of all alternatives. However, no levels would exceed the State noise standard of 50 dB(A). Depending on the number of housing units near the proposed lines, impacts would range from slight to low.

Historic/Cultural Resources

Alternative A is preferred because no cultural resource sites have been documented in the area and because it is in a more heavily developed area (reducing the likelihood of new discoveries). Alternative C also has no documented sites. Alternatives B and D, however, occur in the Camas Swale area, with documented sites nearby. Their locations have higher potential for additional discoveries.

Environmentally Preferred Alternative

Alternative A is environmentally preferred: it has the same or less environmental impact for all resource categories except for noise. (Noise levels would, however, be within State of Oregon noise standards.) It would have less environmental impact primarily because it would use or parallel existing right-of-way, and no new access roads would be needed.

Agency Preferred Alternative

BPA prefers Alternative A because it would provide the best electrical performance, would cost less, and would have the least overall environmental impact, when compared with the other alternatives. Alternative A is the shortest, and it best contributes to energy conservation. The alternatives' preference order is: A, C, B, D.

CUMULATIVE IMPACTS

Cumulative impact is the incremental impact of all past, present, and future anticipated actions similar and close to the North Eugene-Springfield and South Eugene projects. Any additional impact that could possibly occur would be due to the following.

Construction of Both Projects

The environmental impact for each alternative would change only for the final 1.5 mile segment, between Spencer and Alvey, shared by Alternative III (North Eugene-Springfield) and all South Eugene alternatives. Magnetic field exposures could change, but have been estimated as no worse than those reported for the individual projects. The visual character of the right-of-way would become more complex and chaotic. However, existing visual disruptions in the multi-line corridor render this cumulative impact minor. The area is relatively isolated, and the corridor is not visible from any nearby residences or public roads. A total of 48 acres of timber would be removed if both projects were built, an insignificant amount in the context of the county timber base. Slight noise increases would occur, but within State of Oregon standards.

Construction of Some Other Project

In 1991, PP&L is planning to build a 500-kV transmission line which includes construction in the Alvey-Spencer corridor. This DEIS assumes the completion of that project, shown in each figure depicting the right-of-way.

Local Utility Projects

Local utilities may develop an electrical distribution network to tie into this and other projects. BPA cannot speculate on those decisions.

CONSULTATION, PERMITS AND REVIEW

This project is being closely coordinated with the State and Areawide Clearinghouses to ensure State, areawide, and local plan and program consistency. Any exceptions to Statewide Planning Goals for farm and forest areas (dependent on selected alternatives) will be applied for, as necessary.

No species are listed as threatened or endangered in the project area. The finding would be updated before any construction began.

The proposed action is consistent with national policy for preservation of farmland.

No protected recreation resources would be affected.

The project will not interfere with protection, mitigation, enhancement, or conservation of fish and wildlife species. None of the proposed actions would impound, divert, or control water resources.

Some alternatives for the two projects would cross wetlands and floodplains; some would not. Special requirements for construction in floodplains and wetlands would be met if necessary.

A Section 10 permit from the U.S. Army Corps of Engineers may be required if Alternative II were selected. BPA would comply with this requirement.

No discharges into waters of the United States would occur with any of the alternatives. The proposed actions would involve no land administered by other Federal agencies.

Clean Air Act quality standards would not be violated. This proposal would be consistent with Oregon Administrative Rules on clean water and safe drinking water. Minimal hazardous waste would be generated and would be disposed of properly. PCB-contaminated electrical equipment will not be placed in the new substation(s). Herbicide application to control vegetation will be done in accordance with BPA's vegetation management program, with established controls to prevent unwanted spread of chemicals. Noxious weed control will be coordinated with affected landowners and appropriate Federal, State, and local agency representatives.

The proposed projects will not exceed State of Oregon noise standard limits.

Requirements for cultural resources consultation, inventory, and recordation will be followed for these projects.

RECOMMENDATION

Based on the information contained in this DEIS, BPA plans to recommend that the governments of the Cities of Eugene and Springfield and of Lane County adopt into their comprehensive plans the following alternatives.

- North Eugene-Springfield: Transmission Alternative II, Substation Site 1.
- South Eugene: Alternative A.

ISSUES TO BE RESOLVED

Issues to be resolved include the following.

- Whether the tradeoffs among resources have been appropriately judged and balanced in the agency preference
- Whether the recommended alternatives are preferred by the concerned governments as well
- Whether other alternatives or additional information exists which might change the rankings or preferences among these alternatives.

Chapter I

PURPOSE OF AND NEED FOR ACTION

Chapter I explains the need for change to the electrical system serving the Eugene-Springfield area in Oregon. The purposes that will be met by those changes are identified. The chapter also provides background information, and describes the decisionmaking process, the project area, and the organization of the Draft **Environmental Impact Statement** (DEIS).*

NEED

The Bonneville Power Administration (BPA) has evaluated electrical system needs for the Eugene-Springfield area for the next 20 years. With the existing electrical **transmission** system, long-range forecasts indicate the development of two operating problems: one in the north Eugene-Springfield area, and one in the south Eugene area.

North Eugene-Springfield

In their latest long-range plans, Eugene Water & Electric Board (EWEB), Springfield Utility Board (SUB), Emerald Peoples Utility District (EPUD), and BPA anticipate that **loads** in this part of the metropolitan area will increase, based on development patterns and population projections in the Eugene/Springfield Metropolitan Area General Plan. By the mid-to-late 1990's, these increases would cause the existing 230/115-**kilovolt** (kV) **transformers** at Alvey and Lane **Substations** to overload if one transformer were out of service. These increases would also cause the 115-kV lines connecting Alvey and Lane Substations to the north Eugene-Springfield area to overload during **outages**.

EWEB receives power at both the Lane and Alvey Substations. Five of SUB's six substations receive their entire requirements from the Alvey Substation.

South Eugene

As the load grows in the Eugene-Springfield area, southern Oregon, and the Oregon coast, the existing electrical system that serves those areas will become less reliable and efficient.

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* Words highlighted with bold lettering are defined in the glossary, Appendix A.

Figure 1 shows the three main facilities that provide electricity to these three areas.

- A 500-kV transmission line (Marion-Alvey) and a 500/230-kV transformer at Alvey
- A second 500-kV line (Marion-Lane) and a 500/230-kV transformer at Lane
- Two 230-kV lines (Santiam-Alvey and Alvey-Lane) and the Alvey and Lane 230/115-kV transformers

If the 230-kV lines were out, the two 500-kV lines could still supply about 2000 **megawatts** (MW) to the area.

However, if either of the 500-kV lines or their transformers were out, only about 1500 MW could be supplied. When more than 1500 MW are needed--for instance, during **peak load** periods--BPA would be unable to supply power. It is anticipated that loads on these facilities will exceed 1500 MW by the late 1990's or early 2000's. An outage of either of the 500-kV lines or one of the 500/230-kV transformers then would overload the remaining lines and transformers. These overloads could interrupt or reduce electrical service within the Eugene-Springfield area and to portions of the Oregon coast and southern Oregon.

Siting Problems

The most likely solutions to these system operating problems involve construction and operation of new transmission facilities. BPA and the local governments of Eugene, Springfield, and Lane County, Oregon, propose to establish centerlines for new transmission and substation facilities. The facilities will be built sometime within the next 20 years, depending on how rapidly electrical demand grows. It is intended that the centerlines be added to local comprehensive plan maps, and the local governments will consider adoption of ordinances to protect landowners and BPA when and if transmission facilities are developed.

Siting major electrical facilities in and near urban areas is difficult and costly. Electrical facilities are incompatible with some land uses. In addition, once dense urban development has occurred, costs for siting major electrical facilities can greatly increase.

The problems described above do not require solutions now. However, if BPA waited to site the projects until they are needed, they would be more disruptive and costly because of dense urban development that occurred in the meantime.

BPA is siting these projects now so that they can be incorporated into the land use plans of Eugene, Springfield, and Lane County, and so land use conflicts and costs can be kept to a minimum.

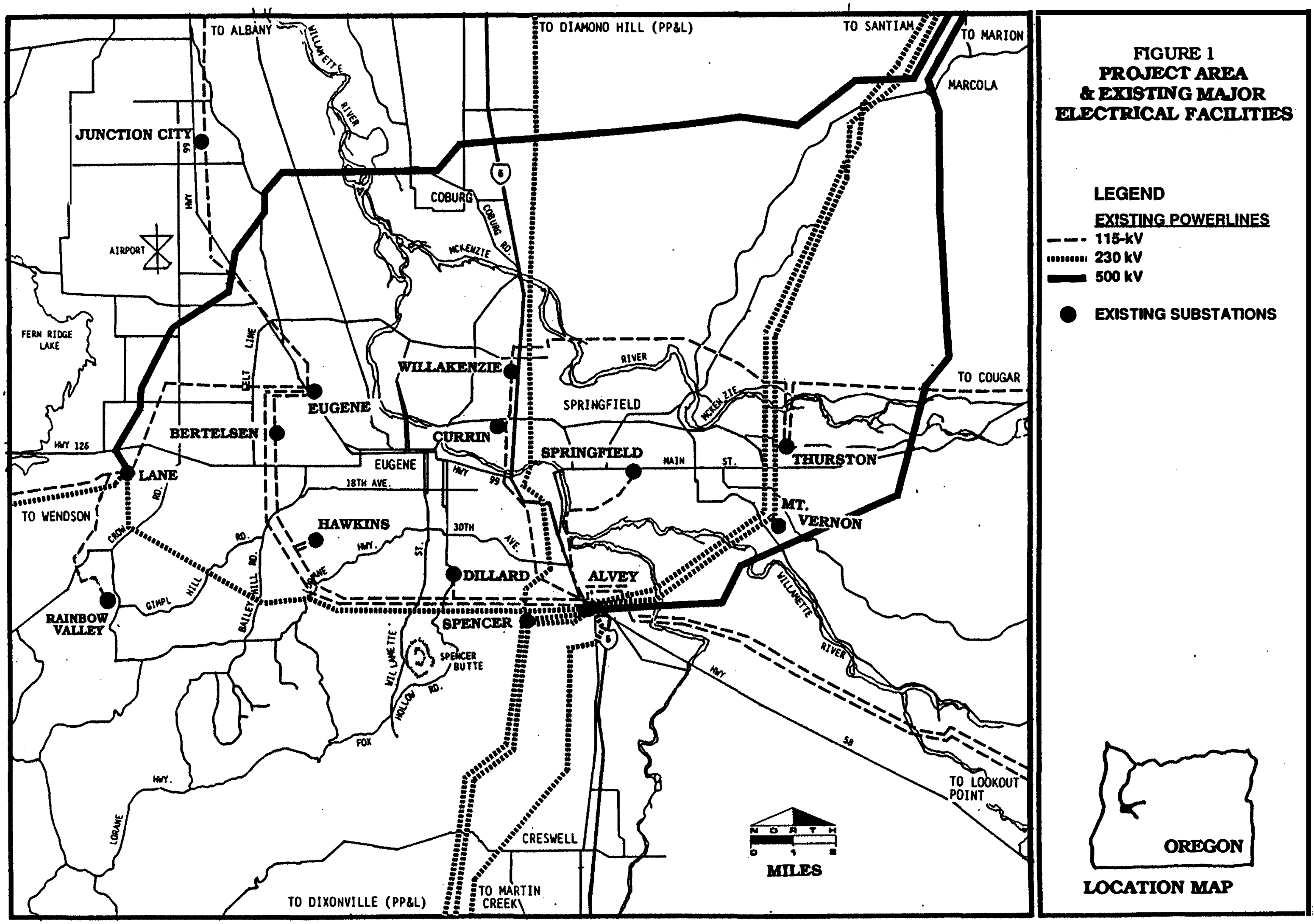


FIGURE 1
PROJECT AREA
& EXISTING MAJOR
ELECTRICAL FACILITIES

PURPOSE

Acceptable solutions for satisfying the identified needs would serve the following purposes.

- **Maintain reliable electric service in the Eugene-Springfield, southern Oregon, and the Oregon coast areas.**

  BPA subscribes to criteria of the National Electric Reliability Council and the Western Systems Coordinating Council, as well as to BPA's own standards to determine the criteria for reliable service. The criteria are published in "Reliability Criteria and Standards," a book available for reference at BPA offices.

- **Minimize cost.**

  BPA subscribes to a one-utility planning concept that views the entire Northwest electrical power system as if it were managed by one utility. That view helps eliminate duplication of facilities, and permits economies of scale that would not otherwise be possible.

  BPA must provide the best value in electric service to its customers; it must also recover its investment in the transmission system through power sales. Therefore, to avoid unnecessary rate increases, BPA must be certain, before construction, that a facility is needed.

  The estimated cost of each alternative includes material and labor costs, which vary with the length of the transmission line; the number, size, and equipment of substations; the type of structures, miles of access roads, acreage of right-of-way, land values, and terrain.

- **Minimize environmental impacts.**

  The following environmental considerations are used to develop and evaluate alternatives.
  - Public health and safety
  - Visual resources
  - Land use
  - Water resources
  - Fish and wildlife
  - Vegetation, including timber
  - Soils
  - Air quality
  - Noise/radio-TV interference
  - Historic/cultural resources
  - Socioeconomic considerations

- **Meet BPA contractual obligations.**

  BPA has agreements with EWEB, SUB, EPUD, Blachly-Lane County Cooperative Electric Association, and the Lane Electric Cooperative, Inc. to meet their needs for **firm power** growth.

- **Contribute to energy conservation.**

  Although it is not a primary objective of the project, construction of the facilities would result in energy savings, as transmission line losses in the area would be reduced.

- **Comply with other applicable National policies.**

  The following are especially important.
  - State, areawide, and local plan and program consistency
  - Threatened and endangered species
  - Farmland protection
  - Recreation resources
  - Fish and wildlife conservation
  - Floodplain management
  - Wetland protection
  - Permits for structures in navigable waters
  - Permits for discharges into waters of the United States
  - Permits for right-of-way on public land
  - Pollution control at Federal facilities
  - Energy conservation at Federal facilities
  - Coastal zone management consistency
  - Heritage conservation

BPA's decision on how to reinforce the electrical system in the Eugene-Springfield area will be based on which alternative best meets these purposes.

BACKGROUND

BPA, an agency of the U.S. Department of Energy, was created by Federal act in 1937 to market Federal power. The Bonneville Project Act directs the agency to provide electric service, giving preference to public utilities. BPA sells electricity to public and private utilities and to large industrial customers. The BPA grid of high-voltage lines transmits power from Federal dams and other power sources to customers with the facilities to accept delivery of that power. BPA also transfers power generated by other utilities.

One of BPA's first projects was to complete a transmission line from Vancouver, Washington, to supply power to Eugene, Oregon, in 1939. As demand for power in the Eugene area has increased, BPA has regularly built and upgraded its lines and substations to provide that needed power.

The Eugene-Springfield Area Planning Project identifies and evaluates the need for and alternative locations of electrical transmission facilities. The project considers those facilities of 230-kV and above which (1) are included in the BPA's long-range plans; (2) would be constructed and owned by BPA; and (3) would be located within the **Urban Growth Boundaries** (UGB) of Eugene and Springfield and in surrounding unincorporated Lane County.

BPA has entered into a contract with the Lane Council of Governments (L-COG) to include local agencies in the planning of transmission facilities. This agreement is to ensure that major BPA projects in the metropolitan area are consistent with the local governments' long-range comprehensive land use plans.

The planning project is being undertaken in two phases. The Technical Report (phase one) described planning criteria and existing facilities, summarized future load forecasts, and identified electrical system needs. That information is incorporated into the DEIS. The second phase, which includes this DEIS, identifies and evaluates specific alternative locations for substations and transmission lines.

Process

BPA continually evaluates its power system, looking at generation of power, energy needs, and BPA transmission facilities. Operations of the system are modeled on a computer to see future need and power supply. This model can then be "tested" to determine when facilities are needed and what facilities will best serve the need.

When a need is identified, BPA develops alternative ways to meet the need. These alternatives are then evaluated by environmental, economic, and technical measures. BPA works with the local utilities to ensure the best plan for any service area. On large projects, BPA also works with state agencies to make sure that plans comply with state standards. The public is invited to participate through the environmental analysis and public involvement processes. A typical project takes up to 5 years or more from the identification of need through construction. Budgeted projects are reviewed each year or whenever service conditions change. If the need changes, BPA can delay, stop, or speed up construction activities.

For this Project, a modified process is being used. BPA is looking at needs over a 20-year period. This means that project alternatives can be incorporated into the long-range comprehensive plans of Eugene, Springfield, and Lane County, and that future rights-of-way can be preserved.

BPA identified those needs in a Technical Report (June 1987). It describes existing facilities and load forecasts. It also evaluates the need for transmission facilities in the Eugene-Springfield area.

The Eugene, Springfield, and Lane County Planning Commissions reviewed the Report. The Metropolitan Policy Committee, made up of elected officials for the three local governments, accepted it.

Early meetings with local government staff, local utilities and the public in the Eugene-Springfield area indicated that the main issues of siting new electrical facilities would be public health and safety, and visual and land use conflicts.

This DEIS was developed by BPA, with the help of local government staff. It covers alternatives to meet the identified needs. It is intended that some of these alternatives will be selected and written into the Eugene-Springfield Metropolitan Area General Plan, the Lane County Rural Comprehensive Plan, and local refinement plans and development codes.

The DEIS will be sent to interested and affected persons, agencies, and organizations for their review and comments in public meetings or in writing. (Please see the letter on the DEIS' inside front cover for how to make comments.) A Final EIS (FEIS) will address those comments. After the FEIS is published, a Record of Decision will be developed to record BPA's decision publicly.

When the projects are proposed for construction, the environmental consequences will be reevaluated. Depending on how much circumstances have changed, either this EIS may be sufficient, or it may need to be supplemented. If circumstances are substantially different a new EIS may be needed. In any case, when that time comes, affected persons and agencies will be notified.

Project Area

The project area centers on the Eugene-Springfield metropolitan area. Roughly, the boundaries are Junction City on the north, Marcola on the east, Creswell on the south, and the Fern Ridge Reservoir on the west. The area was made large enough to include all reasonable alternatives. Figure 1 shows the project area and its existing major electrical facilities.

ORGANIZATION OF DEIS

The format of this DEIS differs from a typical EIS format. The affected environment discussion precedes description of the alternatives. Also, the discussion for North Eugene-Springfield Reinforcement is separated from that for South Eugene Reinforcement. Both changes aid the reader who is interested in one, but not both, projects.

The rest of the DEIS is divided into 12 sections. Chapter II describes the environment of the Eugene-Springfield area that would be affected by the proposed projects.

Chapter III describes and compares proposed alternatives for reinforcing the electrical system in the north Eugene-Springfield area. Chapter IV identifies the environmental consequences of those alternatives.

Chapter V describes and compares alternatives for reinforcement in south Eugene. Chapter VI identifies the environmental consequences of those alternatives.

Chapter VII identifies the cumulative environmental impact of both projects. Chapter VIII explains how BPA has met/will meet environmental consultation, review, and permit requirements.

Chapter IX lists the preparers of the DEIS. Chapter X lists the agencies, organizations, and persons who were sent copies of the DEIS. Chapter XI contains references used to prepare the DEIS.

The Appendixes provide background information. Appendix A is a glossary. Words in the glossary are highlighted with **bold** lettering the first time they appear in the text. Acronyms are also listed in the glossary.

Appendix B is a primer on an electrical system. It defines and describes components of an electrical system, explains how they can affect the environment, and defines the environmental impact ratings used in the DEIS. (Appendix B is recommended as a starting point for all readers unfamiliar with electrical systems.)

Appendix C explains the method used for quantifying magnetic field exposure.

BPA examined a number of alternatives for meeting the needs identified in the Technical Report. Appendix D presents a discussion of alternatives that were considered and dismissed.

Appendix E contains additional data on North Eugene—Springfield alternatives. Appendix F contains additional information on South Eugene.

The final section of the DEIS is an Index.

Chapter II

AFFECTED ENVIRONMENT

This chapter describes environmental features of the area that could be affected by the proposed projects.

The project area centers on Eugene and Springfield and includes approximately 500 square miles of central Lane County, Oregon. The Eugene-Springfield metropolitan area comprises the bulk of the population. The project area also contains three smaller cities: Coburg, Creswell, and Junction City. The total number of housing units in the project area is estimated at 89,800, and the population is estimated at 211,400. L-COG projects that the population of the metropolitan area will grow during the next 20 years, to about 294,000 persons.

The climate in the project area is strongly influenced by the Pacific Ocean and mountains of the Coast and Cascade Ranges. The result is a temperate, maritime climate characterized by moderately warm summers and wet, mild winters. Average annual rainfall is 46 inches.

VISUAL RESOURCES

The project area includes diverse landscape characteristics. The Willamette Valley is generally flat and bounded on the east, west, and south by rolling hills. Outside the urban centers, the Valley exhibits diverse patterns of color and texture that change with the seasons. Vegetation is mainly open pasture or cultivated fields, broken up by groups of trees, mostly deciduous. The moderate-to-steep slopes are mainly covered with Douglas fir and Oregon oak.

The Willamette and McKenzie Rivers are the two dominant water features within the project area, although neither is readily apparent from most vantage points. Cottonwood, red alder, and big leaf maple grow along the rivers.

The Coburg Hills, north of the McKenzie River and east of I-5, have moderately steep slopes and a mix of vegetation interspersed with large openings. The irregularly spaced open areas of light colors contrast with the dark tree cover. Numerous home sites can be found within these hills, many with views of the valley below.

The hills south of Eugene, including Spencer Butte (elevation 2065'), provide a natural boundary for the City. The strong, dominant land forms and wooded character of the south hills contrast with the texture and color of urban development, providing a strong visual edge for the city. The ridgeline of the south hills also marks the most southerly extension of the urban service area. Areas within the south hills are especially suited for parks and recreation.

Throughout the south hills, land uses are complex, as reflected in a variety of land cover: densely forested land with relatively mature timber; small farms; and rural or suburban residences. Fields, usually pastures, vary in size and are found in both valleys and on ridges. Although much of the landscape appears natural, it is rapidly changing, as new development occurs.

The area south and west of Eugene includes the wide, flat, open plain of Coyote Creek which empties into Fern Ridge Reservoir. Lane Substation is located at the base of the hills that form the eastern edge of this plain.

LAND USE

The Eugene-Springfield area offers a typical urban form, with dense urban development at the core and progressively less dense development at the fringe. The residential areas are defined and separated by streets and roads and commercial and industrial uses. At the fringe are rural uses: agriculture, forestry, and rural residential.

Development within the project area is guided by the Eugene-Springfield Metropolitan Area General Plan, the Lane County Rural Comprehensive Plan, and the comprehensive plans for Coburg, Creswell, and Junction City. (None of the proposed actions are within the urban growth boundaries of Coburg, Creswell, and Junction City.)

Farming operations within the study area are primarily limited to the valley bottoms and lower foothills. Wheat, oats, barley, hay, and pasture are grown on most agricultural soils. Cash crops such as mint, sweet corn, strawberries, and similar crops are grown on floodplains, while terrace soils support similar crops and produce grass seed. Fruit and nut orchards are located on well-drained terrace and upland sites. Dairy and beef cattle and sheep are raised on valley and foothill locations. Known noxious plants in the Lane County area include Dalmation Toadflax, Yellow Star Thistle, and Tansy Ragwort.

Approximately 160,000 acres have been designed as prime farmland in Lane County. The County does not have any farmland designated as unique. Prime farmland soils are defined by the U.S. Department of Agriculture as soils best suited to produce food, seed, forage, fiber, and oil seed crops. Additional farmlands are locally important for crop production. Approximately 221,520 acres of these soils occur in Lane County. Most of the lands designated as prime or locally important farmland fall within or immediately adjacent to the Willamette and its tributary valleys. The Federal Farmland Protection Policy Act requires that BPA identify and quantify adverse impacts of Federal programs on these lands.

The Eugene-Springfield area abounds in recreational opportunities, ranging from major sporting events to individual activities such as jogging. The area is noted for its many miles of jogging and bike paths and many recreation centers and parks, including Armitage Park on the McKenzie River, north of Eugene. The area's rivers are noted for boating, fishing, and other water sports.

WATER RESOURCES

The project area is located within the Willamette River drainage basin. Besides the Willamette River, the project area includes the McKenzie River, Mohawk River, and Spencer Creek, as well as numerous small perennial and intermittent streams. The project area also includes several wetlands and floodplains.

The water serves domestic and industrial uses, plus irrigation and recreation. Existing water quality in the project area is generally good, although selected streams have turbidity, sediment, temperature, and/or nutrient problems. Logging operations have contributed to increased **sedimentation** and **turbidity** in some areas.

FISH AND WILDLIFE

Many species of mammals, birds, reptiles, amphibians, and fish are found in the area. Waterfowl are found along the major rivers, raptors are located wherever appropriate habitat exists, and a variety of song birds are present. The black-tailed deer is one of the more conspicuous mammals.

Native cutthroat trout, as well as several species of anadromous fish, are found in the area's rivers.

VEGETATION/TIMBER

Though much of the area has been modified by human activity, remnants of oak woodlands, coniferous forests, and grasslands still exist. Stands of cottonwood, big leaf maple, and red alder occur along the major rivers. The coniferous forest consists mostly of Douglas fir. The County has about 2.5 million acres of forest resources (USDA 1987 and 1978).

SOILS

Project area soils fall into two general topographic divisions: (1) nearly level valley soils formed in **alluvial** material, and (2) soils formed in material weathered from igneous or sedimentary rocks on gently to steeply sloping hills. Soil characteristics are closely related to these topographic divisions. In the Valley, deep, alluvial soils are found on floodplains and terraces. The hill soils vary from deep to shallow, and are mostly well- and moderately well-drained. Overall drainage varies from excessively drained to very poorly drained, depending on landscape position and permeability.

AIR QUALITY

Air quality is measured by comparing air pollutant concentrations with ambient air quality standards. Air pollutant concentrations sometimes exceed National and Oregon Ambient Air Quality standards for particulate matter in the cities of Eugene and Springfield. As an officially designated "non-attainment area," the cities are required to bring air quality to acceptable levels.

During summer months, open burning of grass and forest slash contributes to short-term violations of ambient air quality standards. During winter months, wood space heating, industrial processes, and motor vehicle emissions combine with poor dispersion conditions in the Willamette Valley to produce high particulate concentrations.

HISTORIC/CULTURAL RESOURCES

Systematic inventories of the study area have been conducted and are on file at the Oregon State Historic Preservation Office in Salem. They include the Lane County Comprehensive Plan for Historical Resources (1981) and the Lane County Historical Resources map (1980). Additional cultural resource information is on file at the Oregon State Museum of Anthropology at the University of Oregon in Eugene. Most known cultural resource sites occur along the McKenzie River floodplain north and east of Springfield, and in the Coast Fork of the Willamette River and Camas Swale Creek floodplains, south of Eugene.

Historically, the settling of the Willamette Valley is valued for its **agrarian** landscape elements. Several architectural structures and transportation features in the project area are listed on the National Register of Historic Places. Many structures (including churches, farms and associated outbuildings) in Lane County and the greater Eugene-Springfield area are being reviewed at the State and local level for their historical or architectural significance. Transportation systems, such as roadways, railroads, and bridges, are also valued for their contribution to the settlement of the Valley.

Most recorded archaeological sites, particularly **refuse middens** and **lithic scatter** materials, have been found along streams in the Willamette Valley. These are floodplain sites where seasonal food gathering, hunting, or toolmaking took place. Unrecorded sites can be expected along the major drainages within the study area, at stream confluences, along ridge systems, and at areas with specific natural resources, such as particular plants or kinds of stone for toolmaking.

Although systematic inventories have been made, some of the project area remains uninventoried. Review of General Land Office Plats (1853-55) and Donation Land Claims maps (1860-61) suggests that numerous, historic resources existed in the vicinity of the project area by the mid-1800s.

No part of the project area has been inventoried for sites protected by the American Indian Religious Freedom Act. Such sites may exist.

ECONOMY

The major components of the area's economic base are forest products industries, medical/health care and business services, food products, electronic and transportation equipment manufacturing, tourism-related industries, and the University of Oregon. The per-capita income for Lane County in 1986 was $12,419. This is lower than both the State figure of $13,354, and the national figure of $14,639. Median family income was $28,700 in early 1988, $2,000 lower than the State level (Oregon 1988).

Lane County's unemployment fell sharply during the 1980's from a high of 12.5 percent in 1982 to a two-decade low of 5.5 percent in early 1988. The Lane County economy added 13,600 jobs from 1982-87. Major gains occurred in the services and manufacturing sectors (L-COG 1988).

Chapter III

NORTH EUGENE-SPRINGFIELD REINFORCEMENT - ALTERNATIVES, INCLUDING THE PROPOSED ACTION

The transmission system in the north Eugene-Springfield area will need electrical reinforcement within the next 20 years to accommodate anticipated residential, commercial, and industrial growth in the area. (A more detailed discussion of these needs is contained in the Technical Report.) Considering system performance, cost, and environmental concerns, the best way to reinforce the north Eugene-Springfield area would be (1) to construct a 230-kV/115-kV substation, and (2) to tie it into existing facilities with new transmission lines. There are two parts to the north Eugene-Springfield project: a substation, and a line to bring power to it. Other alternatives that were considered and dismissed are discussed in Appendix D.

DESCRIPTION OF ALTERNATIVES

A No Action Alternative is discussed first. There are three transmission alternatives and three substation alternatives.

No Action Alternative

The No Action Alternative would be just that. No transmission or substation facilities would be constructed. No right-of-way would be acquired. The system would remain as it is.

Transmission Alternatives

Three alternatives are proposed for bringing 230-kV power to the new substation. One alternative requires a second substation. Each alternative either uses or parallels an existing transmission right-of-way to minimize cost and environmental impacts. Planning for 115-kV and lower-voltage **distribution** lines is the responsibility of the local utilities, and is outside the scope of this DEIS.

The three North Eugene-Springfield transmission routing alternatives are described below. Figure 2 depicts the routes. Figure 3 shows how the right-of-way looks now and how it would look under each alternative.

ALTERNATIVE I - Alternative I provides power by connecting with BPA's Lane-Marion 500-kV line near Coburg. Alternative I would require two substations.

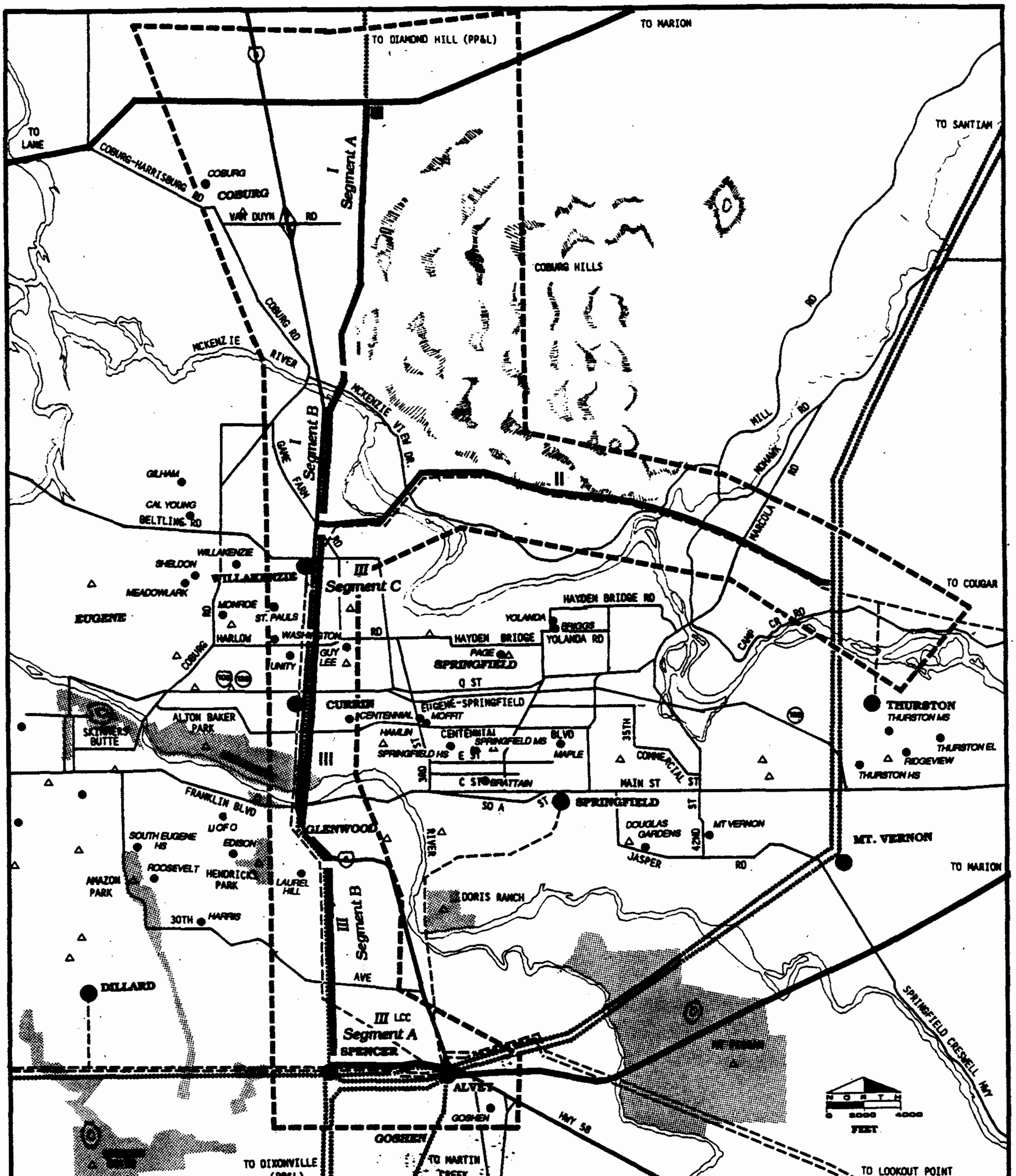


FIGURE 2
TRANSMISSION ALTERNATIVES, NORTH EUGENE-SPRINGFIELD

LEGEND

- STUDY AREA BOUNDARY
- POWERLINES
  - 115-kV
  - 230-kV
  - 500-kV
- SUBSTATION
- SCHOOLS
- PARKS
- WETLANDS
- PROPOSED NORTH EUGENE-SPRINGFIELD TRANSMISSION ALTERNATIVES I, II, III
- LOCATION FOR NEW ALTERNATIVE I SUBSTATION

- One, a new 500/230-kV substation where Pacific Power & Light Company's (PP&L) Spencer-Diamond Hill 230-kV line crosses BPA's Marion-Lane 500-kV line. This substation is needed to take power from the 500-kV line. It would require from 10 to 20 acres.
- The second, in the McKenzie/Gateway area (common to all alternatives)

From the first substation, a new 230-kV transmission line mounted on wood pole, H-frame structures would proceed south for 4 miles. It would parallel PP&L's existing Spencer-Diamond Hill line on the vacant portion of the existing right-of-way.

Starting just north of the McKenzie River, the line would be strung on the vacant west side of PP&L's existing **double-circuit**, steel lattice structures for 2 miles, to the proposed McKenzie/Gateway substation site. This alternative would need less than 1 mile of new access roads, and would use and improve the existing access road system along PP&L's Spencer-Diamond Hill line.

ALTERNATIVE II - Alternative II would **tap** BPA's existing Santiam-Alvey 230-kV lines northeast of Springfield. It would require one new substation.

The new line would proceed westerly for 6 miles, paralleling BPA's existing Cougar-Willakenzie 115-kV line to the proposed McKenzie/Gateway substation site. The existing line is mostly steel lattice towers, with some wood pole, H-frame structures. The new line has three options.

- Steel lattice structures,
- Improved appearance structures, or
- Wood pole, H-frame structures.

About 125 feet of additional right-of-way width would have to be acquired next to the existing Cougar-Willakenzie right-of-way, depending on the type of structure and **conductor** selected. The new line could be either north or south of the existing line.

Alternative II would require less than 1 mile of new access roads outside the right-of-way since it would parallel the Cougar-Willakenzie line. Existing access roads would be used and improved.

ALTERNATIVE III - Alternative III would connect into the 230-kV system at Alvey Substation, south of Eugene. It would require one new substation.

From the Alvey Substation, this alternative would proceed westerly for 1.5 miles, to PP&L's Spencer Substation. It would require 125 feet of additional right-of-way parallel to BPA's Alvey-Lane **corridor**.

The alternative would then turn north and parallel PP&L's Spencer-Diamond Hill 230-kV wood pole, H-frame line for 3 miles on vacant PP&L right-of-way. Just south of I-5 and the Willamette River, PP&L's 230-kV line occupies one side of double-circuit, steel lattice towers. The new line would be strung on the vacant side (west) of the double-circuit structures for 3.5 miles to the proposed McKenzie/Gateway substation site. Alternative III would probably use wood pole, H-frame structures where new structures were required.

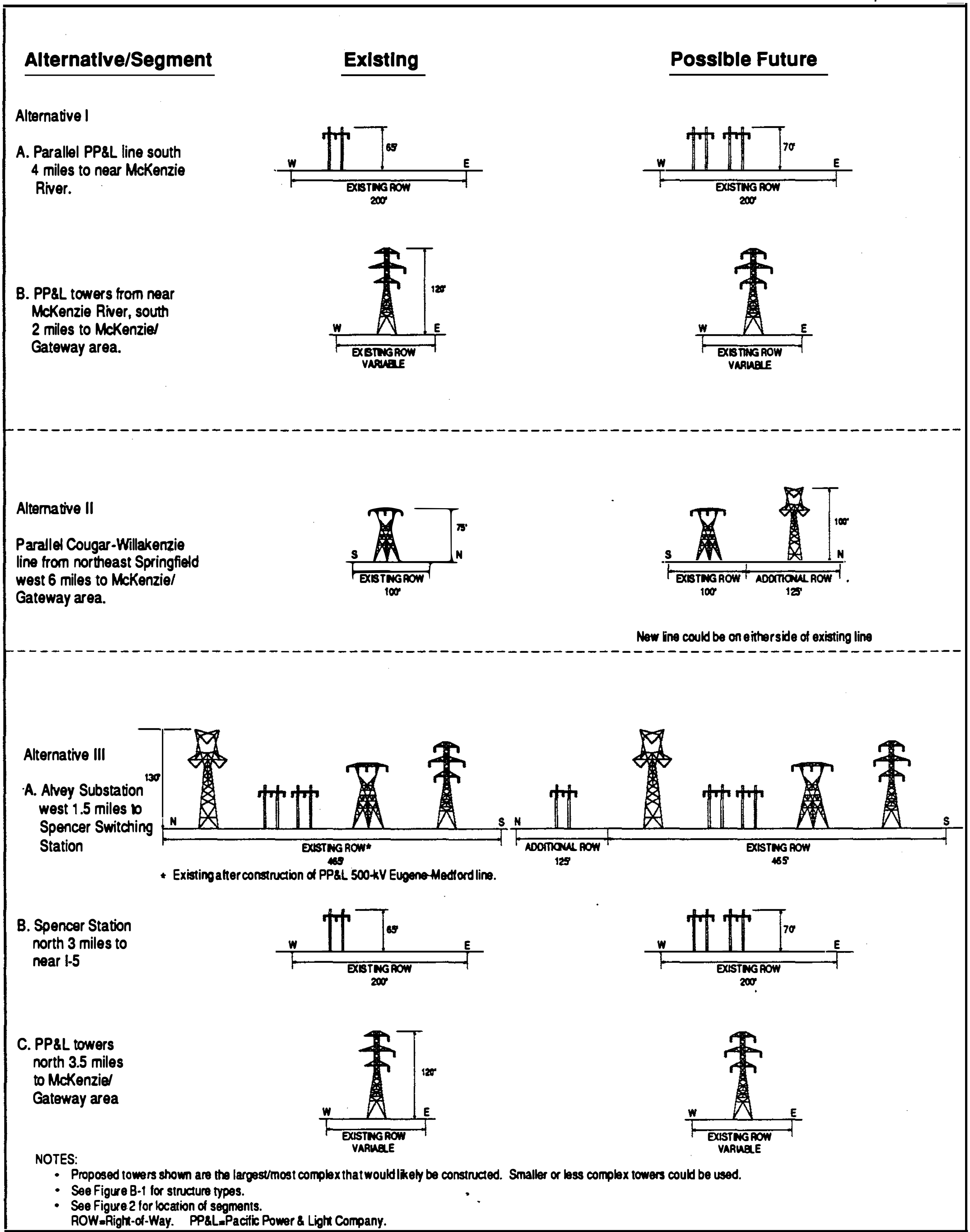


Figure 3
Existing and Proposed Structures and Right-of-Way, by Alternative and Segment
North Eugene-Springfield

Because Alternative III would parallel existing transmission lines, it would require less than 1 mile of new access roads; existing roads could require improvements.

Substation Alternatives

The new McKenzie/Gateway area substation, common to all alternatives, would distribute the energy from the proposed 230-kV line. Although the new substation would not be as big as either the Alvey or Lane Substations, it would have some of the same characteristics.

- It would tie into major sources of power and would serve as a **bulk delivery point**.

- It would connect at the 115-kV level with local utility substations and their lower-voltage, distribution systems.

The objectives of the 230/115-kV substation would be as follows.

- To serve anticipated additional electrical load, and increase reliability of service to local utilities

- To improve the efficiency of the local distribution systems for EWEB, SUB, and EPUD
  - By reducing electrical losses (losses increase as the length of the line increases)
  - By balancing the load among distribution facilities

The substation could terminate, at most, a 230/115-kV transformer, three 230-kV lines, and six 115-kV lines.

- The proposed 230-kV line, one **terminal**
- A possible loop of PP&L's 230-kV line, two terminals
- SUB's proposed 115-kV line to SUB's Laura Street Substation, one terminal
- A loop of EWEB's Willakenzie-Spring Creek 115-kV line, two terminals
- A loop of the Cougar-Willakenzie 115-kV line, two terminals
- A future 115-kV line for EPUD, one terminal

It is expected that local utilities will need the substation as a bulk delivery point within the next 20 years.

The substation would be about 550 feet by 350 feet, or about 5 acres. The substation would be located so as to minimize costs and impacts on the surrounding area, and be of optimum benefit to all participating utilities. The location should provide for future expansion. It would be preferable if the substation were located out of the McKenzie River 100-year floodplain. If the substation were located within the floodplain, it would have to be either protected by dikes or built on fill above the flood zone elevation.

Three alternative locations for the bulk delivery point were analyzed. A description of each follows. (See Figure 4.) It is important to note that any substation alternative could be connected to any transmission alternative.

SITE 1 - Site 1 would be located on property owned by EWEB (which bought it for a possible future substation). The site would be next to and east of both I-5 and PP&L's 230-kV double-circuit structures.

For transmission Alternatives I and III, a substation at Site 1 would be directly under and next to the proposed 230-kV line and PP&L's existing line. For Alternative II, the proposed 230-kV line would be extended westerly to PP&L's 230-kV line; then would parallel that line north to Site 1. BPA's Cougar-Willakenzie 115-kV line would be looped into Site 1. In order to serve EWEB's Willakenzie Substation, two new 115-kV lines would cross I-5. The locations of the other 115-kV lines would be the responsibility of the local utilities. Their locations need not vary for the three transmission alternatives.

SITE 2 - Site 2 would be located next to EWEB's existing Willakenzie Substation, next to and west of I-5.

The 115-kV line locations would be the same for the three 230-kV transmission alternatives. BPA's 115-kV line would remain in place. If a 115-kV line to SUB's service area were needed, it would cross I-5. A future 115-kV line to EPUD's service area would proceed north.

It would be difficult to connect transmission Alternatives I and III and a 115-kV line to SUB's service area into substation Site 2. The area east of I-5, across from Site 2, is highly congested, with a motel, parking lot, PP&L's 230-kV line, BPA's 115-kV line, and I-5 itself. Alternative II would be extended westerly, crossing I-5 about one-half mile north of Belt Line Road and parallelling I-5 south to Site 2.

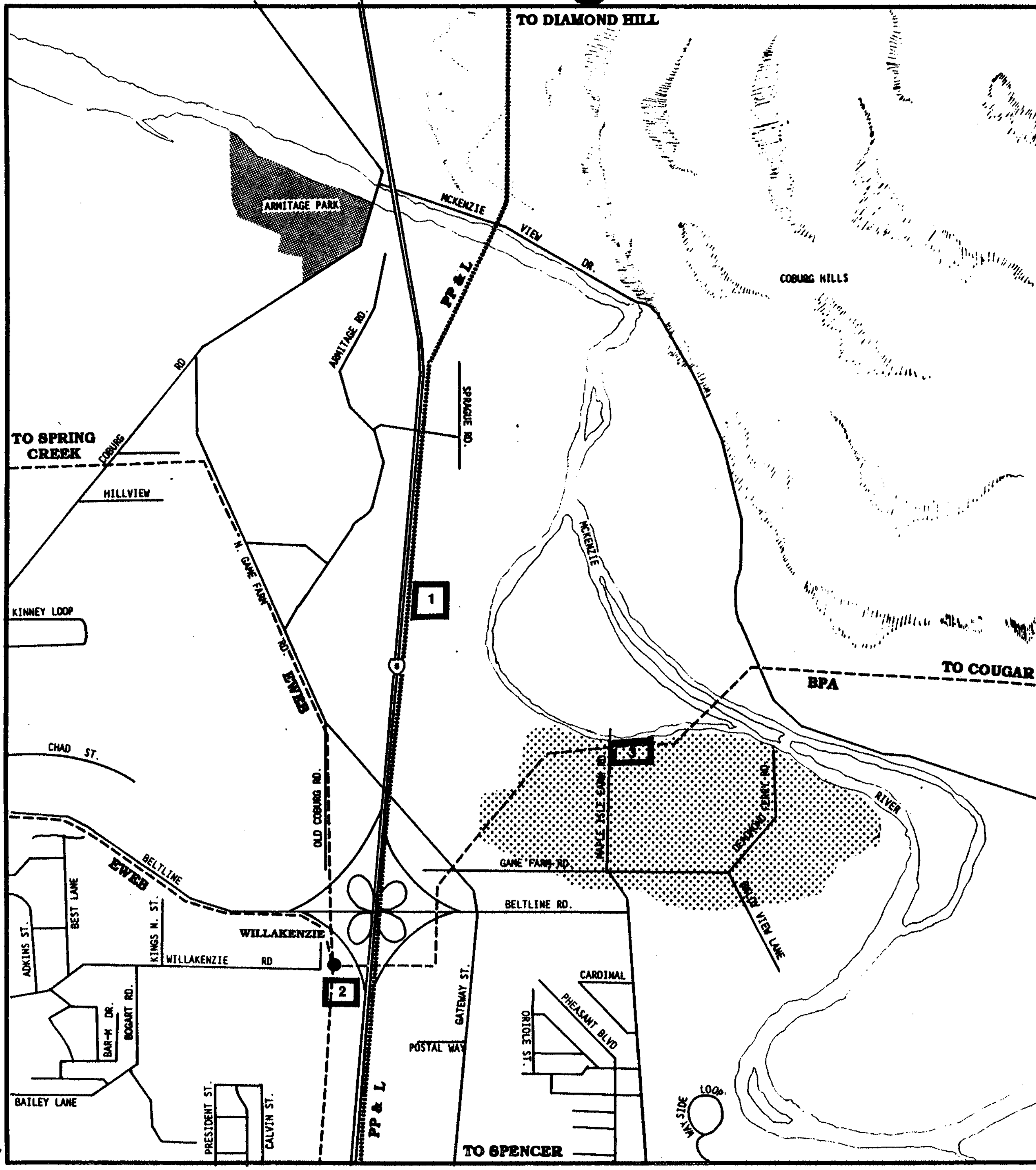
SITE 3 - Site 3 would be located mostly within the up-to-225-foot-wide right-of-way required for BPA's existing 115-kV line and the proposed 230-kV line. The site would be where Maple Isle Farm Road crosses BPA's 115-kV line.

The 115-kV line locations would be the same for each transmission alternative. BPA's Cougar-Willakenzie 115-kV line would be looped into Site 3. EWEB's Willakenzie-Spring Creek 115-kV line would be looped into the new substation, requiring that two new lines cross I-5. A 115-kV line would proceed southerly to SUB's service area. The future EPUD 115-kV line would proceed northerly.

The 230-kV Alternatives I and III would proceed east from PP&L's line to Site 3. Alternative II would go directly into the new substation, for Site 3 would be within Alternative II's right-of-way.

Site 3 is in a flood zone. The substation would have to be protected from flooding.

FIGURE 4
SUBSTATION SITE ALTERNATIVES, NORTH EUGENE-SPRINGFIELD



LEGEND

EXISTING POWERLINES

- 115-kV
- 230-kV

1 SUBSTATION ALTERNATIVE

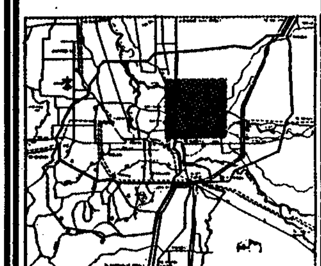
● EXISTING SUBSTATION

EWEB = EUGENE WATER & ELECTRIC BOARD

PPL = PACIFIC POWER & LIGHT COMPANY

BPA = BONNEVILLE POWER ADMINISTRATION

MCKENZIE/GATEWAY SPECIAL LIGHT INDUSTRIAL SITE



NORTH
0 500 1000
FEET

COMPARISON OF ALTERNATIVES

The No Action Alternative is discussed first. Then, the transmission alternatives are compared before the substation alternatives. Ratings in ascending order are: no, slight, low, moderate, high, and very high.

No Action Alternative

A decision not to reinforce the power system when needed would invite a local or regional blackout, where the loss of one line or substation would result in overload and loss of additional facilities. An outage of a 230/115-kV transformer at either Alvey or Lane would ultimately overload the remaining 230/115-kV transformers, requiring local load reductions, i.e., local utilities would have to shut off power to some customers. Further, outages of 115-kV lines would ultimately cause overloads on the remaining 115-kV lines, requiring additional load reductions.

Transmission Alternatives

In the following section, the three alternatives are compared for potential environmental impacts. The discussion of Alternative I includes impacts from the 500-kV substation in the northern part of the study area. (See Figure 2.) Description and comparison of the McKenzie/Gateway Substation, common to all alternatives, follow this section. Table 1 summarizes the comparison; Chapter IV describes the impacts in detail. Figure 2 shows some environmental resources, including rivers and wetlands.

PUBLIC HEALTH AND SAFETY – There would be no increase in magnetic field exposure for Alternative II. Alternatives I and III each would result in increases in magnetic field exposures, with slight and low impacts, respectively.

VISUAL RESOURCES – Because Alternatives I and III would use existing structures for part of their length, some of the impacts have already been established. Any additional increase in impact would be low. Areas where new structures would be needed under Alternative III are zoned for agricultural, industrial, commercial, or forest use. These uses are more compatible with transmission facilities and would be less affected than the recreational, residential, special light industrial, or scenic areas encountered by Alternative II, where impacts would be moderate.

AGRICULTURE – Impacts would be low for Alternative I and slight for Alternatives II and III. Alternative III would remove the least amount of agricultural acreage from production because it encounters little agricultural activity of any kind. For its new 500-kV/230-kV substation, Alternative I would require about 10 – 20 acres which are now in pasture. Alternative II would cross agricultural land in the Mohawk Valley and west of its McKenzie River crossing.

Table 1. Comparison of Transmission Alternatives, North Eugene–Springfield.

Description[1/]	Alternative[2/] I	II	III
Length (miles)			
Parallel to existing line	4	6	4.5
On vacant side of double-circuit structure	2	0	3.5
Total	6	6	8.0
Area (acres)			
Additional Right-of-Way	0	91	0
500/230-kV Substation	10–20	0	0
New Access Roads (miles)	<1	<1	<1
Resource Lands Affected (acres)			
Timber	<5	60	22
Agriculture	10–20	<1	<1
Cost (millions)			
Transmission line[3/]	$1.2	$ 1.3	$ 1.6
500-kV/230-kV Substation	9.0	0	0
Total	$10.2	$ 1.3	$ 1.6
Environmental Criteria/Impact Rating[4/]			
Public Health/Safety[5/]	slight	0	low
Visual Resources	low	moderate	low
Agriculture	low	slight	slight
Recreation	0	0	0
Water Resources	slight	slight	slight
Fish	0/slight	0/slight	0/slight
Wildlife	slight/low	low	0/slight
Vegetation	slight	slight	slight
Timber	slight	slight	slight
Soils	slight/low	low	low
Air Quality	slight	slight	slight
Noise	0	0	0/slight
Historic/Cultural Resources	0/slight	slight/low	0/slight

1/ Each alternative would also require a 230/115-kV substation in the McKenzie/Gateway area. See Table 2.

2/ The No Action Alternative would result in a zero for each category on the table.

3/ Transmission line costs would vary slightly depending on which 230/115-kV substation site were selected.

4/ In order of increasing impact, the ratings are: 0, slight, low, moderate, high, and very high.

5/ Based only on potential increase in magnetic field exposure.

< = less than

RECREATION – No impacts on recreation activities or facilities would occur for Alternatives I, II, or III.

WATER RESOURCES – Impacts would be slight for all three alternatives. Alternative I would be located primarily on gentle terrain with low erosion potential, thereby limiting ground disturbance. It would require minimal clearing and road construction. Since it would use existing double-circuit structures for part of its length, ground disturbance would be minimal. Alternative III would also use existing structures over part of its route. Alternative II would involve steeper terrain and would require all new towers, but the impact would still be slight. Alternative II would require placing about 10 structures in floodplains. No alternative would require structures within a wetland.

FISH – None of the alternatives would affect fish resources, and no roads would be necessary across streams. Little vegetation would need to be removed. The slight negative impact rating for each alternative is for the potential sedimentation that could result from the small amount of clearing that might be necessary.

WILDLIFE – Alternative II would cross about one-half mile of designated **deer and elk winter range**, resulting in a low impact. The substation needed for Alternative I would use area designated as **big game major habitat**. Although I and III would cross some big game major habitat, they are located in developed areas where impacts have already occurred, resulting in no-to-low impacts.

VEGETATION – Vegetation, for the most part, would be modified, not permanently removed. About 30 acres would be modified. Roads will permanently remove approximately 2 acres of vegetation in each alternative. These impacts are judged to be slight for all alternatives.

TIMBER – Alternative I would clear little timber, while Alternatives II and III would remove 60 and 22 acres respectively. These are judged to be slight impacts.

SOILS – Impacts would be slight to low for Alternative I, and low for Alternatives II and III. Both Alternatives I and III would use existing double-circuit structures for part of their length, thereby reducing ground disturbance from construction. Where new construction would be required, Alternative I would traverse more gentle terrain and would be shorter than Alternative III, reducing the risk of erosion and sedimentation.

AIR QUALITY – Air quality impacts would result primarily from dust and exhaust emissions from construction equipment. With mitigating measures, air quality impacts for any of the three alternatives would be short-term and local, and hence would have a slight impact.

NOISE – Alternatives I and II would have the least potential noise impact. Alternative III passes by the largest number of housing units and may have a slight impact. None of the alternatives would result in noise increases greater than 10 dB(A). All would meet the Oregon State noise standard.

HISTORIC/CULTURAL RESOURCES – Nine archaeologic and historic sites occur along Alternatives I and III, but because the area around the sites is already developed, the potential for visual impact is none, and the potential for discovering new sites is highly unlikely.

For Alternative II, several archaeologic sites have been recorded in the lower Mohawk Valley. There is a slight-to-low risk of direct effects on some of these sites from construction surface disturbance. There is also a slight likelihood for discovery of other archaeologic sites in the area.

Substation Alternatives

The three alternatives for the North Eugene-Springfield bulk delivery substation are compared for environmental impact. (See Table 2.)

PUBLIC HEALTH AND SAFETY – Impacts for Sites 1 and 3 would be slight. However, Site 1 is preferred because it and adjacent land are zoned for agricultural use, so significant population growth nearby is not expected. Site 3 is zoned for Special Light Industrial use. Impacts for Site 2 would be low. Site 2 would be least preferred because it is in an area planned for residential development.

VISUAL RESOURCES – Sites 1 and 2 would have high negative impacts, Site 3 moderate. Both Sites 1 and 2 are next to I-5 and would be highly visible to travelers. Site 2 would also be visible from Beltline Road, and would require additional line crossings of I-5. Site 3 would not be visible from I-5, but could conflict visually with the adjacent Special Light Industrial site. Travelers on local roads would have most views blocked by trees.

AGRICULTURE – Impacts would be slight for Sites 2 and 3, and low for Site 1. Site 2 would remove the least amount of land currently in agricultural use from production. Sites 1 and 3 would result in the loss of about 5 acres from production. Only Site 1 is zoned for agricultural use.

RECREATION – No recreation facilities or designated recreation areas would be affected by any of the substation sites.

WATER RESOURCES – Impacts would range from no impact to slight impact for all three sites, which are on nearly level soils with low erosion hazard. However, Sites 1 and 3 are located on the McKenzie River floodplain and must be adequately protected from potential flooding. The sites could be protected by dikes. However, under Executive Order 11988, developments on floodplains are discouraged whenever there is a practicable alternative. No wetlands occur at any of the substation sites. Alternative 2 would be preferred.

FISH – No impacts are expected from any alternative.

WILDLIFE – Only slight impacts are expected, due to removal of habitat for various rodents, other small mammals, and birds.

Table 2. Comparison of Substation Alternatives, North Eugene-Springfield.

Description	Alternative 1/ 1	2	3
Area (acres)	5	5	5
Resource Lands Cleared (acres)			
Timber	0	0	0
Agriculture	5	2-3	5
Cost (millions) 2/	$8.0	$8.0	$8.0
Environmental Criteria/Impact Rating 3/			
Public Health/Safety	slight	low	slight
Visual Resources	high	high	moderate
Agriculture	low	slight	slight
Recreation	0	0	0
Water Resources	slight	0/slight	slight
Fish	0	0	0
Wildlife	0/slight	0/slight	0/slight
Vegetation	slight	slight	slight
Timber	0	0	0
Soils	slight	slight	slight
Air Quality	slight	slight	slight
Noise	0	0	0
Historic/Cultural Resources	0	0	0

1/. The No Action Alternative would result in a zero for each category on the table.
2/ Does not include costs outside the substation, such as for relocating lines. Those costs cannot be determined until final designs are developed.
3/ In order of increasing impact, the ratings are: 0, slight, low, moderate, high, and very high.

VEGETATION -- The alternatives would cause only slight impacts from permanent removal of vegetation. There is no preferred alternative.

TIMBER -- No impacts are expected from any alternatives.

SOILS -- There would be slight impacts on soils for all three sites. All three are on nearly level soils, with only a slight erosion hazard. None of the sites would have any significant impacts on earth resources.

AIR QUALITY -- Air quality impacts would result primarily from exhaust emissions from construction equipment and dust from construction operations. With mitigating measures, air quality impacts for any of the three options would be short-term and local and hence would have a slight impact. There is no preferred alternative.

NOISE - Each of the substation sites would meet the State of Oregon standard of 50 dB(A) for noise-sensitive properties.

HISTORIC/CULTURAL RESOURCES - No archaeologic or historic resources have been recorded at the three proposed substation sites. Known resource sites occur far enough away to eliminate risk of visual impact from constructed facilities. The risk potential for discovery of unrecorded sites is low, based on existing cultural survey data available.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

There is no clear environmentally preferred alternative for North Eugene-Springfield transmission. Overall, Alternatives I and III are slightly preferable to Alternative II. No alternative would pose a high negative impact on any resource. (See Table 1.) Even between the two resource categories that environmental specialists considered most important (public health and safety; visual resources), no clear preference emerges. Alternative II is preferable for public health/safety, but least preferable for visual impacts.

Site 3 is the environmentally preferred alternative for the North Eugene-Springfield substation. The impact ratings of each alternative are the same except for public health/safety, visual resources, agriculture, and water resources. (See Table 2.) Except for water resources, Site 3 rates the same or better than the other alternatives. It is better than Site 2 for public health/safety, better than Sites 1 and 2 for visual resources, and better than Site 1 for agricultural impact. Site 3 is within the 100-year floodplain, as is Site 1.

Site 1 would be the second preference. Site 1 would remove 5 acres of agricultural land and it is visible from Interstate 5. However, it is more compatible with existing and planned land uses. Site 2 would be least preferred. But, again, the environmental impact ratings are very close.

AGENCY PREFERRED ALTERNATIVE

BPA prefers transmission Alternative II and substation Site 1 for reinforcing the system in the North Eugene-Springfield area. Those alternatives best meet the purposes described in Chapter 1. Discussion is presented below.

Alternative II would tap the Santiam-Alvey 230-kV lines northeast of Springfield and parallel BPA's existing Cougar-Willakenzie 115-kV line to the proposed substation site. (See Figure 2.) The proposed 230-kV line would require acquisition of about 125 feet of additional right-of-way. The new line could be either north or south of the existing line. (See Figure 3.) The new line could be on either steel lattice, improved appearance, or wood pole, H-frame structures. (See Figure B-1.)

Substation Site 1 is next to and east of both I-5 and PP&L's 230-kV lines. (See Figure 4.) Site 1 is located on property owned by EWEB, which bought it for a possible future substation.

Transmission

All three transmission alternatives would provide reliable service to the North Eugene-Springfield area. In the future, the No Action Alternative would put the area at risk for periodic outages as existing lines overloaded.

Alternative II would give the best electrical performance at the least economic cost. Alternative I is very strong electrically and provides the most electrical loss savings, but its initial cost is very high. Alternative II would provide a little more electrical support to the area than would Alternative III, and it has slightly lower losses.

Alternatives I and III both would use the vacant side of existing PP&L towers. BPA would need to negotiate an agreement with PP&L for perpetual use of their **easements** and facilities when the project was needed. PP&L could then have other plans for the right-of-way. The cost would have to be negotiated. (Cost estimates used in the DEIS are approximate.) Also, Alternative III would place additional burden on the Alvey Substation, the major power source for the local utilities. Alternative III would require additional equipment at Alvey, where it would be difficult and costly to locate any more.

The environmental impact ratings of Alternative II are zero, slight, or low for all resource categories except visual resources. The moderate impact rating assumes, in a worst-case situation, that the transmission lines and towers could affect the marketability of Springfield's Special Light Industrial site. That seems unlikely, since a line already exists through the area, a condition which would tend to modify the additional impact of a new line. Also, the new line would be sited at the edge of the Special Light Industrial site, and improved appearance structures could be used.

The Cougar-Willakenzie line cuts diagonally across the planned McKenzie/Gateway Special Light Industrial site on steel lattice structures. Both lines could be located to fit better with the development of the Special Light Industrial area. This opportunity could take place at any time with cooperation and monetary compensation among the involved utilities, City of Springfield, and benefiting land owners.

Substation

The three substation alternatives would provide comparable reliable electric service. The total costs also would be similar, although there are specific cost differences. Sites 1 and 3 would be easier and therefore less costly to develop because there is no urban development on adjacent land. Planned light industrial development next to Site 3 could pose a conflict in the future. Sites 1 and 3 are within the 100-year floodplain, so both would require special mitigation. Site 1 is higher than Site 3 and would likely be easier to mitigate. Both also would require new access roads because they are new substation sites. Local utilities have expressed their preference for Site 1.

Cost savings, usually available when building next to an existing substation, would not be realized at Site 2 because of intense adjacent development. It would be difficult and costly to bring transmission lines into Site 2 because I-5 and Beltline Road frame the site on the north and east, and because of the dense commercial development just east of I-5. Future expansion at Site 2 (beyond the 20-year planning period of this DEIS) would be extremely limited because of the adjacent development. The development around Site 2 also limits local utilities' access to the site for their needed distribution lines.

Environmentally, the substation sites are also comparable. Site 1 rated lower than Site 3 because of visual and agricultural impacts. Site 1 is adjacent to I-5, and substation development would be visible to I-5 traffic. Sites 1 and 3 are both in agricultural use, but Site 3 is within the Urban Growth Boundary and already committed to urban development.

All transmission and substation alternatives would meet BPA's contractual obligations to local utilities. All alternatives would meet all applicable national and state policies. (See Chapter VIII.)

Following public review and comment on these preferred facilities, the development of the FEIS, and issuance of the Record of Decision, BPA will recommend that the Lane County Rural Comprehensive Plan, the Metropolitan Area General Plan, and local implementing plans be amended to identify the selected route and substation site on the plan maps and to include policies which will protect the route and sites from incompatible development.

In the future, SUB, EWEB, and EPUD may also need facilities in the same general area. Since environmental impacts and cost reductions are possible with a shared site, BPA will work closely with the local utilities to accommodate their needs at the same location, if possible.

When the need arises for construction of the North Eugene-Springfield Project, BPA and the local utilities will cooperatively develop final designs because the project will connect BPA's transmission system and the local utilities' distribution system. BPA will coordinate the joint process.

Chapter IV

NORTH EUGENE-SPRINGFIELD REINFORCEMENT - ENVIRONMENTAL CONSEQUENCES

This chapter explains environmental effects of the North Eugene-Springfield reinforcement project in more detail. It also describes mitigation and monitoring activities that would occur to minimize environmental impacts. Effects of the transmission facilities are discussed first, those of substations second.

NO ACTION ALTERNATIVE

The No Action Alternative would cost nothing in the short term, but there could be long-term costs. By the mid-to-late 1990's load increases would cause the existing 230/115-kV transformers at Alvey and Lane Substations to overload if one transformer were out of service. These increases would also cause the 115-kV lines connecting Alvey and Lane Substations to the north Eugene-Springfield area to overload during outages. Outages have direct and indirect costs to BPA, the local utilities, and the local economy. The number of customers whose service was disrupted would depend on the load conditions at the time of the outage, and the severity of the outage. As loads in the Eugene-Springfield area continue to grow, the severity of outages would gradually get worse, until heavy overloads were reached that would cause equipment to operate automatically. That could result in disruption of service for most Eugene-Springfield area customers. The consequences could include the following.

- Loss of service to residential customers, which could involve no heat, loss of frozen food, frozen water pipes, normal inconveniences associated with loss of power at home, and loss of revenue to utilities.

- Loss of service to industrial and commercial customers, which could involve suspension of computer operations and loss of records, closing of businesses and loss of revenues to owners, loss of income by employees, loss of revenue to utilities, and the closing of schools.

- Reduced hospital capability: hospitals have emergency generators to sustain emergency operations.

- Associated safety and security problems because power would be out to traffic signals and street lights.

Service to many customers could be restored within 1 to 4 hours. However, some may not be able to be served until the original outage is corrected. That could take 1 to 5 days for a transmission line outage, and 2 to 4 weeks for a transformer outage.

Based on current technology, there is no reasonable alternative to constructing transmission lines. Even though construction is not anticipated for several years, siting of the facilities is proposed now because postponement could be costly. Urban development that could occur in the interim could greatly increase costs of siting the lines later.

Likewise, the No Action Alternative would result in no environmental impacts in the short term. However, if no action were planned for now, the environmental impacts could be greater for public health and safety, visual, noise and air quality—categories sensitive to population density. Postponing the siting could reduce the range of environmentally acceptable locations.

The No Action Alternative may result in increased conservation. It would not interfere with compliance with other applicable national policies. (See Chapter VIII.)

TRANSMISSION

This section discusses how the transmission facilities would affect the environment.

Public Health and Safety

This section summarizes possible changes in **electric and magnetic field** exposures that could occur with the three alternatives. (See Table 3 and Appendix C.) The discussion focuses on the field strengths at the edge of the right-of-way, the closest point that businesses or dwellings would be allowed to the lines. The edge-of-right-of-way values, therefore, indicate the potential long-term field exposures associated with the transmission facilities. All of the facilities would be designed so as not to exceed the maximum electric field allowed on the right-of-way by the State of Oregon (9 kV/m).

Some segments of some alternatives would use double-circuit lines. Contrary to what one might assume, double-circuit lines may result in lower magnetic field strengths than **single-circuit** lines because the two circuits' fields partially cancel each other. There are several possible arrangements for placing the two circuits on a tower. The arrangement has a big effect on the strength of the magnetic field at ground level. The magnetic field strength ranges shown in Table 3 are for the arrangements shown on Figure 3.

ALTERNATIVE I - Electric field strength would not be increased on the left side of Segment A and on the right side of Segment B. (Figure 3 depicts the segments.) (Left refers to the west or the south side of the right-of-way. Right refers to the east or the north side of the right-of-way.) The electric

Table 3. Calculated Changes in Electric and Magnetic Field Strength at the Edge of the Right-of-Way, North Eugene-Springfield.1/

Alternative/Segment2/	Electric Field (kV/m) Left	Right	Magnetic Field (mG)3/4/ Left	Right
Alternative I				
Segment A	0	0.9	-3 to 3	6 to 10
Segment B	1.2	0	9	-5
Alternative II	0	0	-1 to 0	-2 to -1
Alternative III				
Segment A	-1.0	0	-17 to -11	0
Segment B	0	0.9	-2 to 2	3 to 7
Segment C	1.2	0	5	-6

kV/m = kilovolts per meter
mG = milligauss

1/ The values are the increase (positive) or decrease (negative) in magnetic field strength that would result with new lines, compared to existing lines, based on calculations shown on Table E-1, Appendix E.
2/ Alternatives and segments are shown on Figures 2 and 3.
3/ Left refers to the west or the south side of the right-of-way. Right refers to the east or the north side of the right-of-way.
4/ Magnetic fields are based on annual average current levels (load) estimated for the year 2001.

field on the remaining sides could increase from 5 to 10 times over levels from existing lines. Magnetic field strength on the left side of Segment B and right side of Segment A could increase 2 and 6 times over existing lines, respectively. A slight increase or decrease could occur on the left side of Segment A. The right side of Segment B would decrease slightly.

ALTERNATIVE II - No significant change is expected in electric field strength on the edge of the right-of-way. The magnetic field strength is also not expected to be increased, and may even decrease slightly.

ALTERNATIVE III - The future transmission lines considered for this alternative could both decrease and increase the edge-of-right-of-way electric field strength. However, increases would not exceed the maximum level produced by existing lines (2 kV/m). Magnetic field strength along the right side of the right-of-way could also both increase and decrease, depending on the line segment. This would likely result in no significant net change. The magnetic field along the left side of the right-of-way could increase by around 20 to 50 percent. The magnetic field on the left side of Segment B could also decrease slightly.

EXPOSURE ASSESSMENT – The number of housing units within 500 feet of the center of the right-of-way for each of the alternatives is shown in Table 4. This information was combined with expected increases in magnetic field strengths from Table 3 to develop a field exposure index. The index is summarized in Table 5. The index was used to rank the alternatives. In terms of minimizing new magnetic field exposures, the alternatives are preferred in the following order: II, I, III.

Visual Resources

ALTERNATIVE I – Unlike Alternatives II and III, transmission Alternative I would include both a transmission line and a 500/230-kV substation. The 500/230-kV substation would be relatively isolated. No homes or public roads would be within view of the site. Some views of the site by passing motorists would occur during construction, but the impact would be short-term. Impacts would be low for the first 4-mile segment of Alternative I because it is relatively isolated, with few viewing opportunities, and because the existing line has already established the initial impacts. Thirteen housing units would be within 500 feet of the centerline. One of those would be within 100 feet. (See Figure 5.) The rest of this alternative would occupy the unused side of PP&L's existing double-circuit structures. The only visual change would be the added insulators and conductors. Impacts would be negligible. Existing roads would provide needed access, and very little clearing would be required.

ALTERNATIVE II – Alternative II would cross both the McKenzie and Mohawk Rivers. The McKenzie is noted for its scenic and recreational qualities. This alternative would cross McKenzie View Drive twice, Marcola Road, and Old Mohawk Road. These are important rural roads from which views of the line would be unavoidable. Although this route would parallel an existing line, it would require extensive clearing for most of its length. The clearing would increase corridor visibility. Twenty housing units would be within 500 feet of the centerline; four of those within 100 feet. (See Figure 5.) Because the existing corridor has already established initial impacts, there would only be a moderate increase in overall impacts.

One concern with Alternative II would be its possible impact on the McKenzie/Gateway Special Light Industrial site. The site is one of eight special light industrial sites designated in the Metropolitan Area General Plan and one of two within Springfield. At 250 acres, the Gateway site is the largest of the metropolitan area's sites and accounts for almost 25 percent of the total area in this land use designation.

The Gateway site is presently bisected by the Cougar-Willakenzie 115-kV line. City of Springfield staff and property owners have discussed the possibility of relocating this line to enhance the site's marketability and suitability for large-scale special light industrial use. In view of the concern for intrusion of incompatible uses on this site, the 230-kV line would be located at the edge of this site.

Table 4. Number of Housing Units Within 500 Feet of the Center of the Right-of-Way, North Eugene-Springfield.

Alternative/Segment[1]	Number of Housing Units[2] Left Side[3]	Right Side[3]	Total
Alternative I			
Segment A	0	2	2
Segment B	9	2	11
Total	9	4	13
Alternative II	11	9	20
Alternative III			
Segment A	0	0	0
Segment B	1	3	4
Segment C	41	318	359
Total	42	321	363

1/ Alternatives and segments are shown on Figures 2 and 3.
2/ Appendix C explains why existing rather than projected housing unit data are used.
3/ Left refers to the west or the south side of the right-of-way. Right refers to the east or the north side of the right-of-way.

Table 5. Magnetic Field Exposure Index, North Eugene-Springfield.[1]

Alternative/Segment[2]	Exposure Index (mG X Houses)
Alternative I	
Segment A	12-20
Segment B	81
Total	93-101
Alternative II	0
Alternative III	
Segment A	0
Segment B	11-23
Segment C	205
Total	216-228

mG = milligauss

1/ Values are the product of increase in magnetic field at the right-of-way edge (greater than 1 mG), and the number of housing units within 500 feet of the center of the right-of-way.
2/ Alternatives and segments are shown on Figures 2 and 3.

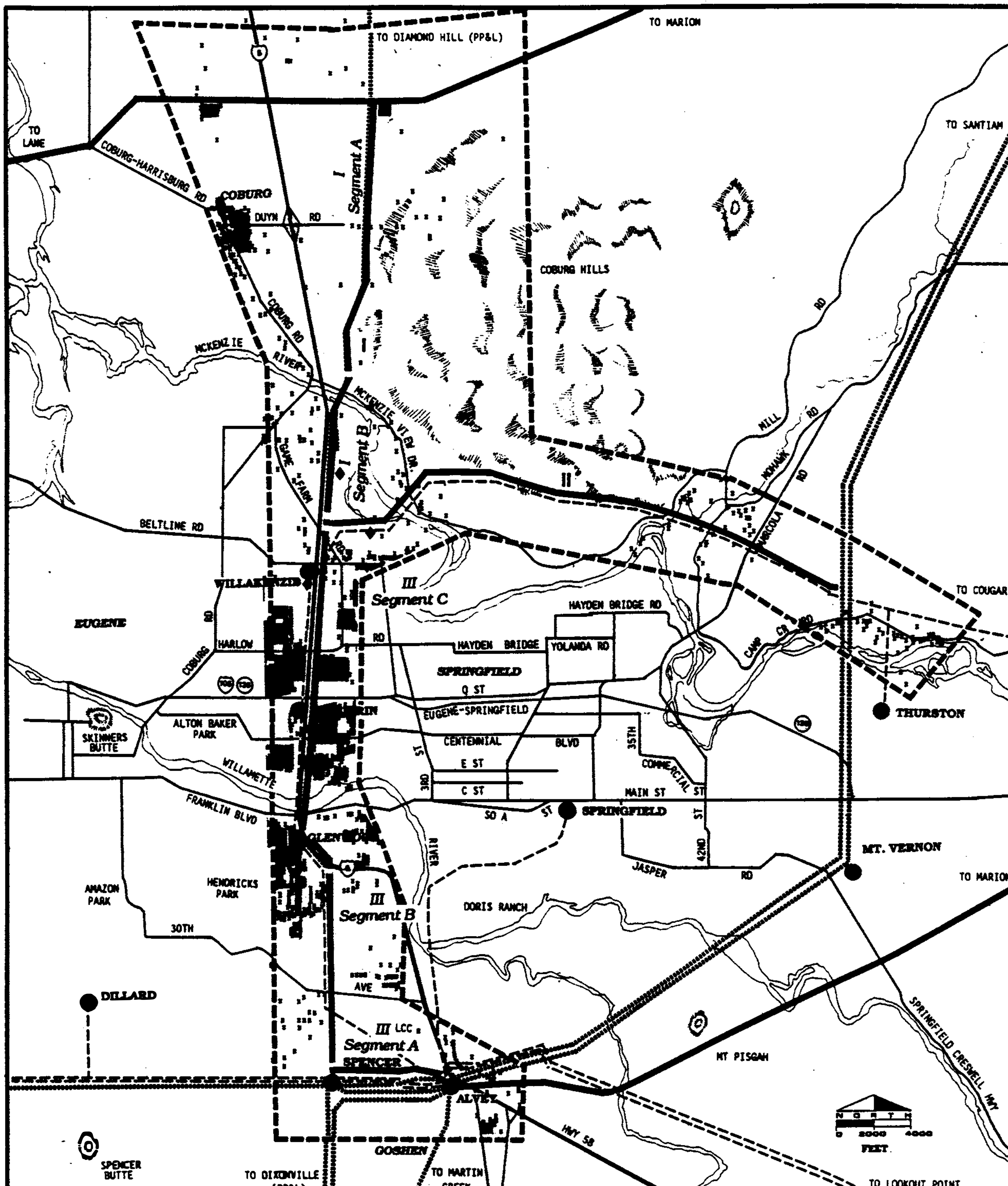


FIGURE 5
LOCATION OF HOUSING UNITS,
NORTH EUGENE-SPRINGFIELD

LEGEND

- STUDY AREA BOUNDARY
- EACH "X" REPRESENTS ONE HOUSING UNIT (SEPT. 1987)
- PROPOSED NORTH EUGENE-SPRINGFIELD TRANSMISSION ALTERNATIVES I, II, III

POWERLINES

- 115-kV
- 230-kV
- 500-kV
- SUBSTATION
- ALTERNATIVE LOCATIONS FOR NEW MCKENZIE/GATEWAY SUBSTATIONS
- LOCATION FOR NEW ALTERNATIVE I SUBSTATION

Visual impacts on the area would at worst be moderate because the transmission corridors and associated impacts have already been established. Also, the character of the surrounding landscape would not change, even with a new line. It might be improved if the existing and new line were combined on a double-circuit improved appearance structure. Since the location of the corridors would be known, any new company locating in this area would have the opportunity to plan and design around them.

ALTERNATIVE III - Alternative III would have the greatest visual exposure—363 housing units within 500 feet, and 133 within 100 feet. (See Figure 5.) However, for most of the way, it would occupy the unused side of existing towers. Only conductors and insulators would be added. These additions would not be noticeable to the casual observer. Where the line would parallel existing facilities, additional clearing would be required, increasing the line's visibility from nearby roads and homes. Since much of the area has already been disrupted by existing facilities, impacts would be low.

Agriculture

Although local impacts on some individual farmers may be moderate, none of the alternatives would significantly affect agricultural production.

Alternative I would traverse 3.3 miles of cropland. Because it would require construction of a substation to tap the Lane-Marion 500-kV line, 10 to 20 acres of productive land would be lost. The land has been cleared and is used for pasture. Although Alternative I would affect the greatest amount of productive land, it represents only 0.02 percent of Lane County's 1986 harvested acreage and would have a low impact on agricultural production.

Alternative II would cross 1.1 miles of land now in agricultural use. Located primarily west of the McKenzie River crossing and in the Mohawk Valley, these lands are in orchards, row crops, and hay. Alternative II would permanently remove less than 0.5 acre of these lands from production, and impacts would be slight.

Alternative III would encounter little agricultural activity; less than 0.1 mile would cross agricultural land. Impacts would be imperceptible to slight. It would remove from production the least amount of land now in agricultural use. Alternative III would encounter land in agricultural use only where it would occupy the unused side of PP&L's 230-kV double-circuit structures. Hence, since no new structures would be required and no new land would be taken out of production, only minimal impacts would be expected.

All three alternatives would cross soils designated by the Soil Conservation Service as prime farmland, and additional farmland of local importance. It is estimated that no alternative would remove from production more than 0.5 acre of these soils. This amount is not significant compared to the 160,000 acres of prime farmland and 222,000 acres of additional farmland of local importance in Lane County.

Estimates of the amount of land taken out of production were derived using a constant factor of 0.15 acre of productive land lost for each mile of agriculture land crossed. No consideration has been given to the possibility of spanning individual fields nor to the creation of non-farmable land due to transmission structure location. These factors cannot be determined until the transmission towers and facilities are actually sited.

To minimize long-term impacts, transmission structures would be sited to minimize interference with agricultural operations whenever possible. Shorter-term impacts such as soil compaction and rutting would be reduced by limiting construction activities when soils are wet. In addition, land operators would be compensated for damage to crops, fences, lost productivity, damage to irrigation and drainage systems, and the cost of subsoiling compacted areas.

Recreation

None of the alternatives would affect any developed recreation sites or designated recreation areas. Armitage Park is the only major park near any of the alternatives. It would not be physically affected. Likewise, the crossing of the McKenzie River by Alternative II would not affect any recreation activities.

Water Resources

The project's impact on water quality would be slight and short-term. Portions of all three transmission alternatives would traverse steep terrain. These areas have high-to-moderate erosion hazards and are subject to slumping. Of the three options, Alternative I would minimize these risks. Covering level terrain for much of its length, Alternative I would cross fewer miles of terrain with a high erosion hazard and would require only minimal clearing. The substation needed to tap the Lane-Marion 500-kV line would be set back from existing stream channels, effectively buffering them from possible sedimentation and water quality impacts. Use of the unused side of existing double-circuit structures for about 2 miles, including across the McKenzie River, would further minimize the risk to water resources.

Alternative II would pose the greatest risk to water resources. It would require 60 acres of timber clearing on steep erosive soils, much of which would be located on drainage to the McKenzie and Mohawk Rivers.

Alternative III would cross steep terrain west and north of the Alvey Substation. Like Alternative II, Alternative III would cross about 4 miles of soils with a high erosion hazard. However, it would require only 22 acres of clearing. In addition, Alternative III would use existing double-circuit structures for part of its length, including the Willamette River crossing.

Erosion and sedimentation rates would be highest during construction and would decrease until a base level is reached upon stabilization and revegetation of disturbed areas. Localized short-term increases in water turbidity could be expected where the line crosses areas with high erosion hazard near

waterways. Impacts could be minimized by limiting clearing and road construction on steep erosive soils, using low gradient road cuts, promptly reseeding disturbed areas, using water bars and other runoff control devices, and leaving vegetation buffers along waterways.

FLOODPLAINS - Under Executive Order 11988, Federal agencies are instructed to avoid development on floodplains whenever there is a practicable alternative. According to the Flood Insurance Rate map prepared by the Federal Management Agency for Lane County, Oregon, Alternative I would cross one 100-year floodplain for approximately 6,750 feet; Alternative II would cross two for 2,250 and 5,250 feet; and Alternative III would cross one for 2,400 feet. Since Alternatives I and III would use existing double-circuit structures for their crossings of the McKenzie and Willamette Rivers, respectively, neither would involve the placement of new structures in the floodplain.

Until design is final, it is not known what type of structure would be used for Alternative II. However, in a worst-case analysis, a wood pole H-frame structure which spans 750 feet would be used. This would mean that about ten structures and associated roads would be in floodplains under Alternative II. The structures would be designed to withstand flooding, and it is unlikely that the presence of transmission line structures would change the character of the floodplain.

WETLANDS - Under Executive Order 11990, construction in wetlands is discouraged whenever there is a practicable alternative. According to a wetlands map prepared by L-COG, Alternatives I and II each would cross one wetland approximately 750 feet wide. These could be spanned, so no impacts would be expected. Alternative III would cross two wetlands: one, for about 750 feet, and the other, for 200 feet. Each could be spanned.

Fish and Wildlife

Alternative I would cross six intermittent or first order streams plus Daniels Creek and the McKenzie River. Alternative II would also cross six intermittent or first order streams, the McKenzie River, and the Mohawk River three times. Alternative III would cross only two intermittent or first order streams and the Willamette. Complete road needs have not been evaluated at this time, so road crossing of the smaller streams is unknown, but no roads would be constructed across any major river channels.

Because the streams are small and can be easily spanned, clearing is not expected to be great, particularly for Alternative I. Standard construction practices would be used which minimize erosion and include revegetation of cut banks and slopes. Clearing in riparian areas would be limited. Vegetation buffers would be left where possible. Therefore, no alternative would be expected to have an adverse impact on fish.

For the most part, black-tailed deer is the common big game species present in the area. Roosevelt elk are found in a few places. The Oregon Department of Fish and Wildlife (ODFW) has provided data to the L-COG on big game habitat within the study area. Overlaying habitat maps with maps of the route alternatives provides a comparison. (See Table 6.)

Table 6. Affected Big Game Habitat, North Eugene-Springfield.

	Miles Crossed by Each Alternative		
Type of Habitat	I	II	III
Deer and Elk Winter Range*	0	0.5	0
Big Game Peripheral Habitat*	1.0	0.5	2.5
Big Game Major Habitat*	1.5	3.5	1.0

* defined in glossary

Designated winter range is less abundant than other big game habitats and therefore is more important. Big game major range supports most of the big game in the County and is generally sparsely developed commercial forest lands. Peripheral range is between valley floors and major range, and can support substantial numbers of big game and serve as winter range in severe winters. Because of the winter range and major ranges crossed, Alternative II is the least desirable. Much of the lands that would be crossed by Alternatives I and III are already developed and the differences between them are minor. The 500/230-kV substation needed for Alternative I is in an area designated as big game major habitat.

Assuming that the more miles of habitat crossed, the greater the impact on the big game resource, Alternative II would have the most negative impact, and Alternative III the least.

The Fish and Wildlife Conservation Act of 1980 encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. Measures proposed to mitigate potential impacts on wildlife and their habitats do this to the maximum extent possible within BPA's statutory responsibility.

There are no species listed as threatened or endangered found in the project area. BPA will request an updated list prior to final design.

Vegetation

Vegetation occupying the right-of-way would be permanently limited to low-growing plant species. All trees creating a hazard to the transmission lines would be removed. During maintenance, tall vegetation would be removed by cutting and controlled hand application of herbicides. BPA's herbicide

application standards meet or exceed all State and Federal standards. Areas where vegetation was removed and the soil disturbed, such as at tower sites, would be reseeded with grass or other plant species.

The Oregon Department of Agriculture (ODA) has responsibility for noxious weed control within the State of Oregon. BPA policy on noxious weed control resulting from BPA project actions includes a noxious weed survey, development of mitigation measures for potential site-specific impacts caused or aggravated by BPA actions, and coordination with County Weed Boards through the BPA Area Maintenance Office.

Control of hazardous and unwanted vegetation and noxious weeds on private and public lands is outlined in BPA's Facilities Vegetation Management EIS (1983). Coordination may also be undertaken with respect to State lands, individual landowners, or weed control districts.

Mitigation measures would include working with private owners and public land managers to develop appropriate mitigation for noxious weed control at substations, structure sites, and along access roads. BPA would also consult with landowners on programs to control BPA-caused noxious weed infestations, give notice prior to control applications, and respond to landowner problems.

Timber

Timber cleared from the right-of-way could be sold. However, some of the timber would be sold before maturity, so its value would be less than optimum. Moreover, the opportunity to grow timber would be foregone, as the right-of-way would need to be kept free of trees.

In evaluating the options, estimates of the affected timber were made from aerial photos and zoning maps. The character and extent of the affected vegetation was also estimated.

Alternative I would require virtually no clearing of timber, while Alternatives II and III would clear 60 and 22 acres respectively. These amounts are not significant, as Lane County has approximately 2.5 million acres of forest resources (USDA 1987 and 1978).

Soils

Earth resource impacts are expected to be of only local significance and short-term. They would be of slight to low intensity for Alternative I, and of low intensity for Alternatives II and III.

Alternative I would have the least impact on earth resources. Both Alternatives I and III would use existing double-circuit structures for part of their length, thereby reducing ground disturbance from construction. Although Alternative I would require construction of a substation to tap the Lane-Marion 500-kV line, Alternative I would cross fewer miles (2) of highly erosive soils, would require only minimal clearing, and would be shorter than Alternative III, thereby reducing the risk of erosion and subsequent

sedimentation. Alternative II would have the greatest impact. Although it would cross about the same amount (4 miles) of soils with a high erosion hazard as Alternative III, it would require three times the amount of timber clearing. Clearing increases runoff and a slope's susceptibility to erosion.

An increase in erosion could be expected during and following construction until disturbed areas were stabilized. Impacts would be minimized by limiting clearing and construction on steep and erosive soils; using water bars and other runoff control devices on access roads; constructing low gradient road cuts; avoiding construction and maintenance activities on wet soils to reduce rutting and compaction; and promptly reseeding road cuts and other disturbed sites.

Air Quality

Air quality impacts would result primarily from exhaust emissions from construction equipment and dust from construction operations. The amount of construction for a transmission line depends on the length of line, the acres of new right-of-way needed and the miles of new access roads needed. Alternative I would need a substation. Alternative II would require 60 acres of clearing; Alternative III, 22 acres. Each alternative would need less than 1 mile of access roads.

If slash burning were necessary, BPA would obtain the appropriate permits from the Lane Regional Air Pollution Authority. BPA would also cooperate with measures to mitigate potential impacts, such as scheduling burning at times that would not coincide with late summer field burning.

Construction vehicles traveling off-road during summer months may create dust in the area. BPA would take dust abatement measures (applying water to access routes is the usual technique) as necessary to prevent construction dust from becoming a local nuisance.

Exhaust emissions would be minimized by using vehicles and equipment that are properly maintained and operated.

With mitigating measures, air quality impacts for each alternative would be slight, localized, and temporary.

Noise

BPA has no history of any problems with noise from 230-kV lines. Corona noise is primarily a foul weather phenomenon and is associated with lines 500-kV and above. The units are in dB(A), a noise scale that models how the human ear responds to noise.

Levels are given for the edge of the right-of-way, which is the closest point that homes are allowed to the lines. None of the line alternatives or substations would produce noise which would exceed the State of Oregon's noise standard, 50 dB(A) at night for noise-sensitive properties. In general, an increase in sound of 10 dB(A) is perceived as a doubling in loudness.

Increases of 3–4 dB(A) are barely perceptible. Because of corona's high frequency content, two preliminary laboratory studies suggest that corona noise may be perceived to be around 3 to 10 dB(A) higher (in terms of annoyance) than other environmental noise of comparable sound intensity (Pearsons et al. 1979, Molino et al. 1979).

Few complaints about noise are received from people living near BPA transmission lines when noise levels are less than 50 dB(A). However, if a higher-voltage line is added to an established right-of-way where there are nearby homes, residents may notice an increase in noise, compared to the noise from existing lines. The extent to which this represents an annoyance will depend on several factors, including the level and type of other background noise.

NOISE IMPACT ASSESSMENT – The number of housing units within 500 feet of the center of the right-of-way for each alternative is shown in Table 4. This information was combined with expected increases in audible noise greater than 10 dB(A) to assess potential noise impacts.

No alternative would result in audible noise increases greater than 10 dB(A). All would be within State regulated levels. However, Segment C of Alternative III would result in a 3–5 dB(A) increase for a large number of housing units close to the line. As a result, a slight impact would be expected for Alternative III.

Historic/Cultural

Historic/cultural resources may be affected by surface or subsurface disturbance during construction, or from visual intrusion of constructed facilities.

Archaeologic and historic sites have been recorded along Alternatives I and III. Due to their distance from these sites, visual effects from either alternative (including the substation unique to Alternative I) are unlikely. Since this section of Eugene-Springfield has been extensively developed, it is highly unlikely that additional cultural sites would be discovered along either Alternative I or III.

Several archaeological sites have been recorded along Alternative II. Impact from construction of Alternative II on these sites would be visual and indirect in nature, with possible direct effects on one archaeological site from construction surface disturbance. Potential exists for discovery of new archaeologic sites on Alternative II. The effect on new sites would be direct from surface or subsurface disturbance during construction.

In case of discovery of archaeological resources, work would cease in the immediate area of discovery until significance of the resource would be determined by a qualified archaeologist.

Mitigation

The following mitigation would be performed in addition to the mitigation activities discussed under specific environmental resource categories.

Before the final design and location of the future transmission facilities, the status of research on electric and magnetic fields and relevant State and/or Federal exposure standards would be reassessed. As may be required, changes in design or location would be considered and implemented, if necessary, to be responsive to newer information or standards.

For Alternative II, mitigation required to reduce visual impacts would include the use of **non-specular conductors**, darkened towers, selective clearing along the right-of-way, and the retention of vegetative buffers along the Mohawk and McKenzie Rivers by using selective clearing and/or raising the towers to increase clearances. In the final design stage, consideration would be given to use of improved appearance structures in the McKenzie/Gateway area.

Also, for Alternative II, construction would be coordinated with the Oregon Department of Fish and Wildlife (ODFW) from mid-November to mid-March in the small area of deer and elk winter range that would be crossed.

Before final design and location of future transmission facilities, potential noise impacts would be further assessed to determine whether site-specific mitigation to reduce such impacts would be required.

SUBSTATION

The environmental consequences of the North Eugene-Springfield substation common to all alternatives are discussed below.

Public Health and Safety

Quantitative estimates of the electric and magnetic field environments of the high-voltage substations cannot be made. This is both because the electrical and physical characteristics of these substations are very complex, and because detailed substation designs and layouts have not been determined for this DEIS. However, it is reasonable to assume that the designs—and therefore the field environments—for each of the site locations would be similar.

Potential impacts on public health and safety would be slight for Sites 1 and 3. They are located directly under or next to existing transmission line facilities with existing field environments. Both sites are located in areas with very low population densities. Site 1 is zoned for agricultural use, so significant population growth is not expected. Site 3 is located within the Urban Growth Boundary; however, it is zoned for Special Light Industrial use. It is also located in a floodplain. Therefore, the probability of significant population growth near Site 3 is considered remote. However, because of these zoning differences, Site 1 is slightly preferred over Site 3.

Potential impacts would be low for Site 2. While this site is located right next to Willakenzie Substation, with its existing field environment, there are slightly more nearby residences and businesses here than at the other sites. Site 2 is within the Urban Growth Boundary and is zoned for residential use. Significant population growth is more likely here than at Sites 1 or 3. For this reason, Site 2 is less preferred than Sites 1 or 3.

Visual Resources

The visual effects of the alternatives are discussed separately for each alternative, and include a discussion of impacts associated with transmission lines into and out of the substation. For each site, mitigation could include site design and landscaping compatible with surrounding features.

SITE 1 - Site 1 would be located east of I-5 in an open field. The site would be bounded on the south and east by trees, on the north by small fields, and on the west by I-5. Visual impacts would be high because the substation would change the site visually from a pastoral to an industrial setting, visible to both north- and south-bound travelers on I-5. It would provide southbound travelers their first impression of Eugene. Views would be modified somewhat by competing tasks, such as driving at high speeds, other traffic, or roadside distractions. The grove of trees just south of this site would have to be partly removed to accommodate associated transmission lines.

SITE 2 - Site 2 would be southwest of the intersection of I-5 and Belt Line Road, and would be visible from both. Visual impacts of this site would also be high, even though the new substation would be next to EWEB's Willakenzie Substation, where impacts have already been established. The most notable impacts would be from the transmission lines entering and exiting the station, and crossing I-5. With the limited space available, a chaotic mix of transmission structures would be required.

SITE 3 - Site 3 would be located under an existing line and could be sited mostly within the right-of-way. The site would be isolated, and would be surrounded by trees on the north and east, by an open field on the south, and by an orchard on the west. The site would be over 1000 feet from the nearest public road and would be screened from view by vegetation. No homesites would be affected by this site. Visual impacts would be moderate because of a potential visual conflict with the planned development. Springfield's plans designate the adjacent land for Special Light Industrial use, a campus-style development. With careful planning, the visual impacts could be minimized.

Substation Site 3 is the visually preferred site because it is more isolated and not visible from any sensitive viewpoints. Site 1 is the least desirable because of its location adjacent to I-5 and in a previously undisturbed area. This site would be changed from a pastoral setting to an industrial type setting.

Agriculture

Impacts would be slight for Sites 2 and 3, and low for Site 1. Construction of the substation at Site 2 would have the least impact on agriculture. Only part of Site 2, about 2-3 acres, is now in agricultural use and would be lost to production. This site would be within the Urban Growth Boundary, and zoned for residential use, indicating that the land is already committed for urban use.

Agricultural impacts at Sites 1 and 3 would be similar. About 5 acres of currently productive land would be lost. However, only Site 1 is zoned for agricultural use. Site 3 would be within the Urban Growth Boundary and zoned for special light industrial use.

All three sites would remove prime farmland, as designated by the Soil Conservation Service, from production. No site would remove more than 5 acres of prime farmland from production. This represents about 0.003 percent of Lane County's total prime farmland.

Overall, none of the options would significantly affect agricultural production, although local impacts on individual farm operators might be of moderate intensity. To reduce long-term agricultural impacts, substation and related transmission structures would be sited to minimize interference with agricultural operators wherever feasible. In addition, operators would be compensated for damage to crops, fences, lost productivity, damage to irrigation and drainage systems, and the cost of subsoiling compacted areas.

Recreation

No recreation facilities or designated recreation areas would be affected by any of the substation sites.

Water Resources

None of the sites would have more than a slight impact on water resources. All sites are nearly level and on soils with a low erosion hazard. Any impacts would be short-term. Erosion and sedimentation can be expected to increase slightly until disturbed sites are stabilized and revegetated. The proximity of Sites 1 and 3 to waterways and the hazard of potential flooding would be concerns. The risk of discharging oil or hazardous substances into surface or groundwater would be very low because containment design would be incorporated into substation construction. A controlled drainage system using an impervious subsurface membrane would discharge into a holding tank or lagoon. In case of an oil spill, oil would be intercepted, separated from any rainwater, and contained for ultimate off-site disposal. Any contaminated soil would be excavated and also disposed of according to applicable Federal and State laws.

FLOODPLAINS - Sites 1 and 3 would be located in a 100-year floodplain. Under Executive Order 11988, developments on floodplains are discouraged whenever there is a practicable alternative. Although the sites could be protected by dikes, an alternative, Site 2, exists.

WETLANDS - Under Executive Order 11990, construction in wetlands is discouraged whenever there is a practicable alternative. No wetlands occur at any of the substation sites.

Fish

The construction of a substation at any of the sites would not affect fish or fish habitat. The lands, for the most part, are flat and cultivated. Although Site 3 would be within one-half mile of the McKenzie River, it is unlikely that construction would affect water quality of that river.

Wildlife

Wildlife values would not be affected to any great extent by construction on any site. The flat cultivated lands are not prime habitat for wildlife, and the removal of this habitat would not be considered significant. No clear choice exists among the three sites.

No species listed as threatened or endangered are found in the project area.

Vegetation/Timber

Site 1 would be located in a cultivated field, creating no impacts on forestry or vegetation. Site 2 would be next to an existing substation, with some adjacent cultivated land and a few scattered deciduous trees. Site 3 would be mainly located in a cultivated field. No trees of commercial importance would likely be removed for any option. Only slight amounts of vegetation would be permanently removed for the substation site. The impacts would be slight but equal for all alternatives.

Soils

For all alternatives, impacts from substation construction would be local in extent, short-term, and slight in intensity. All three sites would be on level soils, which pose only a slight erosion hazard. To minimize erosion at the selected site, disturbed areas would be returned to their original contours and reseeded. Sites 1 and 3 must also be adequately protected from potential flooding of the McKenzie River to prevent damage to the facility and erosion due to flooding. No one alternative is preferred.

Air Quality

Air quality impacts would result primarily from dust and exhaust emissions from construction equipment. The three substation alternatives vary by location, but all would have relatively the same amount of construction activities. With mitigating measures, air quality impacts for each alternative would be slight, localized and temporary.

Construction vehicles traveling off-road during summer months may create dust in the area. BPA would take dust abatement measures (applying water to access routes is the usual way) as necessary to prevent construction dust from becoming a local nuisance.

Exhaust emissions would be minimized by using vehicles and equipment that are properly maintained and operated.

Noise

Because the maximum voltage to be operated in the proposed substation is 230-kV, the audible noise produced at the property boundaries is expected to be much less than the State of Oregon's noise standard of 50 dB(A), a standard for night-time, noise-sensitive properties such as residences. Each of the three substation alternatives would easily meet that standard.

Whether the substation noise is noticeable to nearby residents will depend on many factors, including the noise level, amount of background noise present, and distance from substation. The lowest noise impact potential would occur at sites with the fewest number of nearby residents. Currently, no housing units are near any site. Residential development is planned near Site 2. Noise levels would be reassessed once final substation designs are developed.

Historic/Cultural Resources

Any historic/cultural impact results from surface or subsurface disturbance during construction, or from visual intrusion of constructed facilities on a resource. No archaeological sites have been recorded at the proposed substation sites. Any impact from substation construction on known historic sites would be visual. Since historic sites are well removed from all substation alternatives, the risk of visual effect would be low. Any risk of impact on undiscovered archaeological or historical resources from any substation alternative would be low, based on available survey data.

In case of discovery of archaeological resources, work would cease in the immediate area of discovery until the significance of the resource would be determined by a qualified archaeologist.

Mitigation

No mitigation would be required for the substation beyond what is described under the previous discussion for each environmental resource category.

Chapter V

SOUTH EUGENE REINFORCEMENT (ALVEY-LANE 500-kV) ALTERNATIVES, INCLUDING THE PROPOSED ACTION

The Technical Report identified a need for a 500-kV connection between the Lane and Alvey Substations. These two substations are major sources of power for the Eugene-Springfield area, southern Oregon, and the Oregon coast. The Report indicated that connecting the substations with a 500-kV line would ensure reliable electrical service as the area grows.

The study area for identifying South Eugene alternatives is shown on. Figure 6. The area was to include all viable alternatives, plus the area of any associated environmental impacts, generally including the area within one-half mile of existing corridors. The study area does not go north of the existing Alvey-Lane lines because of potential conflicts, including extensive urban development. The PP&L 230-kV corridor serves as the eastern boundary. The southern boundary limits any interference with Creswell and keeps the lines as short as possible because of cost considerations. The western boundary also keeps the lines as short as possible, close to Lane Substation in the absence of any environmental reason to go further west.

This section of the DEIS discusses and evaluates the No Action Alternative and four alternatives for connecting the Lane and Alvey substations. In each of the four cases, the objective is to connect the two substations with a single 500-kV line. Other alternatives that were considered and dismissed are discussed in Appendix D.

DESCRIPTION OF ALTERNATIVES

A No Action Alternative is discussed first. All four other alternatives would require construction of new transmission towers and lines; all four would require the acquisition of some additional right-of-way; three would use new corridors for several miles. The alternatives discussed below are shown on Figure 6.

No Action Alternative

The No Action Alternative is just that. No right-of-way would be acquired. No construction would occur. The system would remain as it is.

Alternative A - Existing Corridor

Alternative A uses only existing transmission corridors, a practice which usually reduces costs and environmental impacts.

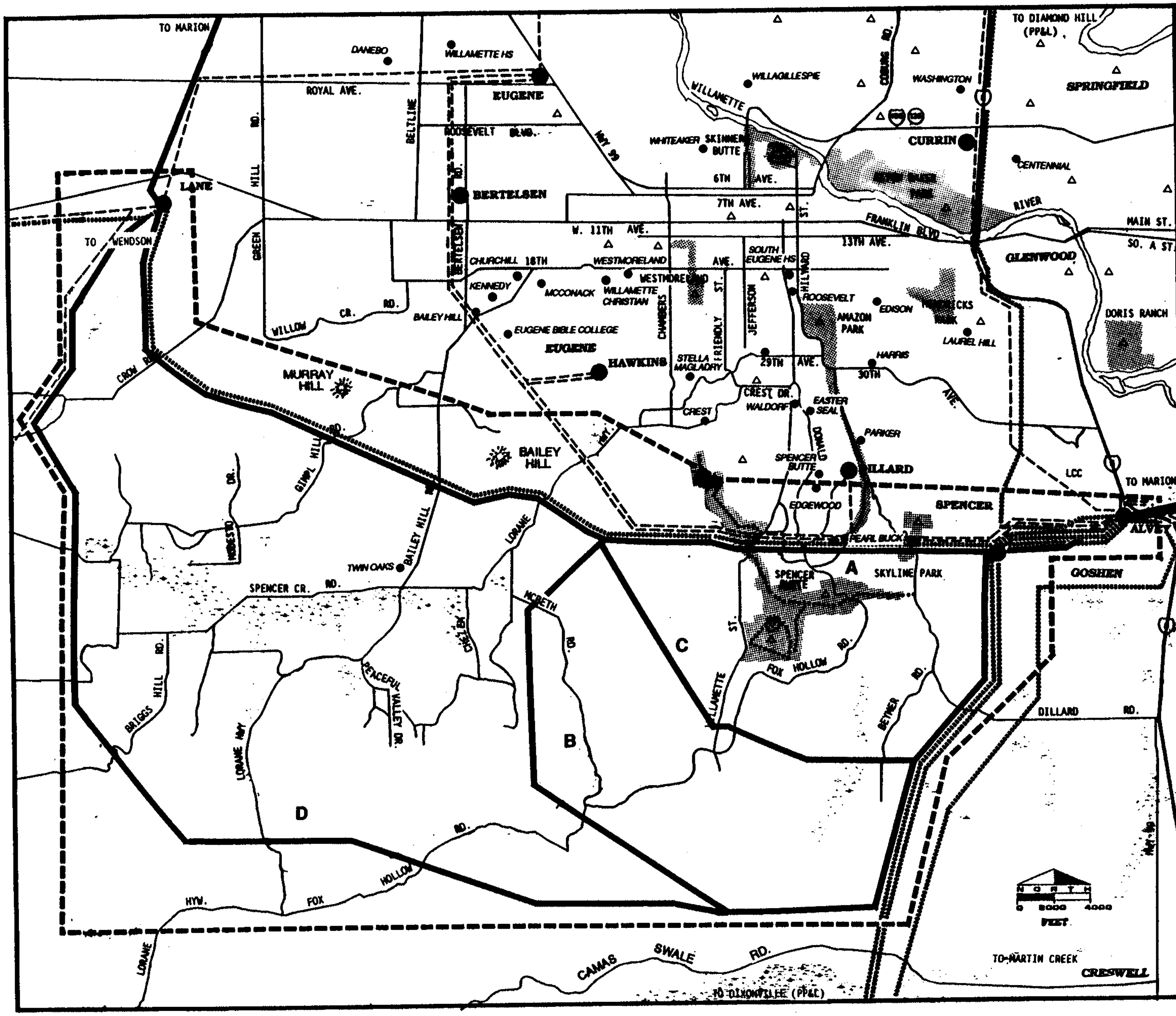


FIGURE 6
TRANSMISSION ALTERNATIVES, SOUTH EUGENE

LEGEND

STUDY AREA BOUNDARY

POWERLINES
- 115-kV
- 230-kV
- 500-kV

SUBSTATION

PROPOSED SOUTH EUGENE TRANSMISSION ALTERNATIVES A, B, C, D

SCHOOLS

PARKS

WETLANDS

RIDGELINE TRAIL

Use of this corridor for a 500-kV line was originally presented to the public in 1982 as part of the DEIS for PP&L's Eugene-Medford 500-kV transmission line. The DEIS proposed that a double-circuit line be constructed in this corridor. The double-circuit line is no longer needed because the Eugene-Medford line, planned for construction in 1991, will connect into Alvey. The analysis conducted for the Technical Report for this project indicated the need for a single-circuit 500-kV line.

CORRIDOR LOCATION AND LENGTH - Alternative A would consist of a new 500-kV line constructed parallel to BPA's existing 13.5-mile-long, 230-kV Alvey-Lane line.

PRESENT USE OF CORRIDOR AND RIGHT-OF-WAY - The Alvey-Lane corridor used for Alternative A is about 13 miles long; it is used presently by several different transmission lines. Because the number of lines and the right-of-way width vary, the corridor is broken into four segments for discussion. The present use of each segment, including the existing structures and right-of-way width, is illustrated on the left side of Figure 7.

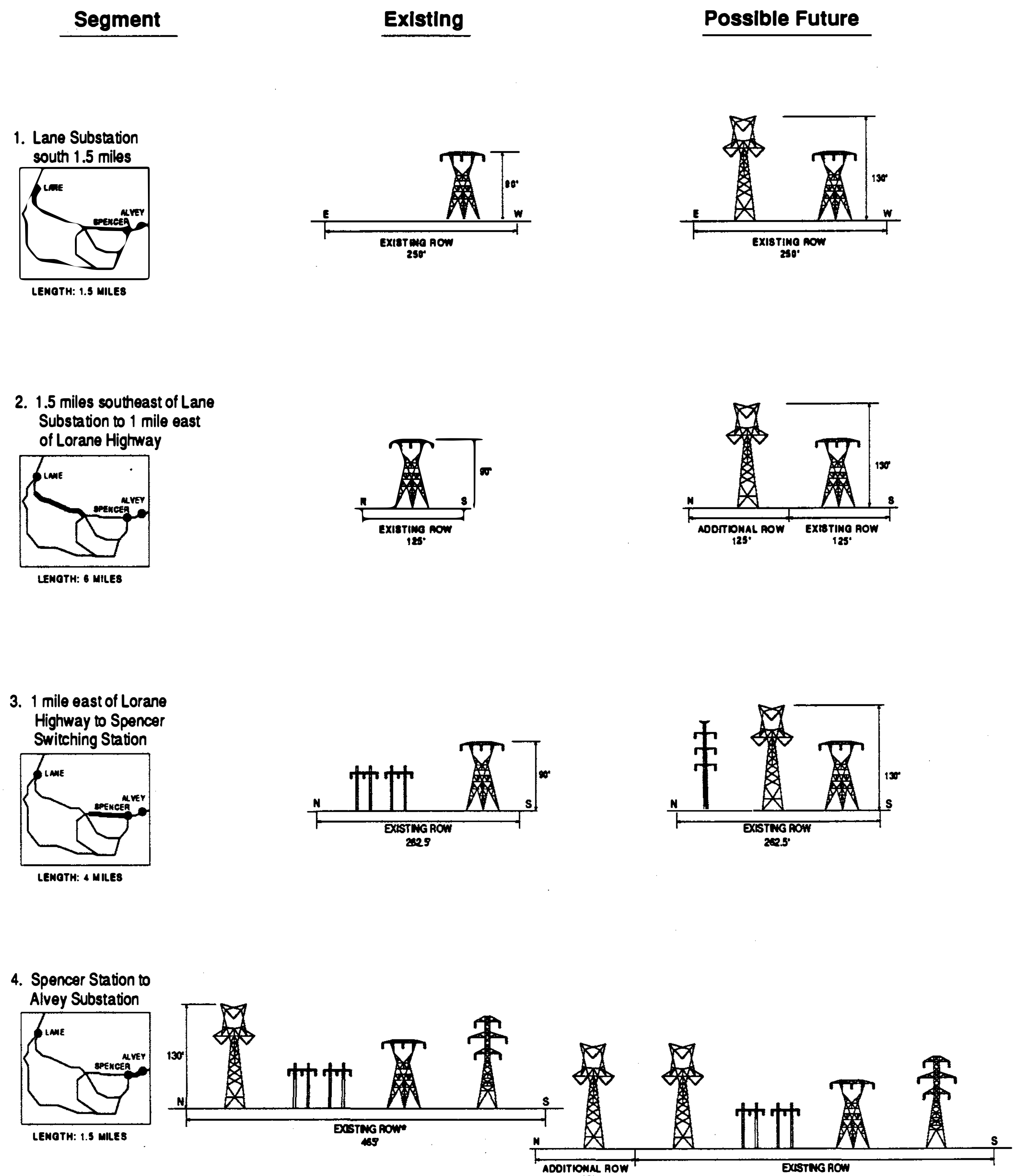
1. Beginning at the Lane Substation, the first 1.5-mile segment of the Alvey-Lane corridor contains only the Alvey-Lane 230-kV transmission line, mounted on steel lattice towers. The right-of-way is 250 feet wide.

2. The next 6-mile segment of the corridor, to about a mile east of the Lorane Highway, differs only in that the right-of-way is only 125 feet wide.

3. About a mile east of the Lorane Highway, the Alvey-Hawkins and Alvey-Eugene transmission lines join the corridor. Each of these 115-kV transmission lines is mounted on H-frame, wood pole structures, parallel to the Alvey-Lane 230-kV line and its steel lattice towers. These three lines continue east through Eugene's south hills for about 4 miles to the Spencer Substation. The right-of-way is 262.5 feet wide.

4. The eastern 1.5-mile section of the corridor between the Spencer and Alvey substations contains several additional transmission lines. Besides BPA's three lines discussed above, the corridor contains PP&L's Alvey-Spencer and Alvey-Dixonville 230-kV double-circuit lines. In 1991, the proposed PP&L Eugene-Medford 500-kV line will also be constructed on the north side of the right-of-way from Alvey to Spencer, where the right-of-way is 465 feet wide.

POSSIBLE USE OF CORRIDOR AND RIGHT-OF-WAY REQUIREMENTS - If Alternative A were used for a new 500-kV connection between Alvey and Lane, some additional right-of-way would have to be acquired and some lines would be relocated. Each of the four segments is discussed below and is illustrated on the right side of Figure 7.



NOTES:

- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- See Figure B-1 for structure types.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.
  ROW=Right-of-Way. PP&L=Pacific Power & Light Company.

Figure 7
Existing and Proposed Structures and Right-Of-Way, Alternative A South Eugene

1. The new 500-kV line could be constructed parallel to the existing Alvey-Lane 230-kV line on the unused portion of the existing right-of-way.

2. Construction of the new 500-kV line would require the acquisition of additional right-of-way. An additional 125 feet of width would be required.

3. In this segment, enough right-of-way exists to add the proposed 500-kV line if the existing 115-kV lines were to be relocated within the existing right-of-way. The two 115-kV lines could be mounted on concrete or steel double-circuit structures located near the north edge of the right-of-way. The existing H-frame, wood pole structures would be removed. The 230-kV line and its steel lattice towers would remain in their present location near the south edge of the right-of-way. The new 500-kV line would then be placed near the center of the right-of-way, between the relocated 115-kV lines and the 230-kV line.

4. For the last segment, the 500-kV line would require 125 feet of additional right-of-way alongside the proposed Eugene-Medford 500-kV line. Steel lattice towers would be used for the approximately 1.5-mile section between Spencer and Alvey.

Alternative A would require acquisition of 112 acres of right-of-way, all of it next to existing right-of-way.

POSSIBLE STRUCTURE SELECTION - In the more heavily populated areas between Dillard Road and Willamette Street, improved appearance structures could be used because they are generally preferred when seen at close range. For the remaining 11 miles, steel lattice towers would probably be used because they are generally less expensive and visually less obtrusive from a distance.

Making room for the 500-kV line by relocating the two existing 115-kV lines also provides an opportunity to change the type and number of structures. Each 115-kV line presently uses wood, H-frame structures placed typically 750 feet apart, depending on terrain. When relocated, both lines could be placed on a single set of concrete or steel double-circuit structures allowing the spans to be increased to match those of the existing 230-kV line (typically 1200 feet apart, depending on the terrain). In sensitive areas, it may be possible to use improved appearance structures such as steel poles for these lines. Structures for the 115-kV lines, the 230-kV line, and the new 500-kV lines could be clustered at the locations presently occupied by 230-kV structures. All existing H-frame, wood structures in Segment 3 would be removed.

ACCESS ROADS - Since Alternative A is based on the use of an existing corridor, there is little need for new access roads. It may be necessary to construct short roads from the current access road system to reach the new 115-kV and 500-kV structures, but they would likely be built within the transmission line right-of-way. Existing access roads may need to be widened to accommodate construction equipment.

Alternative B - Existing and New Corridor

Alternative B was developed to avoid the section of the Alvey-Lane corridor in the more heavily populated section north of Spencer Butte between Dillard Road and Willamette Street.

Use of this corridor was first presented to the public in 1982 as part of the DEIS for PP&L's Eugene-Medford transmission line project. The 1982 proposal was for a double-circuit line, rather than the single-circuit line now under consideration.

CORRIDOR LOCATION AND LENGTH - Alternative B would consist of a 500-kV line constructed along a portion of the Alvey-Lane corridor and a portion of PP&L's Alvey-Dixonville line. Alternative B would also require development of a new transmission line corridor south and west of Spencer Butte. Alternative B would be about 20.5 miles long.

PRESENT USE OF CORRIDOR AND RIGHT-OF-WAY - Alternative B has five segments. Three of these are identical to those discussed under Alternative A. The present structures and right-of-way width are illustrated on the left side of Figure 8.

1&2. Same as Alternative A.

3. Just east of the Lorane Highway, the corridor for Alternative B would depart from the Alvey-Lane transmission line, and follow a new route for about 7 miles. The new route would form a rough arc about 3 miles to the west and south of Spencer Butte. No transmission line right-of-way exists in this segment.

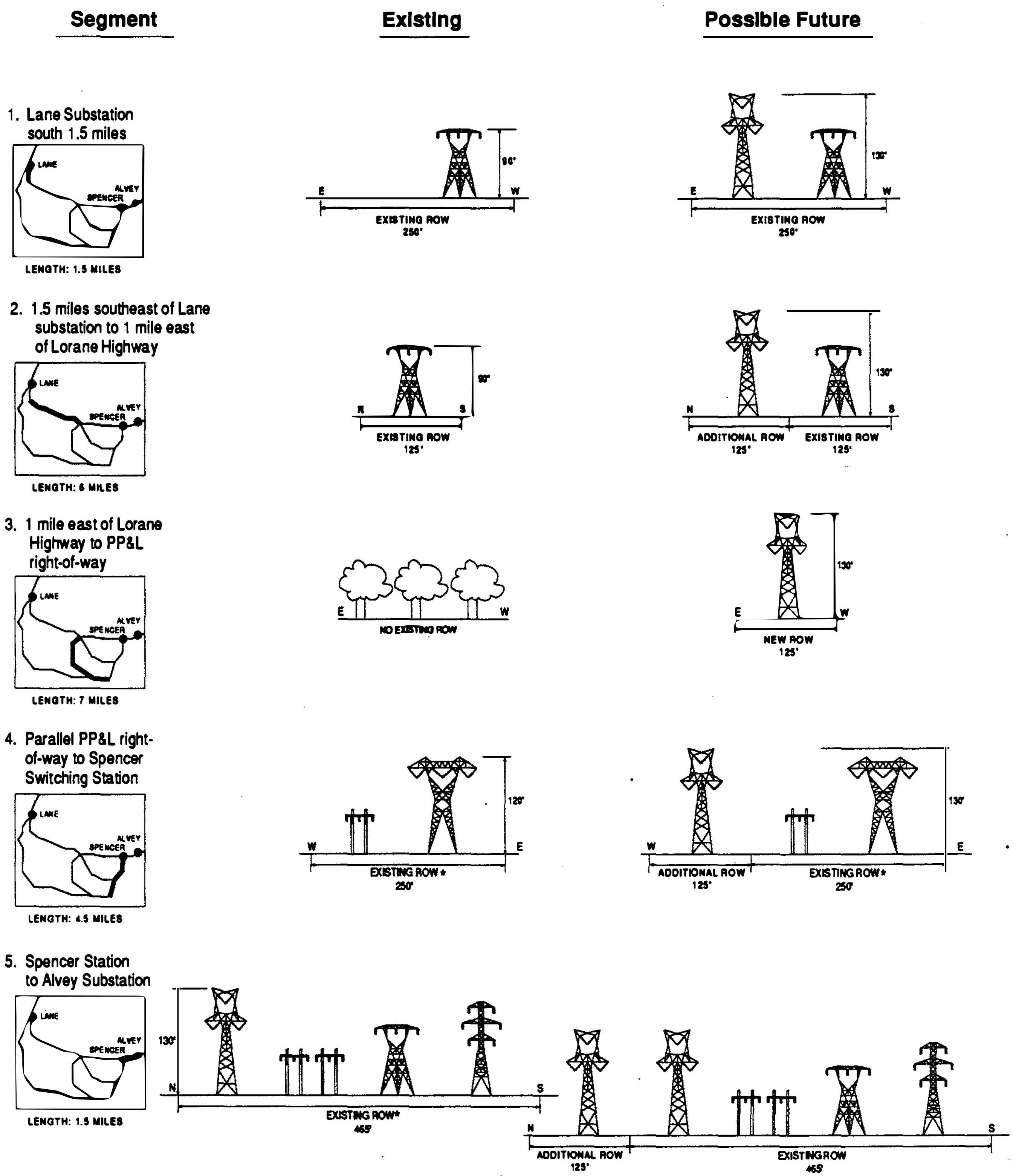
4. About 3 miles northwest of Creswell, the route for Alternative B would turn north and parallel PP&L's Alvey-Dixonville line for about 4.5 miles to the Spencer Substation. PP&L's right-of-way contains two 230-kV lines mounted on H-frame, wood pole structures and is about 250 feet wide. One of the 230-kV lines is scheduled to be removed and replaced with a 500-kV Eugene-Medford line in 1991.

5. Same as Alternative A, segment 4.

POSSIBLE USE OF CORRIDOR AND RIGHT-OF-WAY REQUIREMENTS - If Alternative B were used for a new 500-kV connection between Alvey and Lane, some additional right-of-way would have to be acquired next to existing rights-of-way and a new corridor would be constructed. Each of the five segments is discussed below and is illustrated on the right side of Figure 8.

1&2. Same as Alternative A.

3. Just east of Lorane Highway, Alternative B leaves the existing transmission right-of-way. Construction of the 500-kV line would require acquisition of a new right-of-way about 125 feet wide for 7 miles.



NOTES:

- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- See Figure B-1 for structure types.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.
  ROW=Right-of-Way. PP&L=Pacific Power & Light Company.

Figure 8
Existing and Proposed Structures and Right-Of-Way, Alternative B South Eugene

4. Where Alternative B parallels PP&L's transmission lines, about 125 feet of additional right-of-way would have to be acquired for 4.5 miles. The 500-kV line would be built parallel to PP&L's lines.

5. Same as Alternative A, segment 4.

Alternative B would require the acquisition of 286 acres of additional right-of-way. Some of this would be adjacent to existing lines, but some would be required for a new corridor where no transmission line currently exists.

POSSIBLE STRUCTURE SELECTION– Steel lattice towers or the most economical design would be the likely choice for the entire length of Alternative B.

ACCESS ROADS – Where Alternative B parallels existing transmission lines, only short extensions or widening of existing access roads would be needed. In the 7-mile new transmission corridor section, about 12 miles of new access roads would be needed.

Alternative C – Existing and New Corridor

Alternative C takes a slightly different route than Alternative B, again to avoid the section of the Alvey-Lane corridor in the more heavily populated section north of Spencer Butte between Dillard Road and Willamette Street.

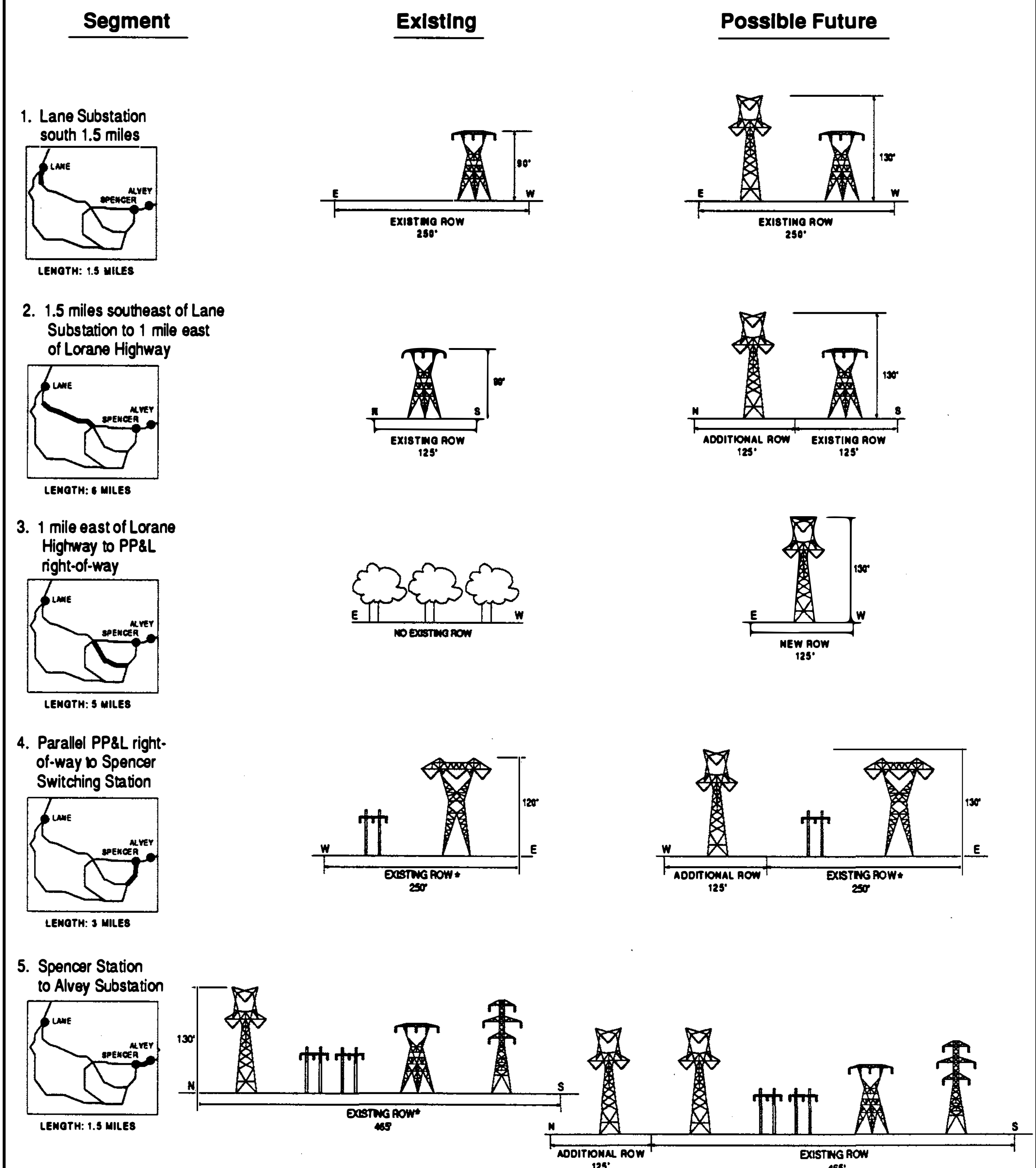
Use of this corridor has not previously been considered.

CORRIDOR LOCATION AND LENGTH – As with Alternative B, a 500-kV line would be constructed along a portion of the Alvey-Lane corridor and a portion of PP&L's Alvey-Dixonville line. Alternative C would also require development of a new transmission line corridor south and west of Spencer Butte. Like Alternative B, Alternative C seeks to avoid rural residences. Alternative C, about 16 miles long, is shorter than Alternative B.

PRESENT USE OF CORRIDOR AND RIGHT-OF-WAY – Alternative C has five segments. Three of these segments are identical to those discussed under Alternatives A and B. The present structures and right-of-way width are illustrated on the left side of Figure 9.

1&2. Same as Alternative A.

3. Just east of the Lorane Highway, the corridor for Alternative C departs from the Alvey-Lane transmission lines, following a new route for about 5 miles. The new route runs southeast toward the intersection of the Willamette Street and Fox Hollow Road, then easterly to PP&L's Alvey-Dixonville line. No transmission line right-of-way exists in this segment.



NOTES:
- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- See Figure B-1 for structure types.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.

ROW=Right-of-Way. PP&L=Pacific Power & Light Company.

Figure 9
Existing and Proposed Structures and Right-Of-Way, Alternative C South Eugene

4. Like Alternative B, the route for Alternative C would turn north and parallel PP&L's Alvey-Dixonville line, in this case for about 3 miles to the Spencer Substation. PP&L's right-of-way contains two 230-kV lines mounted on H-frame, wood pole structures and is about 250 feet wide. In 1991, one of the 230-kV lines is scheduled to be replaced with a 500-kV line.

5. Same as Alternative A, segment 4.

POSSIBLE USE OF CORRIDOR AND RIGHT-OF-WAY REQUIREMENTS - If Alternative C were used for a new 500-kV connection between Alvey and Lane, some additional right-of-way would have to be acquired adjacent to existing right-of-way and a new corridor would be constructed. Each of the five segments is discussed below and is illustrated on the right side of Figure 9.

1&2. Same as Alternative A.

3. Just east of the Lorane Highway, Alternative C would leave the existing transmission right-of-way. Construction of the 500-kV line would require acquisition of a new right-of-way about 125 feet wide for 5 miles (versus 7 miles for Alternative B).

4. Where Alternative C would parallel PP&L's transmission lines, construction of the new 500-kV line would require acquisition of about 125 feet of additional right-of-way for about 3 miles. The 500-kV line would be built parallel to PP&L's lines.

5. Same as Alternative A, segment 4.

Alternative C would require the acquisition of 218 acres of additional right-of-way, some next to the existing lines, but some in a new corridor where no transmission line currently exists.

POSSIBLE STRUCTURE SELECTION - Steel lattice or the most economical towers would be the likely choice for the entire length of Alternative C.

ACCESS ROADS - Alternative C would require about 9 miles of new access roads, mostly in the central, new transmission corridor section. Where Option C parallels existing transmission lines, only short new road extensions or widening of existing access roads would be needed.

__Alternative D - Primarily New Corridor__

Alternatives A, B, and C would parallel existing transmission corridors for most of their length. More than half of Alternative D, however, would be an entirely new route. Alternative D would avoid most of the Alvey-Lane corridor, including the more heavily populated section north of Spencer Butte between Dillard Road and Willamette Street. Like Alternatives B and C, Alternative D was located to avoid rural residences.

This corridor has not been considered previously.

CORRIDOR LOCATION AND LENGTH – Alternative D would parallel a 4-mile segment of an existing 115-kV line, south of the Lane Substation, and a portion of PP&L's Alvey-Dixonville line. A new transmission line corridor would have to be developed for about 12 miles. The complete corridor would be about 21.5 miles long.

PRESENT USE OF CORRIDOR AND RIGHT-OF-WAY – Alternative D has four segments. Two of these segments are the same as those discussed under other alternatives. The present structures and right-of-way width are illustrated on the left side of Figure 10.

1. The first 3.5-mile segment of the corridor would follow a 115-kV line south from the Lane Substation. (This 115-kV line eventually connects the Lane Substation with the Rainbow Valley Substation, just west of the area shown on the maps.) The existing right-of-way is 125 feet wide.

2. Three and one-half miles south of the Lane Substation, the route would leave the 115-kV line, and run south and east to PP&L's Alvey-Dixonville line. This segment would be about 12 miles long. There is no existing transmission line in this segment.

3. Same as Alternative B, segment 4.

4. Same as Alternative A, segment 4.

POSSIBLE USE OF CORRIDOR AND RIGHT-OF-WAY REQUIREMENTS – If Alternative D were used for a new 500-kV connection between Alvey and Lane, some new right-of-way would have to be acquired next to existing rights-of-way, and a new corridor would be constructed. Each of the four segments is discussed below and is illustrated on the right side of Figure 10.

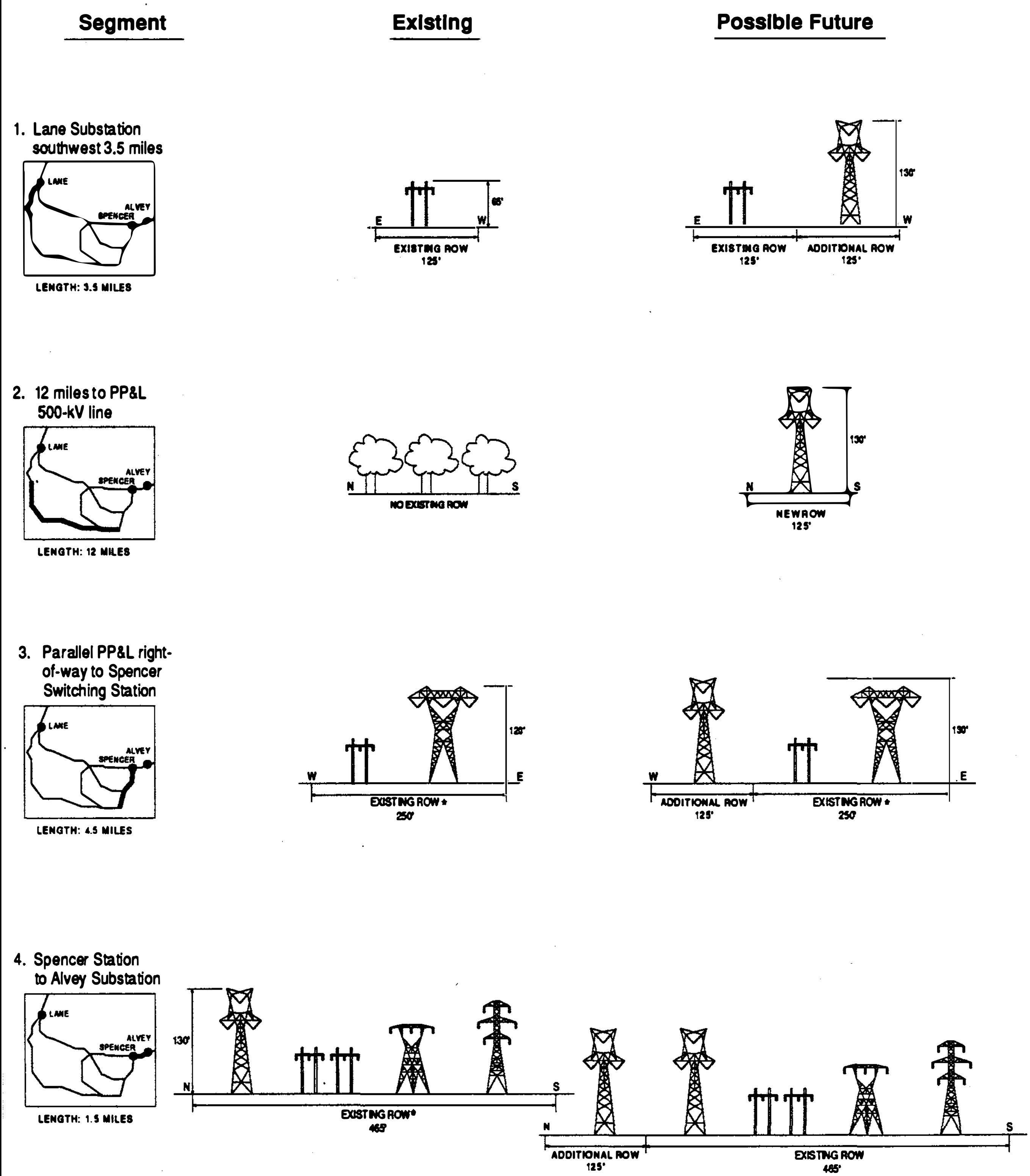
1. In the western segment, the new 500-kV line could be constructed parallel to the existing Lane-Rainbow Valley 115-kV line for about 3.5 miles. The existing right-of-way would have to be widened by 125 feet to accommodate the new line.

2. About 3.5 miles south of the Lane Substation, the route would leave the existing transmission right-of-way. Construction of the 500-kV line would require acquisition of new right-of-way (125 feet wide) where none exists now. This new segment would be 12 miles long.

3. Same as Alternative B, segment 4.

4. Same as Alternative A, segment 4.

Alternative D would require the acquisition of 327 acres of additional right-of-way, some next to the existing lines, but most in a new corridor where no transmission line currently exists.



NOTES:

- Proposed towers shown are the largest/most complex that would likely be constructed. Smaller or less complex towers could be used.
- See Figure B-1 for structure types.
- * Existing after construction of PP&L 500-kV Eugene-Medford line.

ROW=Right-of-Way. PP&L=Pacific Power & Light Company.

Figure 10
Existing and Proposed Structures and Right-Of-Way, Alternative D South Eugene

POSSIBLE STRUCTURE SELECTION – Steel lattice or the most economical towers would be the likely choice for the entire length of Alternative D.

ACCESS ROADS – Where Alternative D parallels existing lines, only short, new road extensions or widening of existing access roads would be needed. In the 12-mile center section, through which a new transmission corridor would be required, about 20 miles of new access roads would be needed.

COMPARISON OF ALTERNATIVES

The environmental decision factors listed in Chapter I were used to evaluate the four construction alternatives for South Eugene Reinforcement. Those evaluations are summarized below. Table 7 compares and ranks the construction alternatives. Figure 6 depicts school locations and some environmental resources such as wetlands and parks. Figure 11 shows the location of housing units within the South Eugene study area. Chapter VI explains the environmental consequences of each action alternative in more detail.

No Action Alternative

Not reinforcing the south Eugene facilities when needed would invite a local or regional blackout, where the loss of one line or substation would result in overload and loss of additional facilities. An outage of a 500/230-kV transformer or the 500-kV lines feeding those transformers at either Alvey or Lane would ultimately overload the remaining 500/230-kV transformers. These outages would require local load reductions or could cause a blackout in the area. Each of the two 500-kV lines serving the area typically suffers two or three outages per year. The outages last from a few seconds to 4 or more hours. Transformer outages are less frequent. However, they last much longer, up to 30 days.

If the load in southern Oregon and the coast, now served from the Alvey and Lane Substations, were to be served from another source, reinforcement of the south Eugene area could be delayed. However, these areas are 50 to 100 miles from the nearest other major electrical transmission facilities in Salem or Klamath Falls. No proposals have been developed to provide other routes from these potential sources to southern Oregon and the coast. Also, so long as the Eugene area is connected to the Northwest electrical power grid, power will flow through the Eugene area to other areas.

Public Health/Safety

All the alternatives would result in some increase in magnetic field exposure at the edge of the right-of-way. The increase would be smallest with Alternative A.

Visual Resources

Although Alternative A would be close to many residents, its visual impacts would be much less than those of the other alternatives, because it would be shorter and would place a line on an existing corridor, where impacts have

Table 7. Comparison of Transmission Alternatives, South Eugene.

Description	Alternative[1/] A	B	C	D
Length (miles)				
Parallel to existing line	9.0	13.5	11.0	9.5
Move/Relocate existing line	4.0	0	0	0
New right-of-way	0	7.0	5.0	12.0
Total	13.0	20.5	16.0	21.5
Area (acres)				
Additional/New Right-of-Way	112	286	218	327
New Access Roads (miles)	0	12	9	20
Resource Lands Affected (acres)				
Timber	110	163	150	206
Agriculture	1	1	1	1
Cost (millions)				
Transmission line	$ 6.2	$ 9.5	$ 7.5	$ 10.0
Substation Additions at Lane and Alvey	5.5	5.5	5.5	5.5
Total	$ 11.7	$ 15.0	$ 13.0	$ 15.5
Environmental Criteria/Impact Rating[2/]				
Public Health/Safety[3/]	slight	low	low	slight
Visual Resources	low	mod/high	mod/high	mod/high
Agriculture	slight	slight	slight	slight
Recreation	slight	slight	slight	slight
Water Resources	slight	low	low	low
Fish	slight	slight	slight	slight
Wildlife	slight	low	low	low
Vegetation	0	slight	slight	slight
Timber	slight	slight	slight	slight
Soils	low	low/mod	low/mod	moderate
Air Quality	slight	slight	slight	slight
Noise	low	slight	slight	slight
Historic/Cultural Resources	0	low	0	moderate

1/ The No Action Alternative would result in a zero for each category on the table.

2/ In order of increasing impact, the ratings are: 0, slight, low, moderate, high, and very high.

3/ Based only on potential increase in magnetic field exposure.

already been established. Alternatives B and C are similar, except that B would be longer. Alternative D would have the most severe impacts. It would be the longest, and its location would allow more open views from major roads. From some points, several towers could be seen. Alternatives B, C, and D would require access roads and clearing that would be visible from some points.

Agriculture

There is not enough difference among the alternatives to discern a preference. The overall impact of any alternative on agriculture would be slight. The amount of land to be removed from agriculture production would be negligible, and changes in agricultural practices would be minimal.

Recreation

Alternative A would be shortest, and on an established right-of-way where impacts have already been introduced. Alternative A would not interfere with any recreation activities, although it would cross the Ridgeline Trail. Since impacts have been established, the change would result in slight additional impacts.

Impacts for Alternatives C, B, and D would also be slight, but would vary according to their length; i.e., C is shorter than B; B is shorter than D. No impacts on any established recreation sites would occur. Impacts on dispersed recreation may occur, but would be slight.

Water Resources

Possible impacts would occur during and for a short time following construction, and would range from slight for Alternative A to low for Alternatives B, C, and D. The degree of impact refers to each alternative's erosion and sedimentation potential, as reflected by the terrain, amount of clearing and access required, and the number of streams crossed.

Fish

None of the alternatives would affect fish resources. No roads would be necessary across streams, and little vegetation would need to be removed at stream crossings. The slight negative rating results from the small amount of clearing necessary.

Wildlife

Alternative A would cross through a small amount of big game major range, but some of it is already developed and cleared. The other alternatives would cross more major range in less developed areas.

Vegetation

Vegetation for the most part would be modified, not permanently removed. No new roads would be needed for Alternative A. New roads would permanently

remove 23, 18, and 39 acres of vegetation from Alternatives B, C, and D, respectively. These are judged as slight impacts.

Timber

Alternatives A, B, C, and D would remove 110, 163, 150, and 206 acres of timber respectively. All of these impacts are judged slight.

Soils

Impacts would be low for Alternative A, low-to-moderate for Alternatives B and C, and moderate for Alternative D. Alternative A is preferred since, by paralleling existing lines, it would minimize access road construction and clearing. The other alternatives would require significantly more clearing and a new access road system, thereby increasing the risk of erosion and sedimentation. No known mining activity would be affected by the alternatives.

Air Quality

Air quality impacts would result primarily from exhaust emissions from construction equipment and dust from clearing. With mitigating measures, air quality impacts for any of the four options would be short-term and localized and hence would have a slight impact.

Noise

All of the alternatives would meet the Oregon noise standard. However, the new high-voltage lines would result in a greater than 10 dB(A) increase in noise levels for some segments of all four alternatives. Due to the low number of housing units near those segments, Alternatives B, C, and D would have slight impacts. Alternative A, with a moderate number of housing units, would have a low impact.

Historic/Cultural Resources

No cultural resource sites have been documented in the area of Alternative A or C. Alternative A is preferred over C because A would be in a much more heavily developed area, which reduces the likelihood of discovery of new resources.

Alternatives B and D would pass through the Camas Swale area, where four archeological sites are located north of Camas Swale Creek. These contain a rockshelter, a bedrock mortar used in domestic activities, and two middens containing refuse from foodstore activity. Also, one historic cemetery site occurs along Alternative B; two historic cemetery sites are located along Alternative D. Alternatives B and D are located in a creek bottomland, where a higher potential for discovery of unknown archaeologic sites exists. For both Alternatives B and D, potential for discovery would be low, with a greater potential for Alternative D.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

Alternative A is the environmentally preferred alternative for South Eugene Reinforcement. When compared with the other alternatives, Alternative A would have the same or less environmental impact for all resource categories except one. It would have less negative environmental impact mainly because it would use or parallel existing right-of-way, and no new access roads would be needed. Although Alternative A would have a slightly higher noise impact, noise levels would be within State of Oregon noise standards.

AGENCY PREFERRED ALTERNATIVE

BPA prefers Alternative A for meeting South Eugene reinforcement needs when load growth necessitates. Alternative A would provide the best electrical performance, would cost less, and would have the least overall environmental impacts. Alternative C is the second choice; then B. Alternative D ranks lowest. The No Action Alternative would result in outages that would violate BPA's reliability standards and contractual obligations with local utilities.

Alternative A would be the shortest. It provides a slightly stronger electrical connection between Alvey and Lane. The shorter distance would also mean fewer towers, less conductor and right-of-way, and fewer access roads. Those add up to lower costs and lower environmental impacts. Because Alternative A would use or parallel existing right-of-way, additional cost and environmental savings would be possible when compared to the other, longer alternatives which would require new right-of-way. Alternative A would also best contribute to energy conservation because the shorter line would result in lower transmission line losses.

Alternatives A, B, C, and D would equally meet BPA contractual obligations to local utilities and would comply with all applicable national policies.

Following public review and comment on the preference for Alternative A, the development of the FEIS, and issuance of the Record of Decision, BPA will recommend that the Lane County Rural Comprehensive Plan, the Metropolitan Area General Plan, and local implementing plans be amended to identify the selected route on the plan maps and to include policies which will protect the route from incompatible development.

Chapter VI

SOUTH EUGENE REINFORCEMENT - ENVIRONMENTAL CONSEQUENCES

The environmental effects of the South Eugene alternatives are explained below. The chapter also describes mitigation and monitoring activities that would occur.

NO ACTION ALTERNATIVE

The No Action Alternative would cost nothing in the short term, but there could be long-term costs. Outages have direct and indirect costs to BPA, the local utilities, and the local economy. The number of customers whose service would be disrupted would depend on the load conditions at the time of the outage, and the severity of the outage. As loads in the Eugene-Springfield area continue to grow, the severity of outages would gradually get worse until heavy overloads would cause equipment to operate automatically. This could result in disrupting service for most Eugene-Springfield area customers. The consequences could include the following.

- Loss of service to residential customers, which could involve no heat, loss of frozen food, frozen water pipes, normal inconveniences associated with loss of power at home, and loss of revenue to utilities.

- Loss of service to industrial and commercial customers, which could involve suspension of computer operations and loss of records, closing of businesses and loss of revenues to owners, loss of income by employees, loss of revenue to utilities, and the closing of schools.

- Reduced hospital capability - hospitals have emergency generators to sustain emergency operations.

- Associated safety and security problems because power would be out to traffic signals and street lights.

Service to many customers could be restored within 4 hours. However, some may not be able to be served until the original outage is corrected. That could take 1 to 5 days for a transmission line outage, and up to 30 days for a transformer outage.

Also, based on current technology, there is no reasonable alternative to constructing transmission lines. Even through construction is not anticipated for several years, siting of the facilities is proposed now because postponement could be costly. Urban development that could occur in the meantime could greatly increase costs of siting the lines later.

Likewise, the No Action Alternative would result in no environmental impacts in the short term. However, if postponed, the environmental impacts could be greater for public health and safety, visual, noise, and air quality, categories sensitive to population density.

The No Action Alternative may result in increased conservation. It would not interfere with compliance with other applicable national policies.

PUBLIC HEALTH AND SAFETY

Following is a summary of possible changes in electric and magnetic field exposures that could occur with the four alternatives. (See Table 8 and Appendix F.) The discussion focuses on the field strength changes at the edge of the right-of-way. This is the closest point that businesses or dwellings would be allowed to the lines. The edge of right-of-way values, therefore, indicate the potential long-term field exposures associated with the transmission facilities. All of the facilities would be designed so as to not exceed the maximum electric field allowed on the right-of-way by the State of Oregon (9 kV/m).

Contrary to what one might assume, the addition of a 500-kV line may result in lower magnetic field strengths than existing lines because the two circuits' fields partially cancel each other. There are several possible arrangements for placing the lines. The arrangement has a big effect on the strength of the magnetic field at ground level. The magnetic field strength changes (Table 8), are for the arrangements that would produce the lower magnetic field strengths, and they are represented by the proposed alternatives.

Alternative A

Future facilities could increase electric field levels on the left side of the right-of-way from around 1.5 to 20 times the levels produced by existing lines. (Left and right refer to the side of the right-of-way if looking east from the Lane Substation toward the Alvey Substation.) (Table F-1 in the Appendix shows electric and magnetic field calculations.) There would be no significant increase in electric field strength on the right side of the right-of-way. Similarly, magnetic field strength on the left side could increase from 1.5 to 9 times in Segments 1 and 2, with no increase in the other segments. For the right side, magnetic field strength could decrease by 20 to 50 percent in Segments 1, 2, and 3, with little change in Segment 4.

Alternative B

Edge-of-right-of-way electric field strength on the left side would increase from 1.5 to 20 times over existing levels. (See Table F-1.) There would be no increase on the right side, with the exception of a small change in Segment 4. However, Segment 3 represents a new line with new exposure potential.

Table 8. Calculated Change in Electric and Magnetic Field Strength at the Edge of the Right-of-Way, South Eugene.[1/]

Alternative/Segment	Electric Field (kV/m)[2/] Left	Right	Magnetic Field (mG)[2/][3/] Left	Right
Alternative A[4/]				
Segment 1	1.9	0	8	−5 to −3
Segment 2	1	0	3	−5 to −3
Segment 3	0.5	0	−5 to 1	−5 to −3
Segment 4	0 to 1	0.1	−3 to −1	−1 to 1
Alternative B[5/]				
Segment 1	1.9	0	8	−5 to −3
Segment 2	1	0	3	−5 to −3
Segment 3	2	2	9	9
Segment 4	1.6	0 to 1	3 to 4	−1 to 0
Segment 5	0 to 1	0.1	−3 to −1	−1 to 1
Alternative C[6/]				
Segment 1	1.9	0	8	−5 to −3
Segment 2	1	0	3	−5 to −3
Segment 3	2	2	9	9
Segment 4	1.6	0 to 1	3 to 4	−1 to 0
Segment 5	0 to 1	0.1	−3 to −1	−1 to 1
Alternative D[7/]				
Segment 1	0.6	1.6	−1 to 1	6
Segment 2	2	2	9	9
Segment 3	1.6	0 to 1	3 to 4	−1 to 0
Segment 4	0 to 1	0.1	−3 to −1	−1 to 1

kV/m = kilovolts per meter
mG = milligauss

1/ The values are the increase (positive) or decrease (negative) of field strength that would result with new lines compared to existing lines, based on calculations shown on Table F-1, Appendix F.
2/ Left and right refer to the side of the right-of-way if looking east from the Lane Substation toward the Alvey Substation.
3/ Magnetic fields are based on average current levels (load) estimated for the year 2001.
4/ Segments shown on Figures 6 and 7.
5/ Segments shown on Figures 6 and 8.
6/ Segments shown on Figures 6 and 9.
7/ Segments shown on Figures 6 and 10.

Magnetic field strength on the left side of the right-of-way would increase in Segments 1, 2, and 4 from 1.5 to 9 times over existing lines. No increases would occur in Segment 5. Segment 3 represents exposure potential from a new line. For the right side of the right-of-way, magnetic field strength in Segments 1 and 2 would decrease by 20 to 50 percent, and Segments 4 and 5 would not change compared to existing lines.

Alternative C

For the left side of the right-of-way, electric field strength would increase from 1.5 to 20 times over existing lines. (See Table F-1.) On the right side, electric field strength would increase by up to 50 percent in Segment 4, with no significant change in the other segments. Segment 3 represents an exposure increase from a new line.

Magnetic field strength would increase on the left side of the right-of-way from 1.5 to 9 times over existing lines in Segments 1, 2, and 4. On the right side, magnetic field strength would significantly decrease in Segments 1 and 2, with no change in Segments 4 and 5. Segment 3 is a new line.

Alternative D

Electric field strength on the left side of the right-of-way would increase from 1.5 to 5 times in Segments 1, 3, and 4. (See Table F-1.) On the right side, the electric field would increase from 1.5 to 5 times only in Segments 1 and 3. No significant change would occur in Segment 4. Segment 2 represents exposure potential from a new line.

In Segment 3, magnetic field strength on the left edge of the right-of-way would increase slightly. No significant changes would occur in Segments 1 or 4. On the right side, magnetic field strength would increase by 3 times in Segment 1, with no significant change in Segments 3 and 4.

Exposure Assessment

The number of housing units within 500 feet of the center of the right-of-way for each of the alternatives is shown in Table 9. This information was combined with the expected increase in magnetic field strength (Table 8) to develop a field exposure index (Table 10). This information was used to rank the alternatives.

In terms of minimizing new magnetic field exposure, the alternatives are preferred in the following order: A, D, C, B.

Table 9. Number of Housing Units Within 500 Feet of the Center of the Right-of-Way, South Eugene.

Alternative/Segment 1/	Number of Housing Units 2/ Left Side 3/	Right Side 3/	Total
Alternative A			
Segment 1	2	0	2
Segment 2	10	6	16
Segment 3	72	53	125
Segment 4	0	0	0
Total	84	59	143
Alternative B			
Segment 1	2	0	2
Segment 2	10	6	16
Segment 3	1	19	20
Segment 4	2	2	4
Segment 5	0	0	0
Total	15	27	42
Alternative C			
Segment 1	2	0	2
Segment 2	10	6	16
Segment 3	2	3	5
Segment 4	2	2	4
Segment 5	0	0	0
Total	16	11	27
Alternative D			
Segment 1	8	9	17
Segment 2	0	0	0
Segment 3	2	2	4
Segment 4	0	0	0
Total	10	11	21

1/ Alternatives and segments are shown on Figures 6, 7, 8, 9, and 10.
2/ Appendix C explains why existing housing unit data are used instead of projected housing unit data.
3/ Left and right refer to the side of the right-of-way if looking east from the Lane Substation toward the Alvey Substation.

Table 10. Magnetic Field Exposure Index, South Eugene.

Alternative/Segment[1/]	Exposure Index[2/] (mG X housing units)
Alternative A	
Segment 1	16
Segment 2	30
Segment 3	0
Segment 4	0
Total	46
Alternative B	
Segment 1	16
Segment 2	30
Segment 3	180
Segment 4	0
Segment 5	0
Total	226
Alternative C	
Segment 1	16
Segment 2	30
Segment 3	45
Segment 4	6–8
Segment 5	0
Total	97–99
Alternative D	
Segment 1	54
Segment 2	0
Segment 3	6–8
Segment 4	0
Total	60–62

mG = milligauss

1/ Alternatives and segments are shown on Figures 6, 7, 8, 9, and 10.

2/ The values are the product of increase in magnetic field at the right-of-way edge (greater than 1 mG), and the number of housing units within 500 feet of the center of the right-of-way.

VISUAL RESOURCES

Alternative A

Alternative A would be close to many residents, but its visual impacts would be low because it would place an additional line in an existing corridor, where impacts have already been established. The removal and replacement of the 115-kV single-circuit wood structures with double-circuit steel structures would reduce the number of structures required. Also, using improved appearance structures rather than steel lattice structures in critical view areas should reduce visual impacts. (See Figure F-1, Appendix F for photos that show what some views would be like under different alternatives.)

Visual impacts of Alternative A would be localized because most distant views are screened by dense vegetation and other obstructions. Although the 500-kV line would be on towers 40 feet taller than the existing ones, there would be few new locations from which the line or towers would be visible. From most points, viewers would see only one or two structures.

VISUAL CHARACTER - This corridor passes through the hills south and west of Eugene. These hills form a continuous but varied ridge bounding the city. This ridge includes Murray Hill, Bailey Hill, and Spencer Butte. For most of its length, the line would be on the south side of these hills and not visible from points in the metropolitan area. The line would lie on the north side of this ridge about 2 miles north of Spencer Butte, where the line might be visible but not prominent from points within Eugene's City Limits. Most of this route would cross low, rounded hills which project out from the main ridge into wide, flat-bottomed Spencer Creek Valley. The line would cross these hills well above the valley floor, but not high enough to be silhouetted against the skyline. The western end of the line would run through the valley of Coyote Creek to Lane Substation.

Where the line would cross to the north side of the ridge facing Eugene, it passes through an area of apartments close to the line. Development also occurs to the west of South Willamette Street just south of the ridgeline. Most of this route has experienced strong development pressure, and new houses occur along roads throughout the area.

VISIBILITY OF LINES FROM ROADS - The line would be visible from the many roads which it crosses; these include Cantrell, Crow, Dukhobar, Gimpl Hill, Bailey Hill, Lorane Highway, South Willamette, Donald Street, Fox Hollow, and Dillard Roads. The presence of screening vegetation and the surrounding topography would make the visual impact of the line on Gimpl Hill, Bailey Hill, Lorane, Cantrell, and Fox Hollow Roads minimal. However, the line would be more visible from Crow and Dukhobar Roads in the open land of the Coyote Creek Plain. Views along the line would be possible at the points where the line crosses South Willamette Street and Dillard Road, but generally not from other locations along these roads. The existing line and right-of-way would be prominent in views from Donald and Saratoga Streets and Fox Hollow Road near the crossing, and would also be visible from developments along Donald Street.

VISIBILITY OF LINE FROM HOUSES - As noted above, houses are scattered throughout the area, and the line would be visible in varying degrees at many points. (See Figure 11.) The two most critical points are the houses near South Willamette Street, and the apartments where the line crosses Fox Hollow Road and Donald Street. Development has occurred right next to the corridor and uphill from it in both of these locations. Between two and four houses would be located within 1000 feet of the right-of-way at almost all the other road crossings. Most of these houses would have a tree screen between them and the line.

At the South Willamette crossing, Solar Heights Subdivision has between 65 and 75 homes and homesites that would be within 1000 feet of the line. In the Fox Hollow, Donald, and Saratoga Street vicinity, Woodridge, Fox Hollow Chalet, Hunnington Apartments, and planned unit developments comprise between 230 and 290 residential units that would be within 1000 feet of the line. Unobstructed views of the line would be common for many of the units in the Fox Hollow, Woodridge, and Solar Heights developments.

VISIBILITY OF LINE FROM PARKS - Eugene's Spencer Butte Park and the adjacent city parks through which the Ridgeline Trail runs would be minimally affected by the presence of the line. The parking lot off Willamette Street and the first 0.2 miles of Ridgeline Trail east of Willamette Street would be adjacent to the power lines, but from most of the trails and from the top of Spencer Butte, the line would not be visible or visible only as a minor element in panoramic views.

Alternative B

Alternative B would be the same as Alternative A from Lane Substation to just east of Lorane Highway where it would diverge on a new right-of-way south of Spencer Butte and rejoin Alternative A near Spencer Substation. This new corridor would have moderate-to-high impacts. It would be more isolated, but would require extensive clearing and access road construction in an area of rural development.

VISIBILITY OF LINE FROM ROADS - In addition to the views from roads on the section common to Alternative A, the line would be visible from MacBeth and Fox Hollow Roads, south of Spencer Butte and from Camas Swale Road, northwest of Creswell. MacBeth and Fox Hollow Roads are the two main roads serving the many homesites scattered through the area traversed by Segment 3 of Alternative B. Forest cover would limit visibility of the line to the road crossings. Few distant views would be possible. However, foreground views would include extensive scarring from the cleared right-of-way.

VISIBILITY OF LINE FROM HOUSES - Most of the land crossed by Segment 3 would be forest interspersed with rural residential development. The highest concentration of homes is along MacBeth Road and near Fox Hollow Road. Until site-specific location and design information is available, impacts on individual homes cannot be addressed. Because of the dense forest cover, extensive clearing would be required, potentially exposing some homes to views of the right-of-way and towers. Since some residents are here because of the rural atmosphere, this would have an adverse effect.

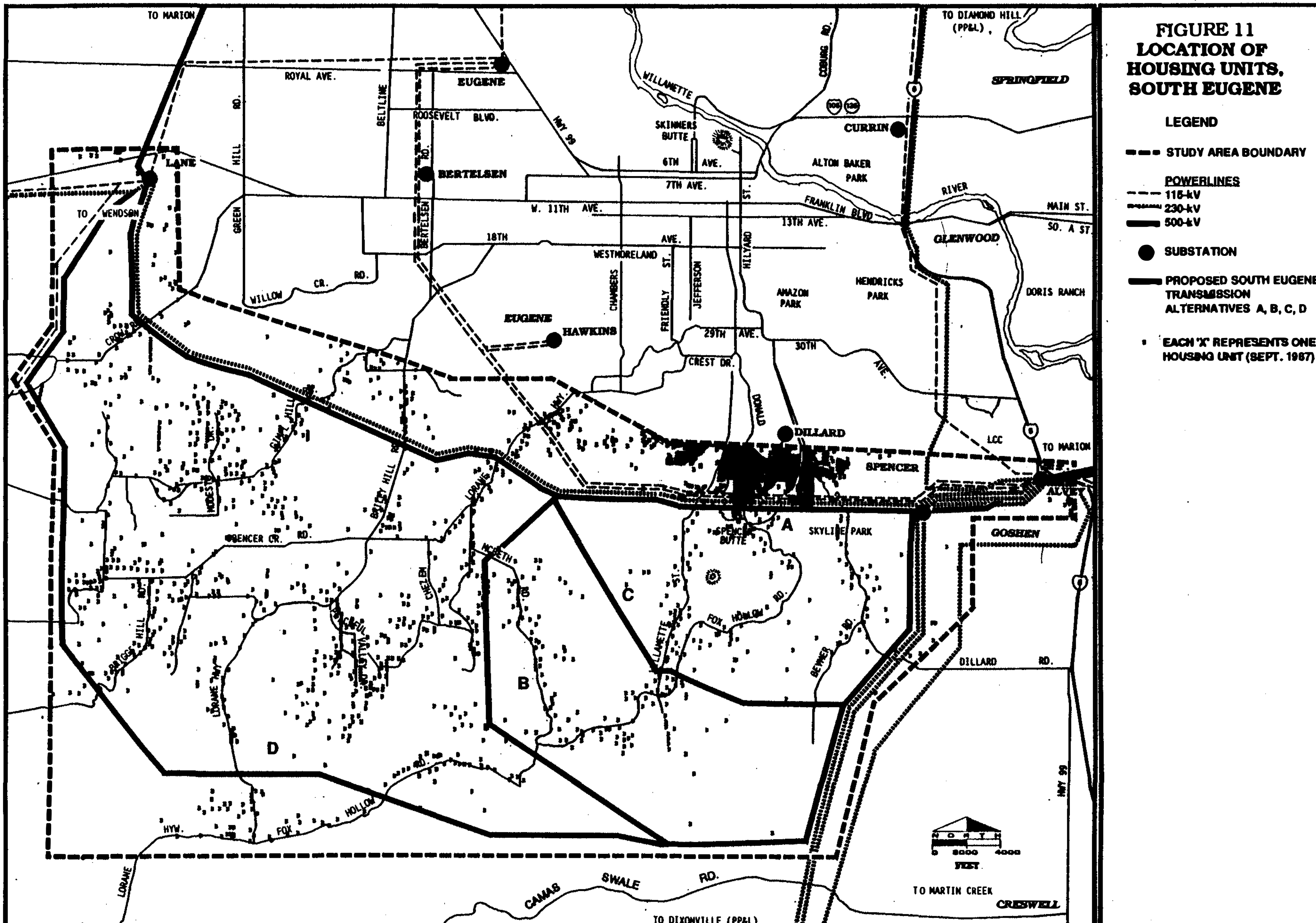


FIGURE 11
LOCATION OF HOUSING UNITS, SOUTH EUGENE
LEGEND
STUDY AREA BOUNDARY
POWERLINES
115-kV
230-kV
500-kV
SUBSTATION
PROPOSED SOUTH EUGENE TRANSMISSION ALTERNATIVES A, B, C, D
EACH 'X' REPRESENTS ONE HOUSING UNIT (SEPT. 1987)
TO MARION
TO DIAMOND HILL (PP&L)
SPRINGFIELD
EUGENE
CURRIN
LANE
BERTELSEN
HAWKINS
DILLARD
SPENCER
ALVEY
GLENWOOD
GOSHEN
CRESWELL
TO MARTIN CREEK
TO DIXONVILLE (PP&L)
CAMAS SWALE RD.
A
B
C
D

Alternative C

Alternative C would be similar to Alternative B except that it would be shorter and would affect fewer residences. Its impacts would be moderate-to-high because of extensive clearing and access road construction.

VISIBILITY OF LINE FROM ROADS – In addition to the views from roads on the sections common to Alternative B, the line would be visible from Willamette Street and Fox Hollow Road near their intersection south of Spencer Butte. These two roads provide the primary access for homesites in the area crossed by Alternative C. Because of existing forest cover, views from roads would be limited to the points at which the line would cross the roads.

VISIBILITY OF LINE FROM HOUSES – Alternative C would be relatively isolated, with few adjacent homes except near the intersection of Willamette Street and Fox Hollow Road, south of Spencer Butte. The primary impacts would be from clearing and access road construction, creating a visual scar. Because of its shorter length, less scarring would occur and there would be fewer viewing opportunities than for Alternative B.

Alternative D

Alternative D would go south of Lane Substation through agricultural land offering distant views of the line. Because of the long section in which a new corridor would be established, overall visual impacts would be moderate to high.

VISIBILITY OF LINE FROM ROADS – This route would cross Cantrell, Crow, Erickson, Briggs Hill, and Fox Hollow Roads, and the Lorane Highway. It would also be visible from Camas Swale Road northwest of Creswell. Views from Cantrell and Crow Roads will be open, with no screening available. Intermittent views of the cleared right-of-way may be possible from Briggs Hill Road and Lorane Highway. Views from other roads would be intermittent, with trees screening distant views.

VISIBILITY OF THE LINE FROM HOUSES – Visibility of the line from homes would be restricted by vegetative screening in most locations. Distant views may be possible from residences near Cantrell and Crow Roads.

AGRICULTURE

Agricultural impacts would be similar in extent and intensity for all four alternatives. Long-term impacts include land permanently lost to production and transmission structure interference with farm operations. Although impacts may be moderately significant to individual farm operators, overall impacts would not be significant. None of the alternatives would represent more than a marginal change in the area of productive land lost. Alternatives A, B, C, and D would permanently remove from production about 0.5, 0.7, 0.6, and 0.7 acre respectively of land currently in agriculture use. That represents less than 0.001 percent of the total 1986 harvested acreage for Lane County.

Within Lane County, 160,000 acres of soils have been identified by the Soil Conservation Service as meeting the requirements for prime farmland, and an additional 220,000 acres have been determined to be of local importance. Options A, B, C, and D would permanently remove 0.1, 0.5, 0.4, and 1.1 acres respectively of these soils from agriculture production. These figures are estimated assuming that 0.15 acres of productive land would be lost per mile of agricultural land crossed. The analysis did not account for the possibility of spanning or avoiding individual fields, or for the possible creation of non-farmable land due to transmission structure placement.

To minimize long-term impacts, transmission structures would be sited to minimize interference with farming operations whenever possible. Impacts such as soil compaction and rutting would be reduced by limiting construction activities when soils are wet. In addition, operators would be compensated for damage to crops, fences, lost productivity, damage to irrigation and drainage systems, and the cost of subsoiling compacted areas.

There is not enough difference among the alternatives to discern a preference. The overall impact of any alternative on agriculture would be slight. The amount of land to be removed from agricultural production would be negligible, and changes in agricultural practices would be minimal.

RECREATION

Alternative A would not disrupt or interfere with any recreation activities, and it would not affect any developed recreation sites. It would, however, cross the Ridgeline Trail, causing slight impacts. Since this alternative would place a line within an existing corridor, the intrusion has already been introduced. The incremental increase in the size of the structures and the accompanying decrease in number of structures would not affect the trail's use.

Alternatives B, C, and D would also have slight impacts. They would not directly affect any developed recreation sites, although some dispersed recreational activities requiring natural-appearing landscapes may be disrupted.

WATER RESOURCES

All four alternatives would encounter steep terrain and erosive soils in the hills south of Eugene. Alternative A would have the least impact on water resources since it minimizes the sedimentation risk. It would cross fewer streams (eight) and less terrain (12 miles) rated as having a high or moderate erosion hazard than the other alternatives. In addition, Alternative A would require minimal access road improvement and only 50 to 70 percent as much clearing as other alternatives.

Construction of Alternative D would have the greatest impact because it would cross the most waterways (13) and would require a significantly greater amount of new access roads (20 miles) and clearing (206 acres) than any other alternative. Much of the new access and clearing would be located on soils with high erosion potential.

Alternative C is slightly favored over Alternative B because of its reduced length, access road, and clearing requirements. In addition, Alternative C would cross fewer streams and miles of erosive soils than Alternative B.

All water resource impacts would be short-term, and would range from slight for Alternative A, to low for Alternatives B, C, and D.

Floodplains

Under Executive Order 11988, Federal agencies are instructed to avoid development on floodplains wherever there is a practicable alternative. According to the Flood Insurance Rate map, prepared by the Federal Emergency Management Agency for Lane County, only Alternative D would cross any floodplains. Alternative D would cross four floodplains for distances of 400, 800, 1000, and 5000 feet.

Until design is final, it is not known what type of structure would be used. However, in a worst-case analysis, a steel lattice 500-kV structure spanning 1150 feet would be used. This would mean that most floodplains would be spanned. As many as four structures would still need to be placed in floodplains. The structures would be designed to withstand flooding, and it is unlikely that the character of the floodplain would be changed if Alternative D were selected.

Wetlands

Under Executive Order 11990, construction in wetlands is discouraged whenever there is a practicable alternative. According to the National Wetlands Inventory, Alternatives A and B would cross no wetlands. Alternative C would cross one wetland for approximately 300 feet, a distance that can be spanned, eliminating potential impacts. Alternative D would cross four wetlands for distances of 300, 800, 2,000, and 3,500 feet. The two larger wetlands would probably require structures to be placed in them. Until engineering is complete, the numbers and locations would not be known; but in a worst-case analysis, using a span of 1,150 feet, as many as four structures may be so placed.

While this may not permanently affect these wetlands, there would be short-term construction impacts. However, other alternatives (A and B) do exist.

FISH AND WILDLIFE

Alternative A would cross five intermittent or first order streams and three larger ones. Alternative B would cross four intermittent or first order streams and four larger ones. Alternative C would cross ten intermittent or first order and two larger streams. Alternative D would cross nine intermittent or first order streams and four larger ones. No major rivers would be crossed.

Alternative A would be preferred, as it would parallel an existing line and no new access roads would need to be built; also less clearing would be needed. Alternative D would be the least preferred, as it would require the greatest amount of access roads and the most clearing.

Impacts from construction along Alternative A would not be significant, and those along Alternative D would have only moderate significance, as standard mitigating measures used in construction and careful placement of roads would mean that impacts would be short-term and local.

ODFW has provided general data to the L-COG on big game habitat use within the study area. For the most part, black-tailed deer is the common big game species present in the area. Roosevelt elk are found in a few places. Overlaying habitat maps with those of the various route options provides the following comparisons. The glossary contains definitions of the range categories.

Designated winter range is less abundant than other big game habitat, and therefore is more important. Big game major habitat supports the majority of the big game in the county and is generally sparsely developed commercial forest land. Peripheral range is between the valley floors and major range, and can support substantial numbers of big game and serve as winter range in severe winters.

Table 11. Affected Big Game Habitat, South Eugene

	Miles Crossed by Each Alternative			
Type of Range	A	B	C	D
Deer and Elk Winter Range*	0	0	0	0
Big Game Peripheral Habitat*	8.0	6.0	5.0	6.0
Big Game Major Habitat*	3.0	12.5	9.0	13.5

* defined in glossary

Because of the small amount of major range crossed, Alternative A would have only a slight negative impact, while the other alternatives would have low impacts.

Assuming that the more miles of habitat crossed, the greater the impact on the big game resource, then Alternatives B and D would have the most, and Alternative A, the least impact.

In a letter to BPA dated October 12, 1988, the U. S. Fish and Wildlife Service stated that "there are no listed or proposed endangered species within the area of the project." As the project would not be started for several years, BPA would request an updated list prior to active planning and design.

The Fish and Wildlife Conservation Act of 1980 encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. Measures proposed to mitigate potential impacts on wildlife and their habitats do this to the maximum extent possible within BPA's statutory responsibility.

VEGETATION

Vegetation occupying the right-of-way would be permanently limited to low-growing plant species. All trees creating a hazard to the transmission line would be removed. During maintenance, tall vegetation would be removed by cutting and controlled hand application of herbicides. BPA's herbicide application standards meet or exceed all State and Federal standards. An area where vegetation was removed and the soil disturbed, such as at tower sites, would be reseeded with grass or other plant species.

ODA has responsibility for noxious weed control within the State of Oregon. BPA policy on noxious weed control resulting from BPA project actions includes a noxious weed survey, development of mitigation measures for potential site-specific impacts caused or aggravated by BPA actions, and coordination with County weed boards through the BPA Area Maintenance Office.

Control of hazardous and unwanted vegetation and noxious weeds on private and public lands is outlined in BPA's Facilities Vegetation Management EIS (1983). Coordination may also be undertaken with respect to State lands, individual landowners, or weed control districts.

Mitigation measures would include working with private owners and public land managers to develop appropriate mitigation for noxious weed control at substations, structure sites, and along access roads. BPA would consult with landowners on programs to control BPA-caused noxious weed infestations, give notice before control applications, and respond to landowner problems.

TIMBER

Timber cleared from the right-of-way could be sold. However, some of the timber would be sold before maturity, so its value would be less. Moreover, the opportunity to grow timber would be foregone, as the right-of-way would need to be kept free of trees.

In evaluating the options, estimates of the affected timber were made from aerial photos and zoning maps. The character and extent of the affected vegetation was also estimated.

Alternative A would require about 110 acres of timber to be removed, while Alternatives B, C, and D would require 163, 150, and 206 acres, respectively. These amounts are not significant, as Lane County has approximately 2.5 million acres of forest resources (USDA 1987 and 1978).

SOILS

Alternative A would have the least impact on soil. All four alternatives traverse steep erosive soils in the hills south of Eugene. However, Alternative A would require only minimal access road improvement; would cross the fewest miles of soils with high (8 miles) and moderate (4 miles) erosion hazard; and would require only 50 to 70 percent as much clearing as the other alternatives. Alternative D would have the greatest impact, due to its length (22.5 miles), amount of new access roads needed (20 miles), and timber clearing requirements (206 acres). Much of the new access road construction and timber clearing would take place on steep erosive soils. Alternative C, because it would require less new access roads and clearing, and would cross fewer miles of erosive soils, would have fewer soil impacts than Alternative B.

Impacts would be short-term. Although erosion might be locally significant at some sites, the overall impact would be low for Alternative A, low-to-moderate for Alternatives B and C, and moderate for Alternative D. Erosion and sedimentation would be expected to increase during and after construction until a new base level is reached upon stabilization of disturbed areas. Impacts would be minimized by: limiting clearing and access road construction on steep and erosive soils; avoiding heavy equipment use on wet soils to prevent excessive rutting and soil compaction; constructing water bars and other runoff control devices on access roads; and promptly reseeding disturbed sites.

AIR QUALITY

Air quality impacts would result primarily from dust and exhaust emissions from construction equipment. The amount of construction for a transmission line depends on the length of line, the acres of new right-of-way needed, and the miles of new access roads needed. Alternative A would run through more residential area, but would require relatively less construction; it would be the shortest proposed alternative, and would use existing right-of-way and access roads. Alternatives B, C, and D all would require some new right-of-way and access roads. Alternative D would require the most construction, with 13 miles of new right-of-way and 20 miles of new access roads. With mitigating measures, air quality impacts for any of the four alternatives would be slight, localized, and temporary.

If slash burning were necessary, BPA would obtain the appropriate permits from the Lane Regional Air Pollution Authority, and would cooperate with measures to mitigate potential impacts.

Construction vehicles traveling off-road during summer months might create dust in the area. BPA would take dust abatement measures (applying water to access routes is the usual way) as necessary to prevent construction dust from becoming a local nuisance. Exhaust emissions would be minimized by using vehicles and equipment that are properly maintained and operated.

NOISE

Because corona noise is primarily a foul weather phenomenon, levels given are averages during rain. The units are in dB(A), a noise scale that models how the human ear responds to noise. Levels are given for the edge of the right-of-way, which is the closest point that homes are allowed to the lines. None of the alternatives would produce noise which would exceed the State of Oregon's noise standard [50 dB(A) at night for noise-sensitive properties]. In general, an increase in sound of 10 dB(A) is perceived as about a doubling in loudness. Increases of 3-4 dB(A) are barely perceptible. Because of its high frequency content, corona noise may be perceived to be around 3 to 10 dB(A) higher (in terms of annoyance) than other environmental noise of comparable sound intensity (Pearsons et al. 1979, Mulino et al., 1979).

Few complaints about noise are received from people living near BPA transmission lines when noise levels are less than 50 dB(A). However, when a higher-voltage line is added to an established right-of-way where there are nearby homes, residents may notice an increase in noise, compared to the noise from existing lines. The extent to which this represents an annoyance will depend on several factors including the level and type of other background noise.

Noise Impact Assessment

The number of housing units within 500 feet of the center of the right-of-way for each alternative is shown in Table 9. This information was combined with expected increases in audible noise greater than 10 dB(A) to assess potential noise impacts. The assessment summary is given in Table 12 where the noise levels reported are for edge of the right-of-way that is noisier. Alternatives B, C, and D would have a slight impact; Alternative A, a low impact. Even though the noise increase would be less for Alternative A, Segment 3 because the line would be farther from the edge of the right-of-way, it would have a greater potential impact because it passes considerably more housing units than the other alternatives.

HISTORIC/CULTURAL RESOURCES

Historic/cultural resources could be affected by surface or subsurface disturbance during construction activity, or from visual intrusion of constructed facilities.

No archaeologic sites have been recorded along segments A and C. However, potential exists for discovery of new historic sites along these segments, based on data available for Lane County.

Several archaeological and historic sites have been recorded along Alternatives B and D. Impacts from transmission construction on these sites would be visual and indirect in nature, but since the sites would be some distance from Alternatives B and D, the risk of visual effect would be slight. Risk of impact on undiscovered archaeological or historical resources from Alternatives B and D would be low, based on available survey data.

Table 12. Audible Noise Impact Assessment, South Eugene.[1/]

Alternative/Segment[2/]	Noise Levels, dB(A) for Segments With Noise Level Increase of More Than 10dB(A)			Housing Units Within 500 Feet
	Existing[3/]	Future[4/]	Change	
Alternative A				
Segment 1	35	48	13	2
Segment 2	35	48	13	10
Segment 3	35	46[5/]	11	72
Total				84
Alternative B				
Segment 1	35	48	13	2
Segment 2	35	48	13	10
Segment 3	35	48	13	20
Total				32
Alternative C				
Segment 1	35	48	13	2
Segment 2	35	48	13	10
Segment 3	35	48	13	5
Total				17
Alternative D				
Segment 1/Total	35	48	13	9

1/ Data shown only for segment and side of right-of-way (right or left) if there is a housing unit within 500 feet, and if the noise increase would be greater than 10 dB(A).
2/ Alternatives and segments are shown on Figures 6, 7, 8, 9, and 10.
3/ Estimated background noise level during rain in rural setting (Stearns, 1980). Existing line noise would be the same or lower.
4/ For side of right-of-way that would be noisier.
5/ The 500-kV line would be farther from the edge of the right-of-way than for other segments and alternatives.

In case of discovery of archaeological resources during construction, work would cease in the immediate area of discovery until significance of the resource would be determined by a qualified archaeologist.

MITIGATION

The following mitigation would be performed in addition to the mitigation discussed above under specific environmental resource categories.

Before the final design and location of the future transmission facilities, the status of research on electric and magnetic fields, and relevant State and/or Federal exposure standards, would be reassessed. Changes in design or location would be considered and implemented, if necessary, to be responsive to newer information or standards.

Although all the alternatives would meet the present Oregon State Noise Standards, some noise impacts could occur in residential areas where new high-voltage lines would be added to existing right-of-way. Before final design and location of future transmission facilities, potential noise impacts would be further assessed to determine whether site-specific mitigation to reduce such impacts would be required.

For Alternative A, mitigation to reduce visual impacts would include the use of non-specular conductors, darkened towers, dark insulators, and the use of improved appearance structures for Segment 3. Clearing would be done to minimize visual impacts and maintain screening as much as possible.

Chapter VII

CUMULATIVE IMPACTS

Several proposals, each having only minor environmental impact, may together cause major environmental impact. Therefore, the cumulative impact of the proposed projects must be determined. Cumulative impact refers to the incremental impact of all past, present and future anticipated actions in this area, regardless of who undertakes them. Of particular interest are actions that are similar and close to the North Eugene-Springfield and South Eugene projects.

Past actions are accounted for in the environmental consequences discussions for each alternative and for each environmental resource category (Chapters IV and VI). For example, calculations for magnetic fields include the impacts of existing lines. The impacts of growth and land development are accounted for in the comprehensive plans for Eugene, Springfield, and Lane County. Preparation of the DEIS has been closely coordinated with the local governments to ensure that it is consistent with local policies and long range plans.

Any additional environmental impact that could possibly occur would be due to the following.

- **Construction of both projects, North Eugene-Springfield and South Eugene.**

  The projects are separated geographically except for one 1.5 mile segment between Alvey Substation and Spencer Switching Station. (See Figure 12.) This segment is common to Alternative III (North Eugene-Springfield) and all South Eugene alternatives. No other combination of alternatives would change the environmental impact on any resource, even if both were constructed at the same time. (See Tables 1 and 7.) In the Alvey-Spencer segment, the cumulative impact of Alternative III (North Eugene-Springfield) and any South Eugene alternative would be as described below.

  The segment between Alvey and Spencer is quite isolated; it is used, zoned, and planned for forest uses. The two closest housing units would be about one-quarter mile from the proposed lines. Nonetheless, in that segment, public health/safety, noise, and visual impacts could change.

  Public Health/Safety — Building both projects would result in slightly different line loading compared to when the North Eugene-Springfield and South Eugene projects are considered separately. Magnetic field studies indicate that the exposure

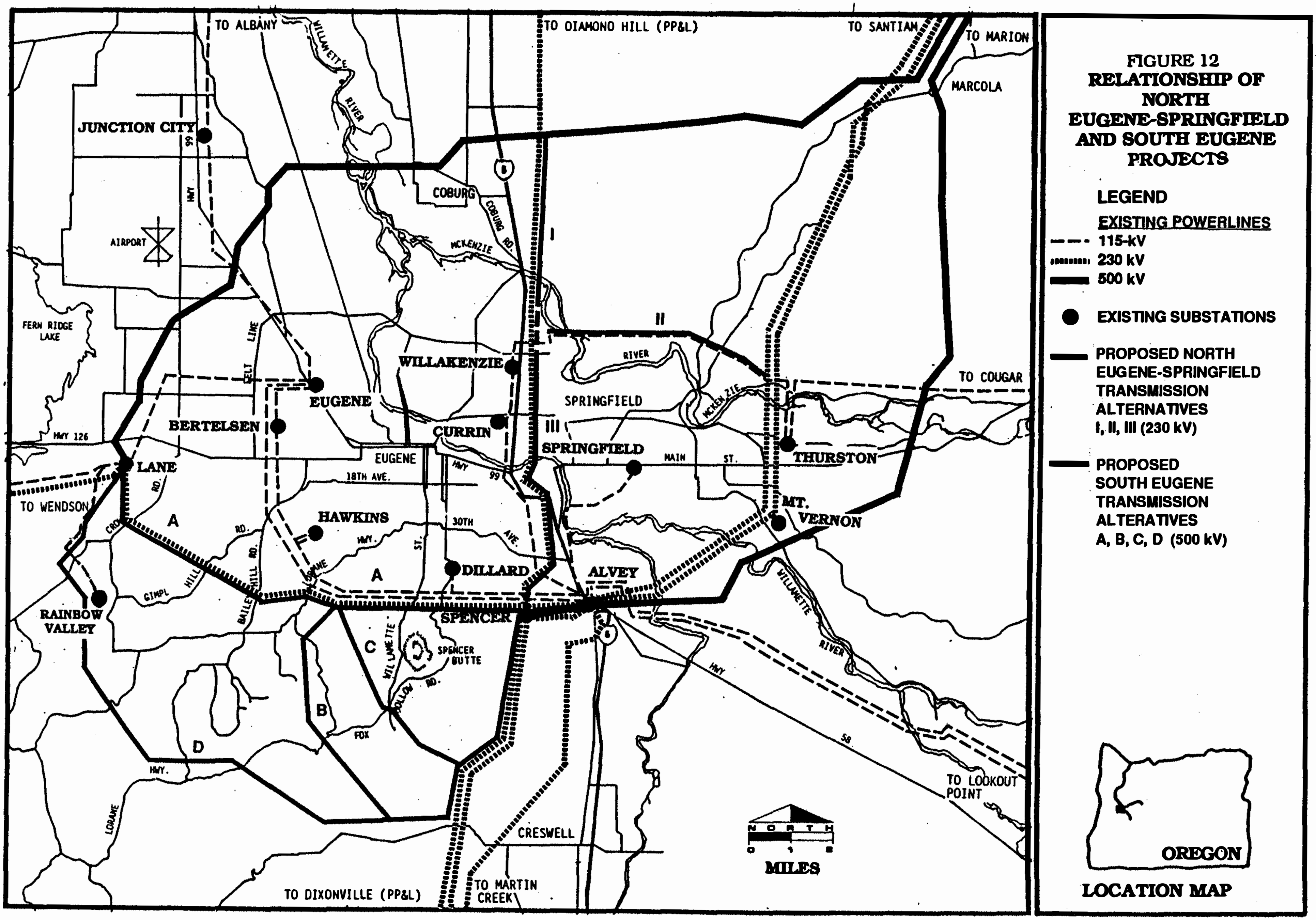


FIGURE 12
RELATIONSHIP OF NORTH EUGENE-SPRINGFIELD AND SOUTH EUGENE PROJECTS

indexes would be no worse for both projects than for each (as reported in Tables 5 and 10). As such, the environmental impact of doing both is determined to be no different than that reported for the separate options.

Visual Resources — The visual character of the right-of-way would become more complex and would appear chaotic with the mix of different structure types and sizes. However, the cumulative impacts are considered minor. This is because visual disruptions have already been established by an existing multi-line corridor, and because the corridor is isolated. Few viewers would see it, and most would not notice the cumulative change. The corridor is not visible from any nearby residences or public roads.

Timber — Alternative III, North Eugene-Springfield, would require removal of about 24 acres of timber between Alvey and Spencer. Each South Eugene alternative would require the same amount between Alvey and Spencer. The 48 acre total is not significant when compared to Lane County's approximately 2.5 million acres of forest resources (USDA, 1987, 1978).

Noise — Slight noise increases may occur, but the area is isolated. Nonetheless, noise levels would be within limits set by the State of Oregon.

Figure 13 shows how the segment between Alvey and Spencer would look if both projects are built.

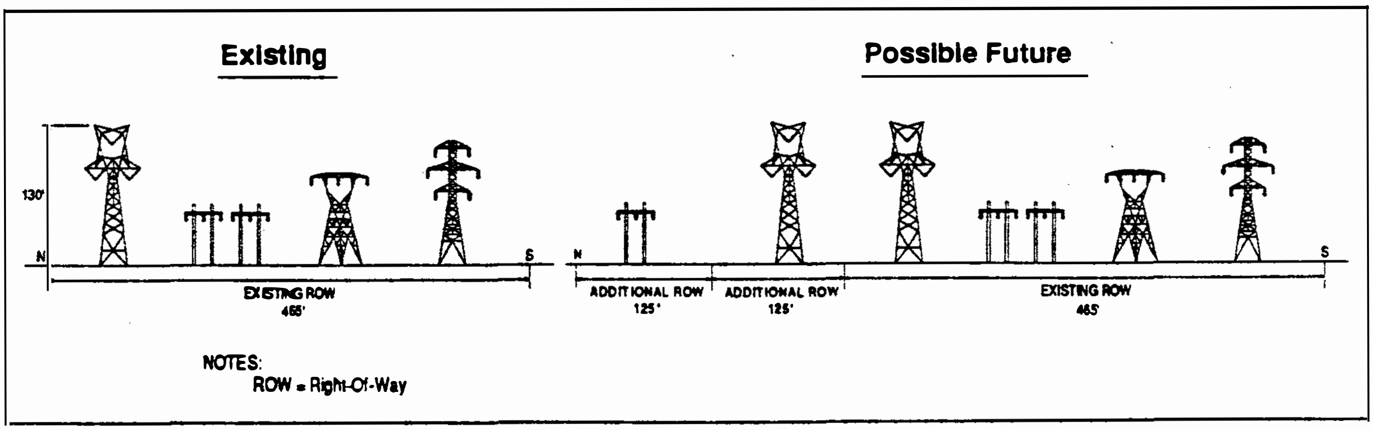


Figure 13
Existing and Proposed Structures and Right-Of-Way Between Alvey and Spencer Stations, If both North Eugene-Springfield, Alternative III, and any South Eugene Alternative Were Built.

- **Any other proposal which is planned but not yet built.**

  BPA is aware of one: PP&L's Eugene-Medford 500-kV Transmission Line. The Eugene-Medford proposal also includes construction in the Alvey-Spencer corridor. BPA's Record of Decision for that segment was issued in October 1985. The project is now scheduled to be placed into service in 1991.

  This Draft EIS has assumed the completion of that project as is shown in each figure depicting the existing right-of-way. (See Figures 3, 7, 8, 9, 10, and 13.)

- **The development of the electrical distribution network of local utilities, especially those actions which would tie into the proposed McKenzie/Gateway Substation, part of the North Eugene-Springfield project.**

  Decisions about the number and location of the local utilities' distribution lines are at the discretion of the local utilities. To make assumptions about them would be inappropriate and speculative.

BPA knows of no other actions, private or public, within the area of impact that has, is, or would cause environmental impact.

Chapter VIII

ENVIRONMENTAL CONSULTATION, REVIEW, AND PERMITS REQUIREMENTS

In addition to analyzing the proposed actions according to the environmental categories discussed previously, the DEIS responds to several laws and administrative requirements. Below is a list of applicable laws and permits, and a brief description of how the requirement has been or will be met.

NATIONAL ENVIRONMENTAL POLICY

This Environmental Impact Statement is prepared according to the National Environmental Policy Act (42 USC 4321 *et seq.*). BPA will base decisions about the proposed projects on an understanding of their potential environmental consequences and will take action to protect, restore, and enhance the environment.

STATE, AREAWIDE, AND LOCAL PLAN AND PROGRAM CONSISTENCY

This project is being closely coordinated with L-COG, the Areawide Clearinghouse. BPA has an Intergovernmental Agreement with L-COG to conduct work in developing the DEIS and to coordinate the project with local governments and the public. This special arrangement was established to ensure consistency with local plans and programs.

In addition, the State and Areawide clearinghouses received formal notification of BPA's intent to prepare a DEIS. The following comments were received, and the DEIS addresses those comments.

> Areawide Clearinghouse: This study is the result of a Memorandum of Agreement signed by BPA, Lane County, Eugene, and Springfield in 1985; in this Memorandum, the agencies agreed to cooperate in planning for new electrical facilities. BPA has entered into a contract with L-COG to fund participation in the study by local government staff. The subject project appears consistent with local or areawide policies, plans, and activities. Recommends support of the project as proposed.

> State Clearinghouse: The project may require "exceptions" to [Statewide Planning] Goals 3 and 4 where the routes cross farm and forest areas. Boundaries of areas affected may need to be delineated in advance.

According to Chapter 16 of the Lane Code, utility facilities of less than 200 feet high are permitted on lands zoned for Exclusive Farm Use (16.212(2)(e)). It is therefore unlikely that a Goal 3 (Agriculture) exception would be required.

Utility facilities are not an outright permitted use on lands zoned for forest use. Chapter 16 of the Lane Code indicates that utility facilities are permitted on lands zoned F-1, Nonimpacted Forest Lands, subject to approval of the Hearings Official (16.210(4)(e)). On land zoned F-2, Impacted Forest Lands, utility facilities are permitted uses, subject to Director approval (16.211(4)(e)). Depending on the selected alternatives, and, if appropriate, a determination of the need, an exception to Goal 4 (Forestry) will be made if and when the Lane County Rural Comprehensive Plan is amended to include the North Eugene-Springfield and South Eugene projects.

Both clearinghouses will be notified when the DEIS is ready for review, and their comments will be addressed by the FEIS. The clearinghouses will also be informed of the availability of the FEIS and the Record of Decision.

THREATENED AND ENDANGERED SPECIES

In a letter dated October 12, 1988, the US Fish and Wildlife Service stated that currently no species listed as threatened or endangered are found in the project area. As the project will not be started for several years, BPA will request an updated list before active planning and design, in order to fulfill its obligations under Section 7 of the Endangered Species Act.

FARMLAND PROTECTION

The Farmland Protection Policy Act (7USC 4201, et. seq.) directs Federal agencies to identify and quantify adverse impacts of Federal programs on farmlands. The Act is an attempt to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of agricultural land to non-agricultural uses. Location of prime farmland and additional farmland of local importance was determined from Soil Conservation Service soil maps for Lane County. Farmland conversion impact ratings were calculated for each alternative that would affect prime farmland and additional farmland of local importance. The calculations showed the amount of affected farmland to be so small that the sites would need only minimal consideration for protection (7CFR 658.4[c][2]). Sites within the Urban Growth Boundary are not subject to the regulations. The proposed action is therefore consistent with national policy for preservation of farmland.

RECREATION RESOURCES

A review of recreation resource inventories reveals that no components of the National Trails System, the National Wild and Scenic Rivers System, wilderness or roadless areas, or Bureau of Land Management Areas of Critical Environmental Concern are found within the study area. No State or local recreation resources would be adversely affected by the proposed projects.

FISH AND WILDLIFE CONSERVATION

No actions will be taken that interfere with the provisions of the Pacific Northwest Power Planning and Conservation Act, intended to protect, mitigate, and enhance fish and wildlife of the Columbia River and its tributaries.

The Fish and Wildlife Conservation Act of 1980 encourages Federal agencies to conserve and promote conservation of non-game fish and wildlife species and their habitats. Measures proposed to mitigate potential impacts on wildlife and wildlife habitat do so to the maximum extent possible within BPA's statutory responsibility.

The Fish and Wildlife Coordination Act requires that Federal agencies undertaking projects affecting water resources, including wetlands, by impoundment, diversion, or other controls must consult with the US Fish and Wildlife Service in order to conserve or improve wildlife resources. None of the proposed actions would impound, divert, or control water resources.

FLOODPLAIN MANAGEMENT

Under Executive Order 11988, developments on floodplains are discouraged whenever there is a practicable alternative. The North Eugene-Springfield preferred alternative, II, would cross two 100-year floodplains: one for 2,250 feet, the other for 5,250 feet. Alternative II would require, at most, 10 structures and associated roads within the floodplains. The structures would be designed to withstand flooding. It is unlikely that the presence of the structures would alter the character of the floodplain.

Alternative III would cross a floodplain for a distance of about 2,400 feet. However, existing transmission towers would be used. Alternative III would result in increased exposures to magnetic fields; would cost more than Alternative II; and is less desirable from the standpoint of electrical efficiency and reliability.

Alternative I would cross a floodplain for about 6,750 feet. Like Alternative III, it would use existing transmission towers. However, Alternative I costs much more than the other alternatives, making it less desirable.

The preferred alternative (Site 1) for the North Eugene-Springfield substation is within a 100-year floodplain. The site could be protected by a dike proposed in Springfield's plan for the McKenzie/Gateway Special Light Industrial site or built on fill. Site 1 is at a higher elevation than Site 3 which would also be within the floodplain. Site 2 is outside the floodplain, but is not a practicable alternative because of expected high negative visual impacts, difficulty in gaining access to the site, and intense adjacent urban development.

For South Eugene, Alternative A, the preferred alternative, would not cross any floodplains.

The DEIS is consistent with the U.S. DOE's floodplain requirements (10 USC 1022).

WETLAND PROTECTION

Under Executive Order 11990, construction in wetlands is discouraged whenever there is a practicable alternative. Other Federal and state regulations which may apply to the alteration of wetlands are Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act of 1899, the National Environmental Policy Act, the Fish and Wildlife Coordination Act, the Emergency Wetlands Act of 1985, and Oregon's Removal-Fill Permit Program.

For North Eugene-Springfield transmission, Alternative II, the preferred alternative, crosses one wetland for approximately 750 feet. That could be spanned. If necessary, BPA would obtain Federal and State permits to place fill in a wetland. When granting a permit, the permitting agencies must find that the public values of the project exceed the public values of the resource, and that there are no other practicable alternative locations for the project.

Both Alternatives I and III cross wetlands that could be spanned, but neither is a practicable alternative. The cost for Alternative I is more than double the cost of Alternative II. Alternative III has other environmental impacts, especially magnetic field exposures, that make it less preferable than Alternative II.

No wetlands occur at any of the North Eugene-Springfield substation sites.

For South Eugene, Alternative A, the preferred alternative, would cross no wetlands.

The DEIS is consistent with the U.S. DOE's wetlands requirements (10 USC 1022).

PERMITS FOR STRUCTURES IN NAVIGABLE WATERS

Section 10 of the Rivers and Harbors Act of March 3, 1899, (33 USC 403 *et seq.*) requires a permit from the U. S. Army Corps of Engineers for activities potentially affecting navigation on waters of the United States. For North Eugene-Springfield, Alternative II would cross the McKenzie River. According to the Corps of Engineers, a Section 10 Permit may be required. If so, BPA would comply.

The preferred alternative for South Eugene would not affect navigable waters.

PERMITS FOR DISCHARGES INTO WATERS OF THE UNITED STATES

Section 404 of the Clean Water Act (33 USC 1251 *et seq.*) requires a permit prior to construction from the U. S. Army Corps of Engineers for discharges into waters of the United States, including adjacent wetlands. Section 404 also gives the Environmental Protection Agency (EPA) the responsibility of reviewing Army Corps of Engineer permits for compliance with EPA 404(b)(1), fill and dredge guidelines. The EPA has authority to override any Army Corps of Engineer permit not in compliance with EPA guidelines.

If necessary, BPA would obtain Federal and State permits to place fill in a wetland. When granting a permit, the permitting agencies must find that the public values of the project exceed the public values of the resource, and that there are no other practicable alternative locations for the project.

PERMITS FOR RIGHT-OF-WAY ON PUBLIC LAND

The proposed actions would involve no land administered by other Federal agencies. Therefore, no permits for rights-of-way on public lands would be required.

POLLUTION CONTROL AT FEDERAL FACILITIES

Several pollution control acts apply. A brief description of each follows.

Clean Air Act

Air quality standards would not be violated. If slash burning were necessary, BPA would obtain the appropriate permits from the Lane Regional Air Pollution Authority, and would cooperate with measures to mitigate potential impacts.

Clean Water Act and Safe Drinking Water Act

This proposal would be consistent with Oregon Administrative Rules, Chapter 340, Division 41. Consistency with State pollution acts cannot be assured until final engineering is complete and appropriate permits approved. However, road building and maintenance procedures would keep waste out of public waters and minimize erosion of cutbanks, fills, and road surfaces. Measures would be taken to keep turbidity within allowable limits. An oil containment system would be installed at substation sites if equipment containing oil were installed.

If necessary, permits or certification would be obtained under terms of Section 404 (Federal Water Pollution Control Act) or OAR 141-85-005 et seq. (Removal and Fill Permits, Division of State Lands). Any activity that proposes removal, fill, or alteration of more than 50 cubic yards of material within the bed or banks of the water of the State of Oregon requires a permit from the Division of State Lands. "Waters of the State of Oregon" means all natural waterways including the Pacific Ocean, rivers, lakes, ponds, and wetlands.

Resource Conservation and Recovery Act (RCRA)

A minimal amount of hazardous waste, as defined by RCRA, would be generated during the construction of this project. Small amounts may be generated incidental to construction, such as paint. Any hazardous waste will be collected on site, properly packaged and labeled for shipment, and manifested to a permitted hazardous waste disposal facility for incineration, in the case of liquids, or for landfilling, according to all applicable Federal and State regulations.

When wood poles are used in the construction of the transmission line, BPA will require that the poles be treated with copper naphthenate. Copper naphthenate is not regulated by RCRA as a hazardous substance, but is regulated by the State of Oregon as a pesticide. All applicable Federal and State regulations will be observed.

Toxic Substances Control Act (TSCA)

TSCA seeks to minimize the introduction of toxic substances into the environment by regulating their manufacture, importation, sale, and distribution. The Act specifically covers all uses and disposal of **polychlorinated biphenyls** (PCB's) used as noncombustible insulating/cooling fluids in certain electrical equipment such as transformers and **capacitors**. PCB's have been designated as a potential human health hazard because they are potential carcinogens, and because of their persistence in the environment and their capacity to accumulate in the food chain.

BPA policy specifically states that electrical equipment with known levels of PCB contamination greater than 50 parts per million (ppm) will not be located in new substations. This policy applies both to the replacement of failed equipment and to new installations of equipment. The purpose is to prevent the introduction of PCB or PCB-contaminated equipment into new or uncontaminated substations. This action is consistent with TSCA.

Federal Insecticide, Fungicide and Rodenticide Act

Herbicide application to control vegetation will be done in accordance with BPA's vegetation management program. (See BPA's Transmission Facilities Vegetation Management Program EIS, 1983.) The program uses established controls to prevent water pollution. The most likely means of vegetation control would be hand cutting and hand spraying of herbicides in selected areas, primarily: 1) to control deciduous trees along access roads, and tall growing species within rights-of-way; 2) to control all plant growth in substation yards; and 3) to eradicate weeds in ornamental plantings, and noxious weeds on rights-of-way. Herbicides will not be applied within 10 feet of any water form.

The control of noxious weeds on an area-wide or county-wide basis is coordinated with affected landowners or appropriate Federal, State, or local agency representatives. BPA's Area Maintenance staff may apply the eradication materials, or they may be given to the landowner for application. BPA is not aware of any ongoing efforts or of any planned future coordinated control efforts of target noxious weed infestations in the project area.

NOISE CONTROL ACT

Oregon Noise Control Regulations (OAR 340.35) limit noise to 50 dB(A) at night for noise-sensitive properties, such as residences. The proposed projects will not exceed this limit. Limits for other uses, such as commercial and industrial, are higher.

ENERGY CONSERVATION AT FEDERAL FACILITIES

Increasing transmission capacity as proposed in the North Eugene-Springfield area would reduce transmission system energy losses by about 2 megawatts per year. The proposal for South Eugene would reduce losses by about 4 megawatts per year.

COASTAL ZONE MANAGEMENT CONSISTENCY

The Coastal Zone Management Act of 1972 (16 USC 1451 et seq) requires that Federal actions be consistent, to the maximum extent practicable, with approved state Coastal Zone Management Programs. Potential effects caused by the proposed projects would occur no closer than about 60 miles from the nearest body of salt water, so there would be no effect within the Oregon coastal zone management resource boundary (Oregon State Coastal Zone Managment Program 1977). A determination for consistency with Oregon's Coastal Zone Management Program is therefore not necessary.

HERITAGE CONSERVATION

Based on consultation with the SHPO, there are ten archaeologic and seven historic sites in the north Eugene-Springfield area. Within the south Eugene study area, there are five archaeologic and two historic sites presently listed or determined to be eligible for listing on the National Register of Historic Places. If required, field inventories will be made along the selected routes to determine effects, significance, and potential for effects on known, inventoried sites and any uninventoried sites which could be affected by the project.

The proposed projects will not directly affect any historic properties currently listed on or determined eligible for the National Register of Historic Places. A review of National Registry of National Landmarks, the World Heritage List, the National Registry of National Landmarks, and subsequent addenda indicates that no such properties are present in the project area.

Before performing any work which may result in harm to or destruction of an Indian tribal religious or cultural site on public land, BPA shall notify the SHPO and any appropriate Tribal representative in accordance with the American Indian Religious Freedom Act (P.L. 95-341). This project would not restrict access by Native Americans to sacred sites for pursuit of religious and traditional activities. BPA would ensure confidentiality of information about archaeological resources when disclosure would threaten the resource, in accordance with the Archaeological Resources Protection Act of 1979 (P.L. 96-95).

Before construction, if the SHPO requires it, BPA will conduct an intensive on-the-ground examination along the transmission line corridor. Appropriate testing and analysis of the area would occur. BPA will consult further with the SHPO to develop measures for acceptable mitigation of potential adverse effects on all properties identified during the survey and determined eligible for or listed on the National Register.

If, after these activities and initiation of construction, previously unidentified cultural resources are found which would be adversely affected by the project, BPA will follow the procedures outlined below as specified in the National Historic Preservation Act, Executive Order 11593, the National Environmental Policy Act, and the American Indian Religious Freedom Act (42 USC 1976).

1. To the maximum extent possible, BPA shall redirect work so that it will not affect the resource. Other work or work in areas that will not affect the resource may continue.

2. BPA shall immediately obtain from BPA's contract cultural resource specialist an evaluation of significance of the site and determination of potential impacts on eligible properties.

3. BPA shall immediately begin consultation with Oregon SHPO regarding eligibility of the site to meet the National Register criteria. Such consultation shall be initiated by telephone or in person, and documented in writing.

4. If the SHPO and BPA both agree that the site is not eligible, they shall document that decision and construction may proceed.

5. If BPA and/or the SHPO considers the site eligible, that determination shall be documented and BPA will proceed with protection and mitigation. BPA will then further consult with the SHPO on the determination of effect as follows:

   a. When BPA and the SHPO agree that there will be no effect, construction may proceed.

   b. When BPA, the SHPO, or both consider that the project will affect an eligible property, they will consult to identify appropriate mitigation measures. Mitigation measures arrived at will be provided to the ACHP. As soon as BPA, the SHPO, and the ACHP have documented the agreed-upon mitigation measures in a Memorandum of Agreement, the project will proceed.

Chapter IX

LIST OF PREPARERS

The following persons work for BPA unless otherwise noted.

THERESA CUNNINGHAM BYRNES, Public Involvement Specialist. Responsible for: Process review and comment. Education: M.A. American Studies; B.A. History, B.A. Secondary Education. Expertise: Public process; with BPA since 1981.

MARK DANLEY, Public Affairs Specialist. Responsible for: Planning and oversight of public involvement activities. Education: M.S. Geography/ Statistics; B.S. Outdoor Recreation Planning/Forestry. Experience: Wilderness Planner, BLM; Public Affairs Specialist with BPA since 1984.

NANCY D. DE MOND, Environmental Specialist. Responsible for: Cultural resource analysis, heritage conservation. Education: B.S. Natural Resource Management. Expertise: Archaeology resource management, long-range corridor planning, vegetation management, and NEPA preparation; with BPA since 1981.

COLLENE DOLL, Graphics Assistant, L-COG. Responsible for: Maps. Education: B. of Landscape Architecture. Expertise: Graphic artist; with L-COG since 1984.

LAURENS C. DRIESSEN, P.E., Civil Engineer. Responsible for: Line location. Education: B.S. Civil Engineering. Expertise: Line location; with BPA since 1968.

RICHARD C. EMBREE, Landscape Architect. Responsible for: Visual/recreation data collection and analysis. Education: B.S. Landscape Architecture. Expertise: Visual/recreation analysis, site location, mitigation and monitoring for EIS teams; with BPA since 1975.

CHARLES E. GILLARD, Environmental Specialist. Responsible for: Material on hazardous wastes. Education: B.A. Political Science. Expertise: Realty and environmental analysis; with BPA since 1973.

JEAN HAHN, Associate Planner, City of Eugene. Responsible for: Eugene planning and zoning. Education: B.A. Environmental Studies. Expertise: Current land use planning, zoning, and neighborhood plans; with Eugene since 1985.

JAMES R. HARRIES, P.E., Electrical Engineer. Responsible for: System studies modeling operation and developing plans for transmission system reinforcement. Education: B.S. Electrical Engineering. Expertise: Budget planning and coordination for transmission system facilities; with BPA since 1973.

PHILLIP HAVENS, Wildlife Biologist. Responsible for: Data collection and analysis. Education: Graduate study in Wildlife Management; B.S. Biological Science. Expertise: Analysis of timber harvest, and transmission line impacts on fish and wildlife; with BPA since 1983.

KENT HOWE, Associate Planner, Lane County. Responsible for: Lane County planning and zoning. Education: M.A. Geography; B.S. Forest Management. Expertise: Long-range rural planning; with Lane County since 1979.

RODGER HOWLETT, Electrical Engineering Technician. Responsible for: Data collection on engineering aspects. Education: A.A.S. Electronics. Expertise: Engineering data collection; with BPA since 1980.

ARNOLD HULTBERG, P.E., Electrical Engineer. Responsible for: Representing Lower Columbia and Eugene District as member of project team. Education: B.S. Electrical Engineering. Expertise: Systems protection, customer power needs, long-range planning; with BPA since 1962.

LINDA KRUGEL, AICP, Planning Consultant. Responsible for: Developing EIS, coordinating project with local governments, conducting public involvement program. Education: Masters of City Planning; Masters of Public Administration; B.S. Related Art. Expertise: Planning and public policy development. Consultant to BPA since 1984.

MARVIN J. LANDAUER, Chief, Project Studies Section. Responsible for: Transmission system needs. Education: B.S. Electrical Engineering. Expertise: Transmission planning and high voltage equipment requirements; with BPA since 1976.

JACK M. LEE, JR, Environmental Health Specialist. Responsible for: Material on public health and safety. Education: Environmental Science doctoral program; Graduate certificate in Occupational Health; M.S. Wildlife Biology. Expertise: Coordination of BPA High Voltage Biological Research, preparation of biological/health sections for environmental documents; with BPA since 1973.

STACY MASON, Environmental Specialist. Responsible for: Material on air quality and socioeconomics. Education: B.A. Aquatic Biology. Expertise: Environmental analysis; with BPA since 1988.

THOMAS MCKINNEY, Chief, Environmental Section. Responsible for: Managing project. Education: B.A. Geography. Expertise: Environmental project management; with BPA since 1979.

PAMELA L. MCPHERRON, Administrative Technician. Responsible for: Word processing, secretarial support. Expertise: Administrative support; under contract with BPA since 1986.

BILL MITCHELL, Associate Planner, City of Springfield. Responsible for: Springfield planning and zoning. Education: B.S. Geography.

JUDITH H. MONTGOMERY, Writer. Responsible for: Editing. Education: Ph.D. American Literature, M.A. English Literature, A.B. English Literature. Expertise: Writing and editing of environmental and public involvement documents for power agency. Consultant to BPA since 1980.

MICHAEL A. RASCHIO: P.E., Chief, Project Coordination Section. Responsible for: Transmission system planning and system electrical requirements. Education: B.S. General Engineering. Expertise: Sixteen years experience in transmission system planning; with BPA since 1973.

JOHN REPLINGER, P.E., Program Manager, L-COG. Responsible for: Coordinating local government, public information and involvement. Education: B.S. Civil Engineer; B.A. Liberal Arts and Science. Expertise: Transportation planning, energy planning, and traffic engineering; with L-COG since 1978.

LEROY P. SANCHEZ, Visual Information Specialist. Responsible for: Coordination of EIS graphics, graphic design, and photosimulation. Expertise: Geographic Information System mapping, including federal transmission EIS; with BPA since 1978.

STEVE SHERER, Geographic Information System Manager. Responsible for: Managing automated spatial analysis for route location. Education: B.S. Geography. Expertise: Resource analysis, geographic information system development, EIS preparation; with BPA since 1976.

PHILIP SMITH, Soils/Geographic Information System Specialist. Responsible for: Data collection and analysis of soils and water. Education: M.S. Soil Science; B.S. Agronomy. Expertise: Soils and water analysis. Under contract with BPA since 1981.

SUSAN SMITH, Assistant Planner, City of Springfield. Responsible for: Springfield planning and zoning. Education: Masters of Urban Planning, B.S. Conservation of Natural Resources. Expertise: Land use planning, renewable energy, sustainable community development; with Springfield since 1987.

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MICHAEL ZECKMEISTER, Environmental Specialist. Responsible for: NEPA coordination and review. Education: M.S. Natural Resource Management, B.S. Wildlife Management, B.S. Biology. Expertise: NEPA coordination and review; with BPA since 1988.

Chapter X

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

The DEIS is being mailed to the following agencies, organizations and persons. BPA is sending a summary of the document to other interested persons and groups. The mailing list for the summary contains about 3,000 names. Because of its length, it is not included here. Persons who receive the summary may order a copy of the DEIS from BPA if they wish.

FEDERAL AGENCIES

Federal Regional Council, Region X, Seattle, WA
US Environmental Protection Agency, Seattle, WA
USDA Forest Service, Eugene, OR
USDA Forest Service, Mapleton, OR
USDA Rural Electrification Administration, Washington, D.C.
USDA Soil Conservation Service, Eugene, OR
US DOD Army Corps of Engineers, Portland, OR
US DOD Army Corps of Engineers, Upper Willamette Valley Projects, Lowell, OR
USDI Bureau of Land Management, District Manager, Eugene, OR
USDI Fish and Wildlife Service, Field Supervisor, Portland, OR

CONGRESSIONAL

Senator Mark O. Hatfield
Senator Robert Packwood
Representative Peter DeFazio

STATE SENATORS

John Brenneman
Larry Hill
Peggy Jolin
Grattan Kerans
Bob Kintigh

STATE REPRESENTATIVES

Larry Campbell
Dave Dix
Sam Dominy
Bill Dwyer
Jim Edmunson
Cedric Hayden
Carl Hosticka
Hedy Rijken

OREGON STATE AGENCIES

Department of Agriculture, Soil and Water Conservation Division, Salem, OR
Department of Economic Development, Salem, OR
Department of Environmental Quality, Portland, OR
Department of Environmental Quality, Salem, OR
Department of Fish and Wildlife, Portland, OR
Department of Fish and Wildlife, Springfield, OR
Department of Forestry, Salem, OR
Department of Land Conservation and Development, Salem, OR
Department of Natural Resources, Eugene, OR
Division of Intergovernmental Relations, Salem, OR
Division of Parks and Recreation, Salem, OR
Division of Parks and Recreation, Office of Historic Preservation, Salem, OR
Division of State Lands, Salem, OR
Division of Tourism, Department of Economic Development, Salem, OR
Oregon State Clearinghouse, Intergovernmental Relations Division, Salem, OR
Water Resource Board, Salem, OR

LOCAL AGENCIES

Mayor, City of Coburg
Mayor, City of Creswell
City Manager, Eugene, OR
Mayor and City Councilors, City of Eugene
Planning Commissioners, City of Eugene
Administrator, County of Lane, Eugene, OR
Lane County Commissioners, Eugene, OR
Lane County Planning Commissioners, Eugene, OR
Areawide Clearinghouse, Lane Council of Governments, Eugene, OR
Lane Council of Governments, Eugene, OR
City Manager, City of Springfield
Mayor and City Councilors, City of Springfield
Planning Commissioners, City of Springfield

UTILITIES

Blachly-Lane County Cooperative Electric Association, Eugene, OR
Emerald People's Utility District, Eugene, OR
Eugene Water & Electric Board, Eugene, OR
Lane Electric Cooperative, Inc., Eugene, OR
Pacific Power & Light Company, Portland, OR
Springfield Utility Board, Springfield, OR

INTEREST GROUPS

1000 Friends of Oregon, Portland, OR
Lane County Audubon Society, Eugene, OR
Native Plant Society, Eugene, OR
Nature Conservancy, Portland, OR
Natural Resources Defense Council, San Francisco, CA
Northwest Conservation Act Coalition, Seattle, WA
Northwest Power Planning Council, Portland, OR
Pacific Northwest Generating Company, Portland, OR
Pacific Northwest Utility Conference Committee, Portland, OR
Portland Audubon Society, Portland, OR
Public Power Council, Inc., Portland, OR
Save Our Ecosystem, Inc., Eugene, OR
Sierra Club, Eugene, OR
Western Public Utilities Group, Mill Creek, WA
Wetlands Conservancy, Tualatin, OR

LIBRARIES

Eugene Public Library, Eugene, OR
Springfield Public Library, Springfield, OR
University of Oregon Library, Eugene, OR

MASS MEDIA

Register-Guard, Eugene, OR
KEZI-TV, Eugene, OR
KMTR-TV, Eugene, OR
KVAL-TV, Eugene, OR
Springfield News, Springfield, OR

Chapter XI

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APPENDICES

APPENDIX A. Glossary/Acronyms

ACHP - Advisory Council on Historic Preservation

AGRARIAN - Characteristic of the farmer or a farmer's way of life and relative to lands, their tenure, settlement, or promotion in an agricultural or economic interest.

ALLUVIAL - Pertaining to material, such as sand, silt, or clay, deposited on land by streams.

ALTERNATING CURRENT - Term applied to an electric current or voltage that reverses its direction of flow at regular intervals and has alternately positive and negative values, the average value of which over a period of time is zero.

BIG GAME MAJOR HABITAT - As defined by the Oregon Department of Fish and Wildlife, land that supports the majority of the big game. In general, these lands are sparsely developed commercial forest lands. They also provide the majority of big game recreational opportunity.

BPA - Bonneville Power Administration

BULK DELIVERY POINT - Major substation where power is delivered by high-voltage transmission lines, usually 500-kV or 230-kV, and transformed to lower voltage for distribution onto lower-voltage lines to serve local load.

CAPACITOR - A device to store an electrical charge. It is usually made of two or more conductors separated by a non-conductor (dielectric) such as glass, paper, air, oil, or mica. A capacitor will not pass direct current; its impedance for alternating current frequencies is inversely proportional to frequency.

CONDEMNATION - In land acquisition usage, the exercise of the power of EMINENT DOMAIN; that is, the taking of private property for public use, paying just compensation.

CONDUCTOR - The wire, strung between transmission towers, through which the electric current flows.

CORONA - The breakdown of air immediately around the conductor; caused by strong electrical fields. Produces visible lights, audible and radio frequency noise, and small amounts of ozone. It can be seen as bluish glow or streamers surrounding the conductor. Generally, a hissing sound can be heard. Transmission line corona varies with atmospheric conditions; it is more intense during wet weather.

CORRIDOR – A strip of land, a half-mile or more wide, forming a passageway for the planning of utility facilities. Compare to RIGHT-OF-WAY.

CULTURAL RESOURCE – An object, structure, site, or district that provides irreplaceable evidence of natural or human history that is of national, state or local significance.

CURRENT – A generic term usually modified by an adjective, the amount of electrical charge flowing through a conductor, as compared to VOLTS, which is the force that drives the electrical charge.

DEER AND ELK WINTER RANGE – As defined by the Oregon Department of Fish and Wildlife, lower elevations, particularly gentle south- and southwest-facing slopes and bottomlands such as alder stands, ash swales, and agricultural areas.

DEIS – Draft Environmental Impact Statement

DISTRIBUTION – In power system usage, the transport of electricity to ultimate usage points (such as homes and industries) directly from nearby generators or from interchanges with higher-voltage transmission networks which transport bulk power over longer distances from large generation centers. Voltage levels on transmission lines, such as those of BPA, typically range from 115 to 500 kV, while levels on utility distribution lines range from 12.5 kV to 115 kV.

DOE – Department of Energy

DOUBLE-CIRCUIT – The placing of two separate electrical circuits, each consisting of three separate conductors or bundles of conductors, on the same row of towers.

EASEMENT – The right, privilege, or interest obtained by BPA through condemnation or legal conveyance to construct, maintain, and operate transmission facilities within a tract of land.

ELECTRIC FIELD – Caused by voltage, the invisible lines of electrical force.

ELECTRIC AND MAGNETIC FIELDS (E/MF) – The two kinds of fields produced around the electric wire or conductor, when an electric transmission line or any electrical wiring is in operation.

EMINENT DOMAIN – The authority of the government, either local, state or Federal, to take private property for public use upon paying just compensation or market value.

ENVIRONMENTAL IMPACT STATEMENT (EIS) – A document prepared by a Federal agency on the environmental impact of its proposals for legislation and/or other major actions significantly affecting the quality of the human environment. Environmental Impact Statements are used as tools for decision-making and are required by the National Environmental Policy Act of 1969.

EPUD – Emerald Peoples Utility District

EWEB – Eugene Water & Electric Board

FEIS – Final Environmental Impact Statement

FIRM POWER – Power which is guaranteed by the supplier to be available at all times except for reason of certain uncontrollable forces or continuity of service provisions.

FLASHOVER – An electrical discharge from the high-voltage conductor through the air to ground. Can result from a lightning surge on a transmission line.

KILOVOLT – Equals 1,000 volts; abbreviated kV.

KILOVOLTS PER METER (kV/M) – Measure of electric field strength; a meter is a distance measure equivalent to 39.37 inches.

L-COG – Lane Council of Governments

LITHIC SCATTER – Surface scattering of flaked stone material; evidence of primitive tool-making activity.

LOAD – The amount of electric power or energy delivered or required at a given point or points on a system. Load originates primarily at the energy-consuming equipment of the customers.

LOOP – To tie a substation into an existing transmission line in such a manner as to complete the circuit along that line; running double-circuit line to a substation or single-circuit line through a substation so that there is both an incoming and an outgoing line. Looping feeds all of the power carried on the line to the substation as opposed to a TAP which would only direct a portion of the line's power into the substation.

MAGNETIC FIELD – Caused by current; invisible lines of magnetic force produced by transmission lines and common household appliances.

MEGA – A prefix indicating a million; thus a megawatt (MW) equals 1 million watts.

MIDDEN – A pile of shells, bone, or refuse material indicating a primitive dwelling place.

MILLIGAUSS (mG) – Gauss is the basic unit of magnetic field strength. Transmission line and appliance fields are generally described in units of milligauss. A mG is equal to 1/1000 of a gauss.

NEPA – National Environmental Policy Act

NON-SPECULAR CONDUCTOR – A conductor that has gone through an extra step during manufacture to reduce the amount of reflected light from its surface. Non-specular conductor is used in areas of high viewer sensitivity to reduce visibility of the line.

ODA – Oregon Department of Agriculture

ODFW – Oregon Department of Fish and Wildlife

OUTAGE – In a power system, the state of a component (such as a transmission line) when it is not available to perform its function due to some event directly associated with the component.

PEAK LOAD – The maximum electrical demand in a stated period of time. It may be the maximum instantaneous load or the maximum average load within a designated interval of the stated period of time.

PERIPHERAL BIG GAME RANGE – As defined by the Oregon Department of Fish and Wildlife, foothill areas generally located between commercial forest lands and valley floors. These lands support substantial big game populations and serve as wintering areas for animals in severe winters.

POLYCHLORINATED BIPHENYL (PCB) – An oily substance used in electrical equipment as an insulator to reduce heat and prevent fire. The manufacture of equipment using PCB's was banned by the Federal government in 1979 after research showed that PCB's caused skin disease and liver damage, and were a suspected carcinogen.

PP&L – Pacific Power & Light Company

RIGHT-OF-WAY – An easement for a certain purpose over the land of another, such as the strip of land used for a road, electric transmission line, ditch, pipeline, and so on. BPA usually acquires easements.for its transmission lines, roads, and other facilities such as guy wires and anchors. Road rights-of-way are usually acquired in 20- or 50-foot widths. Transmission line rights-of-way are usually acquired in the following widths.

69-kV – 50 ft
115-kV – 90-110 ft
230-kV – 90-125 ft
500-kV – 125-165 ft

RIPARIAN – Habitat. Terrestrial areas where the vegetation and micro-climate are influenced by perennial and/or intermittent water, associated high water tables, and soils which exhibit some wetness characteristics. (Brown, 1985)

SEDIMENTATION – A deposit and accumulation of soil or rock fragments in water.

SINGLE CIRCUIT – The placing of one electrical circuit that consists of three separate conductors or bundles of conductors on a row of towers.

SLUMPING – The downslope movement of a mass of rock or soil, usually accompanied by a backward rotation.

SPAN – The horizontal distance between two adjacent supporting points of a conductor.

SUB – Springfield Utility Board

SUBSTATION - An electrical power station without generation which serves as a control and transfer point on an electrical transmission system. It serves the following purposes: (1) to route and control electrical power flow, (2) to transform a voltage to a higher or lower level, and (3) to serve as a delivery point to an individual customer. Substations are named for persons or places. The names are often abbreviated in usage: the J.P. Alvey substation becomes "Alvey."

SUCCESSIONAL – A developmental stage or recognizable condition of a plant community; from bare ground to climax.

SWITCHING STATION – An installation of equipment where several transmission lines are interconnected. It does not include equipment for transforming voltage levels.

TAP – To tie a substation into an existing line by simply running a new single-circuit line from the substation to the existing line and tying into it; tapping feeds only a portion of the power carried on the line to the substation.

TERMINAL – The equipment used to connect a line or transformer into a substation.

TRANSFORMER - A device, which is most frequently used in power systems, to change voltage levels. It consists of a winding with tap or taps, or two or more magnetically coupled windings. Transformers are referred to by their location and function. The Alvey 500/230-kV transformer is located at the Alvey Substation and converts 500-kV to 230-kV.

TRANSMISSION – In power system usage, the bulk transport of electricity from large generation centers over significant distances to interchanges with large industries and distribution networks of utilities. Transmission lines are referred to by the substations they connect, so "Alvey-Lane" refers to a line between Alvey and Lane Substations.

TURBIDITY – Having suspended sediment in a stream or other water body.

URBAN GROWTH BOUNDARY (UGB) – A site-specific line, delineated on a map or by written description, that separates the projected urban service area from rural land.

VOLTS – The unit of voltage or potential difference. It is the electromotive force which, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere. **OHM** – the unit of resistance. The resistance of a conductor such that a constant current of one ampere produces a voltage of one volt between its ends. **AMPERE** – The unit of measurement of electric current. It is proportional to the rate of flow of electrons through a conductor. It is the unit current produced in a circuit by one volt applied across a resistance of one ohm.

WATT – The electrical unit of power or rate of doing work. It is analogous to horsepower. One horsepower is equivalent to approximately 746 watts. A megawatt equals 1 million watts.

APPENDIX B. Electrical System Components and Their Environmental Impact

This appendix describes the different parts of the electrical system. It also explains how they can affect the environment.

ELECTRICAL SYSTEM COMPONENTS

Components that affect the design and evaluation of proposed options include substations and associated equipment, transmission facilities and rights-of-way, access roads, and towers. Not all components are part of every project.

Substations

A substation connects several transmission lines and may transform the voltage of high-capacity transmission lines to lower voltages. For example, a 230-115-kV substation transforms the voltage of incoming 230-kilovolt transmission lines to 115 kilovolts. Substations also provide switches to turn off a transmission line for maintenance.

An area the size of Eugene-Springfield typically would be served by a series of transmission lines and substations. These would range from 500-kV or 230-kV at the perimeter of the city, down to 115-kV or lower at the center of the city. Substations within residential and commercial areas typically range from 115-kV to 12.5-kV.

Substations are named for persons or places. Transmission lines are referred to by the substations they connect, so "Alvey-Lane" refers to a line between the J.P. Alvey and Lane Substations.

Right-of-Way

When locating new transmission lines, BPA tries either to replace existing lines, or to use or parallel existing transmission rights-of-way. Most options for this DEIS follow that practice, because it can greatly reduce costs and environmental impacts. For instance, adding a transmission line next to an existing one causes less visual impact than a new, totally separate line, and the need for new access roads can be kept to a minimum by using existing access roads.

Right-of-way width is mostly determined by electrical clearance requirements, noise, and electrical effects.

Access Roads

Construction and maintenance vehicles must have access to each transmission tower and substation. Access roads are located within the right-of-way, when possible. New roads require a 50-foot-wide easement. This width is needed for a roadway of 16 feet, ditches, and a cleared area wide enough for the large, long construction and maintenance vehicles. The easement also must be large enough for measures needed to minimize erosion.

Access roads can cause major land use and visual impacts. This is especially true in steep terrain, where a great deal of hillside reconstruction may be needed. Because of the large amount of earth moved, a large visual scar may be left.

An access road system is designed and located after a transmission line survey has located exact tower sites. This typically occurs just before construction. In the beginning, only rough estimates can be made of the location of access roads and their impacts.

Transmission Structures

The DEIS covers several transmission tower designs. (See Figure B-1.) Higher-voltage power lines must have taller towers to provide safe clearances between the lines and the ground, buildings, and vegetation. Tower heights also change, depending on span length, terrain, and type of feature crossed. For instance, a line crossing a public road would be higher than one crossing an open field, so that tall vehicles can safely pass under the line.

WOOD POLE – Wood pole structures are usually used for 230-kV and lower-voltage lines. (Higher-voltage lines need stronger materials.) Wood poles are often less expensive than steel or concrete structures, and usually blend visually with wooded backgrounds. Single wood poles and H-frame wood pole structures are used in different situations. H-frame wood poles are sturdier. They can span more distance, and require wider right-of-way.

STEEL LATTICE STRUCTURES – Steel lattice towers are used for higher-voltage lines, 230-kV and above. They may be used for lower-voltage lines where towers must be spaced farther apart, increasing the stress beyond the capacity of wood structures. Steel lattice towers are generally more expensive than wood structures.

IMPROVED APPEARANCE STRUCTURES – Simpler, improved appearance structures of tubular steel or concrete have a smaller, cleaner-looking profile and are often visually preferred in urban areas. They are usually more expensive than steel lattice structures.

DOUBLE-CIRCUIT STRUCTURES – Double-circuit structures contain two separate electrical circuits. Each circuit consists of three separate conductors or bundles of conductors.

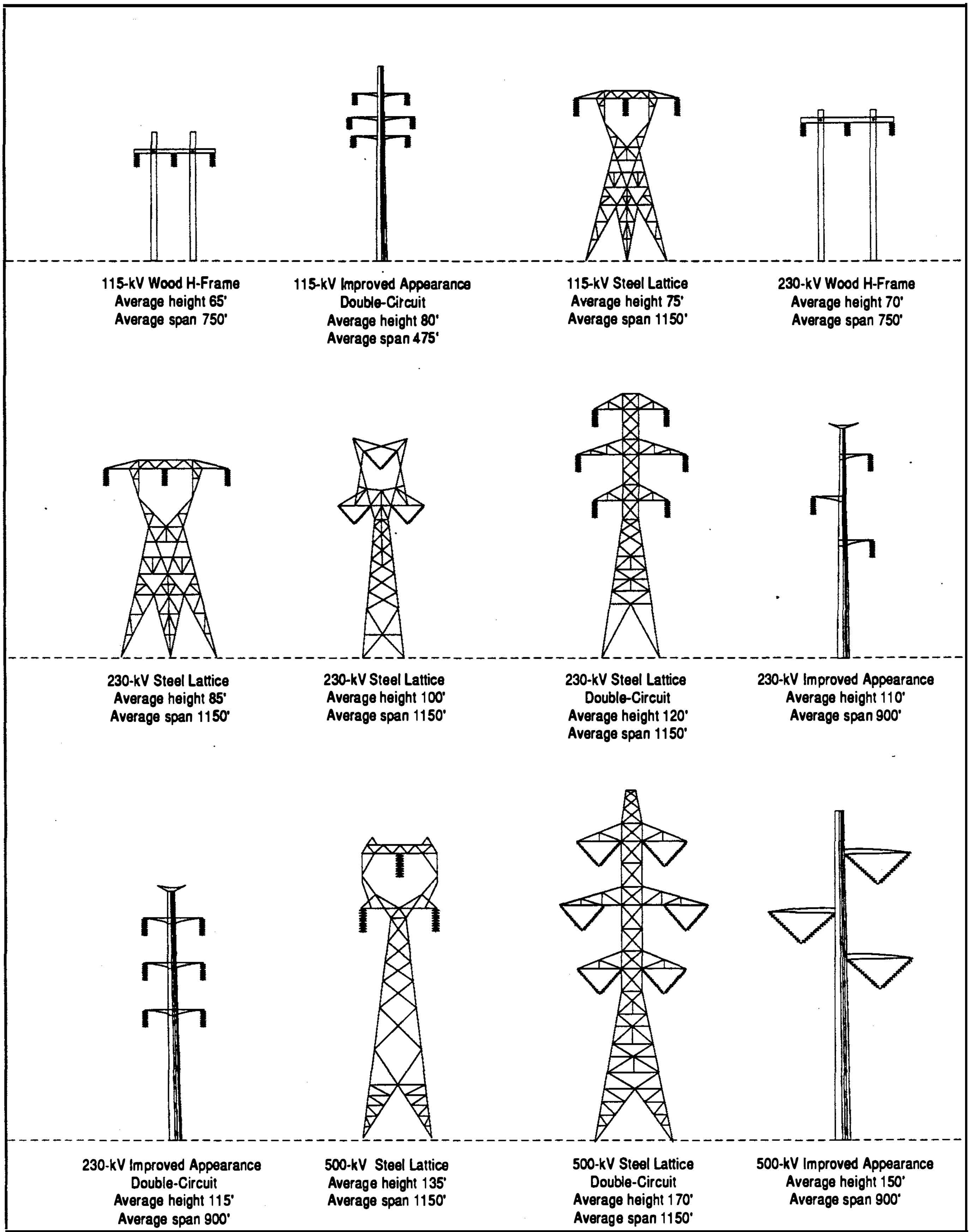


Figure B-1
Structure Types

Type, design, and location of transmission structures are determined when a project is actually proposed and designed. Current structure designs and electrical clearance requirements may change before a project is built. Proposed towers shown on the figures in the DEIS are the largest/most complex that would be considered. Smaller or simpler towers could be used.

ENVIRONMENTAL EFFECTS OF ELECTRICAL SYSTEM COMPONENTS

Electrical system components can affect the environment in a variety of ways. This section explains how. The discussion also identifies the measures used to determine the presence and scope of specific environmental impacts. It defines the impact ratings used in the DEIS. There were six possible ratings; all but "no impact" are negative.

- No impact
- Slight impact
- Low impact
- Moderate impact
- High impact
- Very high impact

Only the ratings actually used are defined. For example, none of the proposed alternatives would cause a moderate, high, or very high water resource impact, so those ratings are not defined for that topic.

Public Health and Safety

This section discusses the possible effects of the electrical properties of transmission lines on public health and safety. These effects include electric shocks and potential long-term health effects.

SAFETY PRECAUTIONS – Powerlines, as with electrical wiring, can cause serious electric shocks if certain precautions are not taken. These precautions include building the lines to minimize the shock hazard. All BPA lines are designed and constructed in accordance with the National Electrical Safety Code (NESC). NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements basically determine the edge of the right-of-way and the height of the line, i.e., the closest point that houses, other buildings, and vehicles are allowed to the line, to limit electric field effects to acceptable levels.

People must also take certain precautions when working or playing near powerlines. It is extremely important that a person not bring anything, such as a TV antenna or irrigation pipe, too close to the lines. BPA provides a free booklet that describes safety precautions for people who live or work near transmission lines. It is entitled, "Living and Working Around High Voltage Power Lines."

Transmission lines can also induce voltages into objects near the lines. This effect can lead to nuisance shocks if a voltage is induced on something like

wire fencing which is on wood posts and, therefore, insulated from ground. Usually, however, this becomes a problem only with lines of voltages above 230-kV. Should problems develop with either high- or low-voltage lines, they can be corrected by simple grounding techniques. For 500-kV lines, grounding of certain objects near the lines is a routine part of the construction process.

ELECTRIC AND MAGNETIC FIELDS - Powerlines, like all electrical devices and equipment, produce electric fields and magnetic fields. Current (movement of electrons in a wire) produces the magnetic field. Voltage (the force that drives the current) is the source of the electric field. The strength of these fields also depends on the design of the line and on distance from the line. Field strength decreases rapidly with this distance.

Electric and magnetic fields are found around any electrical wiring, including household wiring and electrical appliances and equipment. Throughout a home, the electric field strength from wiring and appliances is typically less than 0.01 kilovolts per meter (kV/m). However, fields of 0.1 kV/m and higher can be found very close to electrical appliances. (See Table B-1.)

Average magnetic field strength in the home from electrical appliances is typically less than 1 milligauss (mG). Very close to appliances carrying high current, fields of tens or hundreds of milligauss are present. Unlike electric fields, magnetic fields from outside powerlines are not reduced in strength by trees and building material. So, powerlines can be the major source of magnetic field exposure throughout a home located close to the line. Table B-1 gives some representative field strengths for electrical appliances and transmission lines.

There are no national standards for electric or magnetic fields. Oregon is one of six states with a standard for electric fields. (See Table B-2.) In Oregon, the electric field on a transmission line right-of-way is limited to 9-kV/m or less. This is also the same maximum allowed by BPA design standards. Neither Oregon nor BPA has a magnetic field standard. The State of Oregon has begun a review to determine whether electric field standards need to be changed, and/or to set a magnetic field standard. Future BPA lines in Oregon would continue to be designed to be consistent with field standards adopted by the State of Oregon.

Both electric and magnetic **alternating-current** (a-c) fields induce currents in conducting objects, including people and animals. These currents, even from the largest powerlines, are too weak to be felt. However, some scientists believe that these currents might be potentially harmful and that long-term exposure should be minimized. Dozens of research projects on electric and magnetic fields have been conducted in the U.S. and other countries. Studies of laboratory animals generally show that these fields have no obvious harmful effects. However, a number of subtle effects of unknown biological significance have been reported in some laboratory studies (Ahlbom et al., 1987).

Table B-1. Typical Electric and Magnetic Field Strength, 1 Foot from Common Electrical Appliances, and for BPA Transmission Lines.

Appliance	Electric Field (kV/m)	Magnetic Field 1/ (mG)	
Coffee Maker	.030	1 – 1.5	
Electric Range	.004	4 – 40	
Hair Dryer	.040	0.1 – 70	
Television	.030	0.4 – 20	
Vacuum Cleaner	.016	20 – 200	
Electric Blanket 2/	.01 – 1.0	15 – 100	
Transmission Lines		Maximum 3/	Average 4/
115-kV			
Maximum on Right-of-Way	1.0	40	20
Edge of Right-of-Way	0.5	10	5
200 Feet from Center	0.01	0.7	0.3
230-kV			
Maximum on Right-of-Way	2.0	70	35
Edge of Right-of-Way	1.5	30	15
200 Feet from Center	0.05	2	1
500-kV			
Maximum on Right-of-Way	7.0	140	70
Edge of Right-of-Way	3.0	50	25
200 Feet from Center	0.3	7	3

kV/m – kilovolts per meter
mG – milligauss

1/ By 3-5 feet, the magnetic field from appliances is usually decreased to less than 1 mG.
2/ Values are for distances from a blanket in normal use, not 1 foot away.
3/ Under winter peak load conditions.
4/ Under annual average loading conditions.

Sources for appliance data: Miller, 1974; Gauger, 1985

Much attention at present is focused on several recent reports suggesting that workers in certain electrical occupations and people living close to power lines have a small increased risk of leukemia and other cancers (Coleman and Beral 1988). The evidence, however, has not established a cause-and-effect relationship between electric or magnetic fields and cancer.

Table B-2. Summary of Existing and Proposed Standards and Guidelines for Transmission Line Electric and Magnetic Field Strength.

State	Electric Field: On Right-of-way (kV/m)	Electric Field: Edge of Right-of-way (kV/m)	Magnetic Field 1/: Edge of Right-of-way (mG)
Florida			
230-kV or smaller	8	2	150 (maximum load)
500-kV sgl. circuit	10	2	200 (maximum load)
500-kV dbl. circuit	10	2	250 (maximum load)
Minnesota	8	—	—
Montana	7 2/	1	—
New Jersey	—	3	—
New York	11.8	1.6	100 3/
North Dakota	9	—	—
Oregon	9	—	—
BPA	9	5	—
	5 2/	—	—
	3.5 4/	—	—
	2.5 5/	—	—

kV/m — kilovolts per meter
mG — milligauss

1/ No magnetic field standards on right-of-way.
2/ Maximum for highway crossings.
3/ Proposed interim standards.
4/ Maximum for shopping center parking lots.
5/ Maximum for commercial/industrial parking lots.

A study in Denver, Colorado, (Wertheimer and Leeper 1979) and one in Sweden (Tomenius 1986) found that some cancer risks were about 2-3 times greater for children living near certain types of powerlines assumed to be carrying high current. Those researchers suggested that the finding may be related to the magnetic fields of 2-3 mG produced in homes by such lines. The possibility could not be ruled out, however, that other factors, or chance, may be involved. If certain powerlines actually do influence cancer rates, this would mean that 2 or 3 children out of 10,000 children exposed to such lines would develop cancer each year, compared to the normal rate of 1 in 10,000 per year (Ahlbom et al., 1987).

A new study from Denver (Savitz et al., 1988) indicated results that were generally consistent with the earlier work on childhood cancer by Wertheimer and Leeper (1979). However, the relative risk in the new study (1.5) was smaller than that reported earlier (2-3). It was also on the borderline of statistical significance. Results of another study, from the Seattle area, found no association between powerlines and leukemia in adults (Severson et al., 1988). An earlier powerline study in Denver by Wertheimer and Leeper (1982) also found no increase in adult leukemia. However, the earlier Denver study did find an increased risk for some other types of adult cancers.

Studies in Rhode Island (Fulton et al., 1980) and in England (Meyers et al., 1985) found no association between childhood cancer and powerlines. Other community studies in England found no consistent evidence to support a powerline-cancer association (Coleman et al., 1985; McDowall 1986).

A study in Washington State found that men in various "electrical occupations" had died more frequently from leukemia than men in other occupations (Milham 1982). Other studies reported similar findings, suggesting an increased risk of around 20 to 50 percent (Savitz and Calle, 1987; Coleman and Beral, 1988).

However, the studies were primarily based on information only from death certificates (i.e., job title, and cause of death). It therefore was not possible to determine whether the preliminary findings were related to electric and magnetic fields, or to other exposures such as those from chemicals.

Table B-3 gives some examples of confirmed and potential cancer risk levels compared to potential levels discussed above. In general, relative risk levels of 1.2-1.5 point to a weak association between the factor and the occurrence of cancer (Monson 1980). Levels of 1.5-3.0 point to a moderate

Table B-3. Examples of Confirmed and Potential Cancer Risks Reported for Various Factors.

Factor (Cancer Type)	Relative Risk	Reference
Smoking (Lung Cancer)*	10 - 40	Wynder and Hoffman, 1982
Workers Exposed to Benzene (Leukemia)*	1.5 - 20	Sandler and Collman, 1987
Workers Exposed to Carbon Tetrachloride (Leukemia)	12 - 18	Sandler and Collman, 1987
Environmental Tobacco Smoke (Lung Cancer)*	2 - 3	Ammann et al., 1987
High-Current Power Lines (Childhood Cancer)	1.3 - 2.6	Ahlbom, 1988
Radium Contamination of Drinking Water (Leukemia)	2	Lyman et al., 1985
Use of Hair Dye (Leukemia)	1.8	Cantor et al., 1988
Workers Exposed to Electric and Magnetic Fields (Acute Myelogenous Leukemia)	1.2 - 1.8	Savitz and Calle, 1987

* Generally considered as confirmed cause-and-effect associations.

association. Higher levels indicate a strong association, such as between smoking and lung cancer. The relative risks for powerlines and child cancer (1.3 – 2.6) represent the range of risks reported for four studies. For electrical workers, the risks (1.2 – 1.8) represent the 95 percent confidence interval for a summary risk of 1.5, from data combined from eight studies.

The U.S. and several other countries are continuing research to obtain more definitive information on a possible association between powerlines and other electrical devices and cancer. At this time, the data only suggest that a cause-and-effect association is possible.

A few studies have looked for an association between use of electrical appliances or electrical heating, and human health effects. Appliance studies have involved electric blankets and heated waterbeds because of the relatively high and prolonged exposures to electric and magnetic fields.

Wertheimer and Leeper (1986) interviewed a sample of new mothers in the Denver area. They found that women who had used electrically-heated beds had an average gestation period that was 1 week longer than women who did not use them. Fetal losses were also more frequent in women using the heated beds. The authors suggested their findings could be related to field exposures or to heat associated with use of electric blankets.

Wertheimer and Leeper (1989) recently completed a study of women who lived in homes with ceiling cable heat in the Eugene-Springfield area. Results indicated no overall difference in the ratio of fetal losses to live births between these women and women in homes with baseboard heat. However, women in the cable heat homes reported fetal losses disproportionately often during the onset of the cold season when field exposure was assumed to be increasing. Because the overall rates were similar, this would imply that fetal losses in cable heat homes were lower during other times of the year. The authors concluded that their study suggested an association between magnetic fields and fetal losses.

In addition to research on humans and laboratory animals, several studies have investigated possible effects of transmission line electric and magnetic fields on plants, wildlife, and domestic animals (BPA, Lee et al., 1986). Crop growth is not noticeably affected by even the largest transmission lines. Trees that are allowed to grow too close to transmission line conductors can be damaged by the strong electric fields near the conductors. Normally trees are not allowed close to conductors to prevent electrical **flashover**, i.e., spontaneous arcing of electrical current from lines to trees.

Studies have shown that honey bees in commercial hives can be adversely affected by strong transmission line electric fields. Shocks received by bees while in the hive cause decreased honey production and increased mortality. As a precaution, BPA recommends that bee hives not be placed directly on the transmission line right-of-way.

Wildlife do respond to effects (e.g., changes in food supply), of cleared rights-of-way. However, there is no evidence that their behavior is noticeably affected by the presence of electric and magnetic fields. Few studies have attempted to determine whether wildlife may be affected by long-term exposure to these fields. As noted above, some effects of electric and magnetic fields have been found in laboratory animal studies. It is not known whether such effects occur in wildlife similarly exposed to these fields.

Several studies have looked at the behavior and production of livestock raised near transmission lines. These studies found no indication that electric or magnetic fields have any major effects on livestock. Most of the studies were not designed to detect any subtle field effects.

More detailed information on the potential health effects of electric and magnetic fields can be found in two free BPA publications (incorporated here by reference): "Electrical and Biological Effects of Transmission Lines: A Review" (1989) and "Electric Power Lines: Questions and Answers on Research Into Health Effects" (1988). (To get these publications, see the "Dear Reviewer" letter, inside the DEIS' front cover.)

Because no hazardous effects of electric or magnetic fields have been confirmed, it is not possible to identify "unsafe" field levels. It is possible, however, to look at changes in potential human exposures to these fields. Some scientists have recommended that new field exposures be limited or minimized (e.g., WHO 1984; Parker et al. 1987; Ammann et al. 1987). Because of scientific and public interest in this issue, it is BPA practice to consider potential electric and magnetic field exposure increases in the design and location of new transmission facilities. Increases in long-term, involuntary exposures to these fields are avoided if practical alternatives exist.

The method used to quantify exposures is based on changes in magnetic fields due to changes in the lines and to the number of housing units within 500 feet of the center of the right-of-way. (The method is explained in Appendix C.) None of the project alternatives are located close to schools, so electric and magnetic field levels would not be increased at such facilities. Impact ratings of slight or low would indicate that field increases would be small and would affect a limited number of housing units. Ratings of high or very high would indicate major increases in magnetic field strength that could affect large numbers of housing units.

In summary, it is possible to compare the project alternatives in terms of potential increases in magnetic field exposures. However, there is no conclusive evidence that exposure to even the strongest fields produced by the transmission lines will produce harmful effects in people. Because of potential effects identified in some studies, research is continuing to determine whether exposure to either electric or magnetic fields is a health hazard.

Visual Resources

The main visual components of transmission facilities are the towers, conductors, cleared right-of-way, and access roads. The concern is for a potential decline in visual quality.

The following visual impact elements are evaluated.

- Landscape compatibility
- Effects on views from residential and other visually sensitive land uses such as schools and campus-like special light industrial sites
- Effects on views from highways and roads
- Effects on views from established, designated or planned park or recreation areas

Impacts are based on the ability of the landscape to absorb visual changes and the degree of visibility the project would have at key observation points and other sensitive viewpoints.

At a minimum, there would be some visual impacts, because the line would always be visible. Low impacts would occur where structures are visible, but do not attract attention and remain in context with surrounding elements. Impacts are considered to be low in the following cases.

1. Few viewers would see the facility because of its isolation; it is screened from sensitive viewpoints by topography, vegetation, or other obstructions; and/or it is in background views, and a minor visual element in the landscape.

2. Existing modifications, such as transmission facilities, have already established initial impacts, and the addition of another line would not significantly change existing conditions.

3. Minimal scarring from access road construction or right-of-way clearing would occur.

4. Views would be of short duration.

Moderate impacts would occur when the structures attract attention, but remain subordinate elements in the view. Impacts are considered moderate when one or more of the following conditions exist.

1. The line would be visible to a large number of persons, but because of other visual factors is not a dominant element in the view.
   - Existing facilities already exist in the area.
   - Views are partially screened.
   - Large segments of the line may be visible, but the views are of short duration.
   - Most views are in the middleground range, one-quarter to 3 miles.

2. The line would conflict with existing land patterns, natural or manmade. However, it would be visible only to a few people, and/or views would be of short duration.

3. Scarring from access roads and/or clearing swaths would be evident but not severe or extensive enough to attract attention.

High impacts would occur in any of the following cases.

1. A large number of viewers would see the facilities in foreground or mid-range views.
2. The viewers were highly sensitive to their surroundings.
3. The line was a dominant part of the view.
4. The line crossed areas identified as having high visual and recreational value, such as Spencer Butte.
5. The structures are viewed against the sky.

Land Use

Transmission facilities affect some land uses, particularly agriculture, recreation, residential, forest, and some special industrial uses.

AGRICULTURE – Some agricultural impacts are short-term. These include the temporary loss of productive land to construction, and reduced soil productivity from compaction, top soil removal, and erosion. Other potential problems are damage to fences and gates, resulting in livestock dispersal and changes in grazing patterns during the construction period. Long-term effects include the permanent loss of land to tower or substation locations; introduction of weeds around structure bases and into adjacent fields; and changes in agricultural practices caused by the presence of a transmission line and towers. Irrigation systems could be disrupted or production time lost because of the towers.

Most long-term effects are related to the number and location of transmission structures. If possible, towers are located outside or on the edge of agricultural areas, with the transmission lines spanning cultivated fields. When possible, construction begins after harvest. Changes to agricultural practices can be minimized by locating new lines next to existing ones.

For agriculture, the DEIS uses three impact ratings: no impact, slight, and low.

- No impact would occur if the proposal does not affect agricultural land.

- A slight impact would occur if less than 1 acre of agricultural land would be permanently lost from production, if the facilities would minimally disrupt agricultural operations.

- A low impact would occur if more than 1 acre of agricultural land would be permanently lost from production, but the amount was not significant when compared to the total productive land in the county.

Noxious Weed Control---Noxious weeds are plants that have an adverse effect on humans or their environment. They include weeds from Europe and Asia which continue to be introduced and spread by contaminated seed, vehicles, livestock, and natural elements like wind, water, and wildlife. They adapt rapidly to a variety of environmental conditions at the expense of native or desirable non-native plants. Noxious weeds compete with agricultural crops for space, water, light, and nutrients. They are a serious threat to range production. They have the potential to reduce yields or make crops unusable. They may be poisonous to people or animals.

During and after construction, ground disturbance from machinery and vehicles could open ground to new noxious weed infestations at substations, at structure bases, on the right-of-way, or along access roads. BPA carries out mitigation and monitoring to limit noxious weed infestation.

RECREATION - Construction, operation, and maintenance of transmission facilities can create both short- and long-term impacts on recreation resources. Recreation impacts include the temporary disruption caused by construction; the permanent loss of land to structures or facilities, and changes to the enjoyment of recreation caused by the presence of the facilities. (Visual impacts are discussed under VISUAL RESOURCES.)

RESIDENTIAL - These impacts include the temporary disruption caused by construction, the permanent loss of land to structures or facilities, and changes to livability caused by the presence of the facilities. The DEIS discusses residential impacts under several more specific categories, including: public health and safety, visual resources, air quality, noise/ TV-radio interference, and socioeconomic considerations. In most cases, the criteria for determining impact consists of the number of housing units affected.

FOREST - Impacts on forest land are discussed in the section on VEGETATION/ TIMBER.

SPECIAL INDUSTRIAL - BPA has been unable to identify any impact on special light industrial sites other than visual. The impacts on special light industrial uses are discussed in sections dealing with VISUAL RESOURCES.

Water Resources

Water resources, including wetlands, could be affected by increased sedimentation from erosion caused by soil disturbance during construction. Areas requiring high amounts of access road construction and clearing are susceptible to increased runoff, erosion, and sedimentation. Sediment particles could be either deposited in the stream bed or transported as suspended solids, depending on particle size and stream velocity. Increased sediment in streams can be detrimental to fish habitat, recreational activities, and domestic and industrial water use. Generally, sedimentation is not a problem near a major river or stream crossing because transmission

towers would be set back from the bank and access roads would use existing bridges. Critical areas where sedimentation could occur are as follows.

- Areas of high erosion potential where access roads or transmission towers are constructed near waterways

- Drainages where substantial clearing is required

- Places where an access road crosses a small tributary, requiring culverts or bridge construction

- In wetlands

Placement of fill in, or drainage of, a wetland for roads or towers may reduce the wetland's flood storage capacity or may increase runoff, which can increase flood and erosion damage on adjacent and downstream lands. In addition, structures placed in wetlands are themselves subject to flood damage.

The potential for erosion and impact on wetlands is the key factor in evaluating water resource impacts. The extent of erosion is influenced by terrain, ground disturbance, and soil type. For water resources, the DEIS uses three impact ratings: no impact, slight, and low.

- No impact would occur if the proposal does not affect water resources.

- Slight refers to short-term, local impacts, where streams or wetlands are easily spanned, and access road and clearing requirements are minimal.

- Low refers to short-term, local impacts, where streams or wetlands are easily spanned, access and clearing requirements are moderate, fill requirements are minimal, and erosion and sedimentation can be mitigated with standard construction practices.

Fish and Wildlife

Fish habitat could be affected by soil erosion. For example, clearing of vegetation, tower placement, or access road construction may cause sedimentation in spawning beds. Also, clearing for access roads and rights-of-way could eliminate shade and cause debris to enter streams, blocking fish passage.

Impacts are determined by the number of times the transmission line would cross rivers and the number and extent of access roads that might be constructed near rivers and streams.

- No impacts would be expected where no streams were crossed by transmission lines or access roads, or where the streams were spanned with a minimal removal of streamside vegetation.

- A slight impact would be expected where streams of low fish value were crossed by transmission lines and access roads, and moderate

clearing was required; or where high value streams were crossed without construction of new road crossings and only minimal clearing of vegetation.

Wildlife is affected if habitat is altered for access roads, towers, or right-of-way clearing. Reports indicate that bird collisions with transmission lines are usually not a problem (Kroodsma 1978). Some wildlife impacts are short-term, occurring only during construction; others, such as right-of-way clearing, can be permanent. Clearing may be needed for access roads, construction sites, tower sites, or maintenance of safe clearance between the lines and adjacent vegetation.

Clearing affects each habitat differently. Because water is constantly present, riparian habitats are used by more species than most other habitats. Altering a small riparian area may have a disproportionately large effect. Clearing can greatly affect forest habitats. Once cleared, the forest habitat can be replaced by low-growing, early successional plant communities. Some forest-inhabiting species that do not readily use early successional or forest edge habitats may decline. Other species may increase.

No key wildlife habitat areas were identified in the study area. However, various species of small birds, mammals, amphibians, and reptiles would probably be displaced by construction.

The impact of different alternatives on wildlife habitat is evaluated according to the amount, extent and type of habitat that would be altered.

- No impacts would be expected if no wildlife habitat were modified or if modification were to take place in a developed area.
- Slight impacts would be expected if abundant habitat in a non-developed area were modified.
- Low impacts would be expected if small amounts of key habitat were modified or if new but controlled access were created into areas not previously accessible.

THREATENED AND ENDANGERED SPECIES – To determine impact, any threatened and endangered species which may inhabit the study area is identified by the US Fish and Wildlife Service. The agency reported there are no species listed as threatened or endangered found in the study area.

Vegetation/Timber

Vegetation occupying the right-of-way would be permanently limited to low-growing plants. Trees creating a hazard to the transmission lines would be removed. During maintenance, tall vegetation would be removed by cutting and controlled hand application of herbicides. BPA's herbicide application standards meet or exceed all State and Federal standards. An area where vegetation was removed and the soil disturbed, such as at tower sites, would be reseeded with grass or other plant species. Where construction activity would disturb the soil, weeds might invade and become established.

For vegetation, two impact ratings were used.

- No impact would be expected if no vegetation were permanently removed.

- A slight impact would be expected if less than about 230 acres (0.05 percent of the land base of Lane County) were to have timber or other vegetation permanently removed.

In evaluating the alternatives, estimates of the affected timber were made from aerial photos and zoning maps. The character and extent of the affected vegetation was also estimated.

Timber cleared from the right-of-way could be sold. However, some of the timber would be sold before maturity, so its value would be less. Moreover, the opportunity to grow timber would be foregone in areas where vegetation would present a hazard to the transmission lines.

Soils

Construction of access roads, transmission lines, and substations can hasten soil erosion and alter soil physical properties. Heavy equipment can compact soils. Steep slopes along access roads are susceptible to slumping. Soils cleared of vegetation are prone to increased runoff and erosion. Increased erosion represents the most severe impact. An increase in erosion can reduce soil productivity and degrade water quality. The amount of soil erosion caused by transmission facility construction is a function of soil properties, slope, vegetation, rainfall patterns, and construction practices.

Alluvial sand and gravel deposits as well as volcanic outcrops (a source of rock for road construction) are possible mineral resources in the area. The value of mineral deposits near transmission facilities can be reduced because it may cost more to extract them. However, mineral deposits generally may be located, leased, sold, or otherwise developed within or beneath transmission line rights-of-way, provided such activities do not interfere with transmission line structures.

For soils, the DEIS uses three impact ratings: slight, low, and moderate.

- Slight refers to short-term, local impacts easily mitigated by standard construction procedures; or to the presence of soils that have little erosion hazard potential; and/or to projects that require little or no access road construction or clearing.

- Low refers to short-term, local impacts which can be mitigated by standard construction practices; the presence of soils with moderate erosion hazard; and projects with low access road construction and clearing requirements.

- Moderate refers to extensive, short-term, local impacts that can be mitigated by standard procedures, although special attention may be needed; the presence of soils with severe erosion hazard; and projects that require moderate amounts of access road construction and clearing.

Air Quality

Air quality can be affected by activities which introduce gases, particles, or odors into the air. Electrical transmission lines discharge barely detectable amounts of ozone into the air (Janes 1980; Bracken and Gabriel 1981). Air quality impacts would result primarily from construction activities which may reduce visibility and pollute the air through slash burning, dust from disturbed soil, and vehicle and equipment exhaust emissions. Impacts would be limited primarily to the time of construction and would not pose a health hazard to people in the area or cause environmental damage. These impacts would vary with the amount of construction.

Each project would comply with State and local air pollution control requirements.

In evaluating impacts, a slight rating is given when air quality impacts would be mitigated, and would be short-term and localized.

Noise/Radio-TV Interference

AUDIBLE NOISE - Noise impacts result from construction activities and from the operation of the transmission facilities. Construction noise is short-term and typically does not result in any serious disturbances to residents.

Audible noise produced by corona on transmission line wire is primarily associated with lines of 345 kV and above. The noise is a hissing, popping, cracking sound. A 120-Hertz "hum" is also occasionally superimposed on the corona-generated noise. The sound level depends on ambient noise, line geometry, voltage, and weather. The noise is most noticeable during rain or snow, and is hardly noticeable during fair weather.

Transmission line noise is measured in decibels on the "A scale" [dB(A)] which models how the human ear perceives sound. The State of Oregon has a noise standard that applies to transmission lines. Oregon Noise Control Regulations (ORS 340.35) limit noise to 50 dB(A) at night for noise-sensitive properties, such as residences. BPA lines are designed so as to not exceed this limit. This is primarily done by selecting conductors (size and geometry) which will limit corona effects.

The impact ratings for noise are based on the number of housing units near alternatives where a noticeable increase (10dB[A] or more) in corona noise could occur. Because all alternatives would meet the Oregon State Noise Standard, no impacts greater than "low" are anticipated.

- Ratings of no impact would indicate noise increases of less than 10 dB(A) in areas with small (less than 50) or moderate (50 - 100) numbers of housing units.

- Ratings of slight would either indicate that small numbers of housing units would be located in areas with noise increases of 10 dB(A) or greater, or large (more than 100) numbers of housing units would be located in areas with noise increases of less than 10 dB(A).

- Ratings of low would indicate moderate numbers of housing units with noise increases of 10 dB(A) or greater.

This method is subject to considerable uncertainty, however, because perceived transmission line noise is in part dependent on the level and type of background noise, the weather, and how close a housing unit is to the line. Based on past BPA studies (Stearns 1980) the background noise level during rain in rural settings is estimated to be 35 dB(A). The DEIS uses that level for background noise. That is the same or higher than calculated noise levels of any affected existing line in the area.

The major noise sources produced in substations are primarily due to energized transformers. Transformers produce a constant, low-frequency (120-Hertz) "hum" type noise. In addition, some corona noise (crackling-hissing sound) can occur within the substation, primarily in inclement weather, although the levels are usually much less than that produced by transmission lines.

ELECTRO MAGNETIC NOISE -- Corona also generates high-frequency noise which is not audible, but which can disrupt AM radio reception. In some situations, such as areas of weak broadcast signals, foul weather corona can also disrupt television reception in some residences near a transmission line. The interference is in the form of static on the radio and lines of interference on television. Corona-generated interference is usually associated with the higher-voltage lines, i.e. 230-kV or above.

BPA investigates complaints about radio or television interference which are attributed to a BPA facility. If BPA is causing a problem with television or radio reception in areas where there is reasonably good reception, BPA will provide mitigation, such as relocating a receiving antenna, to restore the quality of the reception. BPA receives very few reception complaints. All legitimate complaints are satisfactorily corrected.

Since transmission-caused radio and television interference can usually be entirely mitigated, it is not included as a decision factor.

Historic/Cultural Resources

A cultural resource is an object, structure, site, or district that provides irreplaceable evidence of natural or human history that is of national, state or local significance. Transmission facilities can affect cultural resources in three ways.

- The construction of towers and access roads can disturb surface and subsurface resources.

- Transmission facilities may intrude visually on some sites.

- New right-of-way or access roads can increase public access to previously isolated or unknown resource sites, which can increase the likelihood of their disturbance.

To evaluate the alternatives, affected cultural resources are first identified. Then their significance is determined, and the effect of the proposal on the resources is evaluated.

The construction, operation, and maintenance of transmission facilities can create short- and long-term impacts on historic and archaeological resources. However, BPA's compliance with extensive protective laws and regulations for these resources make impacts on them unlikely.

Cultural resources are vulnerable to impacts from surface or subsurface disturbance and from visual intrusion. Structures are vulnerable to tree felling and to movement of heavy equipment. Vehicle traffic, dragging of objects, and erosion caused by project activities can cause minor disturbance or destroy deposits on or below the surface. Increased public access to previously isolated areas, an indirect result of the project, may increase likelihood of further disturbance. A line may also intrude visually upon the setting of cultural sites, especially historic sites with potential as interpretive locations.

The significance of a site depends on its sensitivity to impact, the present condition of the resource, and its relative importance. Highly sensitive sites contain information important to the understanding of history and prehistory or are unique or are associated with people or events important in the history of the area in which they occur. Disturbance of or visual intrusion on sensitive sites or areas could constitute a significant impact. For the purposes of this document, any existing known cultural site could be indirectly affected by visual intrusion from the project on specific known sites. Any unknown resources in the project area could also be directly affected through construction or access road activity.

For any such sites identified, BPA will comply with the National Historic Preservation Act of 1966 and all other laws and regulations protecting historic and archaeologic resources. Systematic field surveys would be required, as determined by State Historic Preservation Office review. For identified sites, avoidance, protection, or documentation would be required before project construction. Where sites cannot be avoided, mitigation will be undertaken in consultation with the State Historic Preservation Officer, the Advisory Council on Historic Preservation (ACHP), and the Secretary of Interior.

The environmental impact rankings for cultural resources are defined as follows.

- No impact would occur if no recorded historic or archaeological resources were present, and if no potential existed for discovery of new sites.

- A slight impact would occur if historic or archaeological resources were present; potential discovery of new sites were limited as documented by surveys over much of the affected area; and/or there would be no effect on known resources from construction activities.

- A moderate impact would occur if historic or archaeological resources were present; potential discovery of new sites were likely, due to known heavily occupied site areas or limited survey documentation; and/or there would be some effect on known resources, such as visual intrusion or surface disturbance.

Socioeconomic Considerations

The construction, operation and maintenance of transmission facilities can create short- and long-term social and economic impacts.

Two categories of impacts might occur. The first includes short-term effects of construction on the local community: population, employment, housing, and economics. The second includes long-term effects associated with operation and maintenance of the line: property taxes, property values, trespassing, and agricultural and forest productivity effects.

SHORT-TERM -- Population impacts would result from the influx of temporary, nonlocal construction workers and would vary by month and work location.

Employment impacts would result from the hiring of local labor, depending on the availability of construction firms in the area.

Housing impacts would result from nonlocal workers staying in hotels/motels and commercial campgrounds, which could conflict with the demand for lodging by tourists and business travelers.

Economic impacts would result from two major sources—construction payroll and local purchases of goods and services required for construction. Payroll expenses would increase local income directly when paid to local workers who were previously unemployed. Local income would increase indirectly when local and nonlocal construction workers made local expenditures for goods and services. It is assumed that workers would spend wages in the communities where they would stay. Empirical evidence from several transmission line construction sites in the Pacific Northwest indicate that nonlocal workers spent approximately 40 percent of their income in or near their local communities of residence. The other 60 percent was saved or sent to their permanent residences (Gale 1982).

The proposed actions would, at most, require a construction crew of 60 for one construction season, resulting in negligible short-term socioeconomic impact in an urban area the size of Eugene-Springfield. Consequently, short-term socioeconomic effects will not be used as a decision factor.

LONG-TERM -- Property tax losses could occur where property would be purchased in fee, as for substation sites. As a Federal agency, BPA is exempt from paying local property taxes. There would be no property tax impacts where easements are purchased, as for transmission line rights-of-way.

Property value studies indicate that property within transmission line easements is reduced in value from 0 to 100 percent. A larger representation occurs in the 50 to 100 percent range. The studies also indicate that transmission lines do not diminish the market value of land abutting or near the right-of-way (Malin-Warner Mountain Project Report, BPA, 1980; and Bell-Boundary Project Report, BPA, 1982). Since BPA pays landowners the fair market value of the easements, the landowner is compensated for any property value reduction.

The potential for trespassing can increase where new rights-of-way and/or access roads pass. Access roads are not public roads. They are open to the public only if invited by the landowner. The use of these areas by trespassers, including off-road vehicles or motorcyclists, can be a nuisance to landowners. With mitigating measures such as good gate management, the increase in trespassing would be minor.

Potential agricultural and forest productivity impacts would result from: the temporary loss of crops during construction; the long-term loss of productive land at structure sites; and the interference of the transmission lines and structures with agricultural practices. (See Agriculture and Timber for more detailed descriptions of potential impacts.)

Because of the difficulty of projecting tax base growth in the next 20 years and projecting assessed land values for possible growth in areas designated for residential and industrial use, the analysis looked at current assessed land values and the current county tax base. Substation sites are presently assessed based on agricultural use. As a result the proposed project would make no more than $15,000 of taxable property tax-exempt. This would have little effect on the county's current overall tax base of $6.9 billion. Construction of the project could induce new economic development and diversity, increase the tax base, and outweigh tax losses from property acquired for substations. At the time of construction, if land values changed drastically from the current values, those changes would be considered in a supplement to the EIS.

The long-term socioeconomic impacts on Eugene-Springfield would be negligible since: any increase in development due to the project would outweigh the slight effects of tax losses due to property acquisition; landowners would be compensated for new easements; and, with mitigating measures, the possible increase in trespassing would be minor.

Since the potential impacts would be negligible, long-term socioeconomic effects will not be used as a decision factor.

APPENDIX C. Method for Quantifying Magnetic Field Exposure

The method used to quantify magnetic field exposures in this project is described below.

First, the amount of change in electric and magnetic field levels at the edge of the right-of-way was determined for each alternative. A minus value means a decrease in field strength compared to existing line designs.

To estimate potential exposure, the magnetic field increases greater than 1 mG for each segment were multiplied by the number of housing units within 500 feet of the right-of-way center. Fields from the lines would usually no longer be measurable at this distance. The product of field strength increase and number of housing units generates an index of potential exposure. The index was used to rate each of the alternatives.

The ratings are based on the relative size of the exposure increase index calculated for each alternative. This reflects the potential for increases in the strength of the magnetic field at the edge of the right-of-way in developed areas. Ratings of slight or low, for example, would indicate that field increases would be small and would affect a limited number of housing units. Ratings of high or very high would indicate major increases in magnetic field strength that could affect large numbers of housing units.

The exposure assessment index did not include electric fields because all the alternatives would produce levels that do not exceed the Oregon State standard. In addition, most recent interest is over the potential for long-term effects associated with residential exposure to magnetic fields.

None of the project alternatives are located close to schools, so electric and magnetic field levels would not be increased at such facilities.

It is important to note that the calculated field levels used in the exposure assessment represent typical levels obtained using BPA's best estimates for key factors such as line loading and line design. Future changes in the assumptions used for making these calculations could, therefore, result in changes in the predicted field levels. However, it is not expected that such changes would have any significant impact on the <u>relative</u> exposure comparisons made in this EIS.

Because this is a planning project where construction will occur when needed within the next 20 years, there was consideration of using projected housing units rather than existing housing units in the exposure assessment calculation. Projected housing units were calculated by L-COG for the 20-year planning period using the following assumptions.

- Future development would occur according to existing zoning.
- Urban residential development would occur at an average density of 3.5 units per acre.
- Rural residential development would occur at a density of .2 units per acre.
- No additional units would be permitted on land zoned for forest or agriculture.
- Development would occur on all vacant parcels in each corridor during the next 20 years.

Table C-1 shows the number of housing units that would be expected within 500 feet of the centerline of each alternative for both North Eugene-Springfield Reinforcement and South Eugene Reinforcement in the 20 year planning period.

Table C-1. Number of Housing Units Within 500 Feet of the Center of the Right-of-Way, Projected for the Year 2008.

North Eugene-Springfield	Number of Housing Units
I	20
II	65
III	699
South Eugene	
A	522
B	51
C	36
D	23

The projected housing units data are directly comparable to the existing housing unit data. (Refer to Tables 4 and 9.) For both the North Eugene-Springfield and South Eugene projects, the alternative with the highest number of housing units now would have the highest number of housing units in the future. The alternative with the fewest housing units now would have the fewest in the future. None of the relative rankings would change within the 20-year planning period. A limitation of the projections is that they reflect the number of units at the end of the 20-year planning period, not an interim time when construction may actually be needed.

For those reasons, it was decided to use the existing housing unit data which were considered a more reliable indicator of magnetic field exposure.

APPENDIX D. System Alternatives Considered and Dismissed

The Technical Report identified two long-range needs for major electrical facilities within the Eugene-Springfield area during the next 20 years: one in the north Eugene-Springfield area, one in south Eugene. Although the DEIS proposes that new transmission facilities be constructed to meet those needs, it should be acknowledged that those needs can be met in a variety of ways. This Appendix identifies other ways that the needs could be met, and briefly explains why they were dismissed.

North Eugene-Springfield

In the north Eugene-Springfield area, the local utilities will need reinforcement from BPA's 230-kV or 500-kV system. The DEIS proposes providing the reinforcement with a 230/115-kV substation and transmission lines tying the substation into the BPA system. Other ways of providing that reinforcement that were considered but dismissed are listed below.

1. Conservation programs. BPA has spent about $300 million on conservation in the Northwest over about a 5-year period. The local utilities have aggressively acquired much of that for the Eugene-Springfield area. The result, to date, has been a savings of about 100 megawatts for the BPA four-state service area. This savings will ultimately defer the need for new generation and could delay a thermal plant. The local utility forecasts already include expected levels of conservation by the electricity users.

   Conservation activities do not necessarily reduce the need to reinforce the power system. For example, an insulated home will use less energy to heat than an uninsulated home. However, when the heat does come on, the peak demand on the power system is about the same. The investment in conservation required to achieve the capacity of a 230-kV or 500-kV line would be many times the cost of the line.

2. Look to new technologies, such as superconductors. BPA is interested in superconductors and supports research for electrical power transmission. Superconductors have the potential to change the way BPA provides service to its customers. BPA has installed an experimental superconducting magnetic energy storage device at Tacoma. The results have shown that application is possible on the power system, although the cost and maintenance required are high. Numerous problems need to be overcome before superconductors can be considered for transmission line use. Superconductors developed to date have low current densities, and would not be practical for the amount of current required of a typical transmission line. As these problems are overcome, BPA may seek test locations on the power system.

As with other technologies, BPA will consider the cost, reliability, and environmental impacts of superconducting cable systems, cooling stations, and terminals to determine how the technology could be applied. BPA does not foresee general use for transmission lines for an indefinite time period. Should breakthroughs in development and manufacture occur by the time facilities are needed in the Eugene-Springfield area, BPA will certainly consider such alternatives, and may seek to incorporate options in future updates of the Metropolitan Plan.

3. Tapping PP&L 230-kV line as source for new bulk delivery substation. This circuit supplies load to PP&L stations north of the Eugene-Springfield area. Due to this additional loading, it would not be adequate to support the McKenzie/Gateway area.

4. 500/115 transformer in McKenzie/Gateway area, fed from a 500-kV tap line north to the Marion-Lane 500-kV line. This plan would provide too strong a source in the McKenzie/Gateway area, requiring additional 115-kV line construction to transmit the power out of the new station. This would cause the plan to cost more. Also, 500-kV line construction would be difficult in an urban area and would cost more.

South Eugene

There are other ways to meet the need for South Eugene Reinforcement than the transmission options described in the DEIS. Ways that were considered and dismissed are described below.

1. Conservation programs. (See item 1, in previous section on North Eugene-Springfield.)

2. Add transformers at both Alvey and Lane and do not build a line between the two stations. Since each transformer has about one-half the capacity of the line serving the transformer, it could make sense to add transformers to match the line capacity. With two transformer additions, one transformer could be out of service and the remaining transformers would have adequate capacity to carry the load. However, one line outage would remove two transformers from service. The existing Alvey-Lane 230-kV line would overload for a Marion-Lane 500-kV outage. Another problem is that the Santiam-Alvey 230-kV line operates in parallel with the Marion-Alvey 500-kV line. When the Marion-Alvey 500-kV line is out of service, the Santiam-Alvey 230-kV line, with much less capacity, tries to carry the load. To prevent the eventual overload of the Santiam-Alvey 230-kV line, an Alvey-Lane 500-kV tie would be needed.

3. <u>Develop a new substation at the north Eugene-Springfield site with 500/230-kV transformers and ties to both lines at Marcola</u>.

A new substation served from the 500-kV system (rather than 230-kV as discussed in Chapter III) could reduce the loading on the existing substations at Alvey and Lane such that South Eugene Reinforcement could be delayed for several years. A North Eugene-Springfield project would, however, be about four or five times more expensive, with the additional line construction to Marcola and two new large 500-kV substations, one at Gateway and the other at Marcola. Connections from the new substation to the existing 230-kV and 115-kV systems at the north Eugene-Springfield site would also add to expenses and impacts.

4. <u>Connect Alvey and Lane with an additional 230-kV line</u>.

A typical 230-kV line has about one-fourth the capacity of a 500-kV line and is about one-fourth as efficient. A 230-kV line would not have enough capacity to provide service for an outage of a 500-kV line. It is possible to construct high capacity multiple-circuit 230-kV lines, but the tower size is about the same as or greater than those for a single 500-kV line.

5. <u>Connect Lane and Alvey with a 500-kV line via existing 500-kV corridors through Marcola</u>.

The existing 500-kV lines could be paralleled from Marcola to Lane and Alvey. While this alternative could be made to perform satisfactorily, about 35 miles of line construction would be required, with a new major switching station at Marcola, as compared with 13 to 20 miles between Alvey and Lane when using Alternatives A, B, C, or D. The additional construction would increase costs about four to five times. BPA also anticipates that expansion of the existing corridor from Marcola to Lane would be difficult, with impacts on farmland, suburban, and airport areas. A second 500-kV line could be added between Marcola and Alvey, using existing right-of-way of one of the Santiam-Alvey 230-kV lines.

6. <u>Connect Lane and Alvey with an underground 500-kV line</u>.

In planning the addition of transmission lines, BPA considers the use of underground transmission cables as a component of the line to be added. BPA also considers the use of transmission cable for relocating existing transmission lines that might interfere with the best route for the proposed transmission lines. Transmission cables are highly complex utility equipment in comparison to overhead transmission lines. With current technologies, transmission cables normally exceed the cost of equivalent capacity overhead transmission line designs by many times. For 500-kV circuits, cable may be ten times as costly as overhead designs.

Because of transmission cable cost, their application by BPA is usually limited to special reliability or routing situations. Examples of these situations are locations where unusually high circuit reliability is required, such as nuclear power stations and locations where high capacity lines must cross. Cables are also considered where the line route is not appropriate for overhead, such as long water crossings or in heavily urbanized areas. Transmission cable options are also studied when considering whether undergrounding of existing lower-voltage transmission lines would minimize the cost to install a new higher-capacity transmission lines. Transmission cables used by BPA are short in comparison to typical overhead transmission lines. BPA's longest transmission cable is 8 miles. BPA operates one 500-kV cable which is 600 feet long. One of BPA's suppliers, the US Bureau of Reclamation, operates two 500-kV cable circuits at Grand Coulee Dam. These circuits are about 6,000 feet long.

To keep abreast of the latest transmission cable technologies, BPA actively supports and tracks research in these technologies. In the next 20 years, significant advancements are anticipated in cable technologies dealing with the efficiency of insulation (low-loss synthetic laminated insulation), and conductors (high-temperature superconductors). With these advances come expectations for reduced cost for transmission cable. However, it is expected that transmission cables will remain the tool for those special situations where reliability or overall project cost warrants the use of cable in lengths that are short in comparison to typical overhead transmission lines.

7. Replace one Santiam-Alvey 230-kV line with a 500-kV line between Marcola and Alvey and develop a new substation at Marcola. Adding a second 500-kV source to the Alvey Substation could delay the need to reinforce the system in south Eugene for several years. However, the Lane Substation would still be served by one 500-kV line, and the Alvey-Lane 230-kV line would still have limited capacity. Whenever a second source would be needed at Lane, the South Eugene Reinforcement would need to be built. The Marcola-Alvey line would be about 20 miles long, compared with 13 miles for Alvey-Lane. The additional line length and the need for a new substation at Marcola would make this option about three times more expensive than an Alvey-Lane connection.

8. Switching Station Alternatives. Options B, C, and D were diverted away from the existing Alvey-Lane corridor such that their length, costs, and environmental impacts were increased. One way of reducing the length and possible environmental impacts would be to tie the new 500-kV line into PP&L's proposed Eugene-Medford 500-kV line with a switching station rather than to construct the new line all the way into the Alvey Substation. The switching station alternatives were more expensive and less reliable, yet only slightly reduced overall environmental/social impacts. The switching station alternatives were not considered further.

9. Look to new technologies, such as superconductors. (See item 2, in previous section on North Eugene-Springfield.)

10. Reduced Peak Load. Reducing the peak load by managing it may provide some benefits and delay the need to build major transmission. Load in the residential area would be managed mainly by automatically controlling of the use of electrical space heating and hot water heaters. Industrial loads could also be reduced, depending on the nature of the load. To be effective, peak load reduction would have to be implemented not only in the Eugene-Springfield area, but also in southern Oregon and the Oregon coastal areas, since these areas are also served through the transmission system and substations in the Eugene area.

    It is uncertain how much reduction could be achieved through this method. Generally, small reductions could be expected. These reductions could delay the need for transmission support, but eventually, as load growth occurs, transmission support will be required. When the need develops for new major transmission in the Eugene area, this option would be reviewed to determine its application and cost effectiveness.

APPENDIX E. Additional Data, North Eugene-Springfield

Table E-1. Calculated Electric and Magnetic Field Strength for Existing and Possible Future Transmission Facilities, North Eugene-Springfield.

Alternative/Segment 3/	Electric Field (kV/m) 1/ On ROW	Electric Field Edge ROW Left	Electric Field Edge ROW Right	Magnetic Field (mG) 1/ 2/ On ROW	Magnetic Field Edge ROW Left	Magnetic Field Edge ROW Right
Alternative I						
Segment A						
Existing	2	1	0.1	31	9	2
Future	3 to 4	1	1	50 to 61	6 to 12	8 to 12
Change	1 to 2	0	0.9	19 to 30	-3 to 3	6 to 10
Segment B						
Existing	2	0.3	1	21	10	13
Future	2	1.5	1	27	19	8
Change	0	1.2	0	6	9	-5
Alternative II						
Existing	1	0.5	0.5	25	7	7
Future	2	0.5	0.5	26 to 28	6 to 7	5 to 6
Change	1	0	0	1 to 3	-1 to 0	-2 to -1
Alternative III						
Segment A						
Existing	8	2	0.2	78	24	8
Future	8	1	0.2	77 to 82	7 to 13	8
Change	0	-1	0	-1 to 4	-17 to -11	-1
Segment B						
Existing	2	1	0.1	31	9	2
Future	3 to 4	1	1	36 to 47	7 to 11	5 to 9
Change	1 to 2	0	0.9	5 to 16	-2 to 2	3 to 7
Segment C						
Existing	2	0.3	1	21	10	13
Future	2	1.5	1	22	15	7
Change	0	1.2	0	1	5	-6

kV/m = kilovolts per meter
mG = milligauss
ROW = right-of-way

1/ Left refers to the south and west sides; right refers to the north and east sides.
2/ Magnetic fields are based on average current levels (load) for the year 2001.
3/ Alternatives and segments are shown on Figure 2.

APPENDIX F. Additional Data, South Eugene

Table F-1. Calculated Electric and Magnetic Field Strength for Existing and Possible Future Transmission Facilities, South Eugene.

Alternative/Segment	Electric Field (kV/m)[1] On ROW	Electric Field Edge ROW Left	Electric Field Edge ROW Right	Magnetic Field (mG)[1/2] On ROW	Magnetic Field Edge ROW Left	Magnetic Field Edge ROW Right
Alternative A[3]						
Segment 1						
Existing	3	0.1	1	18	1	6
Future	8	2	1	32 to 33	9	1 to 3
Change	5	1.9	0	14 to 15	8	-5 to -3
Segment 2						
Existing	3	1	1	18	6	6
Future	8	2	1	32 to 33	9	1 to 3
Change	5	1	0	14 to 15	3	-5 to -3
Segment 3						
Existing	3	0.5	1	49	9	6
Future	8 to 9	1	1	30 to 35	4 to 10	1 to 3
Change	5 to 6	0.5	0	-19 to -14	-5 to -1	-5 to -3
Segment 4						
Existing	8	2	0.2	78	24	8
Future	8 to 9	2	0.2	73 to 79	5 to 10	7 to 8
Change	0 to 1	0	0	-5 to 1	-19 to -14	-1 to 0
Alternative B[4]						
Segment 1						
Existing	3	0.1	1	18	1	6
Future	8	2	1	32 to 33	9	1 to 3
Change	5	1.9	0	14 to 15	8	-5 to -3
Segment 2						
Existing	3	1	1	18	6	6
Future	8	2	1	32 to 33	9	1 to 3
Change	5	1	0	14 to 15	3	-5 to -3
Segment 3						
Existing	(no existing lines)					
Future	8	2	2	32	9	9
Change	8	2	2	32	9	9
Segment 4						
Existing	8	0.4	2	83	6	22
Future	8	2	2 to 3	78 to 80	9 to 10	21 to 22
Change	0	1.6	0 to 1	-5 to -3	3 to 4	-1 to 0
Segment 5						
Existing	8	2	0.2	78	24	8
Future	8 to 9	2	2	73 to 79	5 to 10	7 to 8
Change	0 to 1	0	0	-5 to 1	-19 to -14	-1 to 0

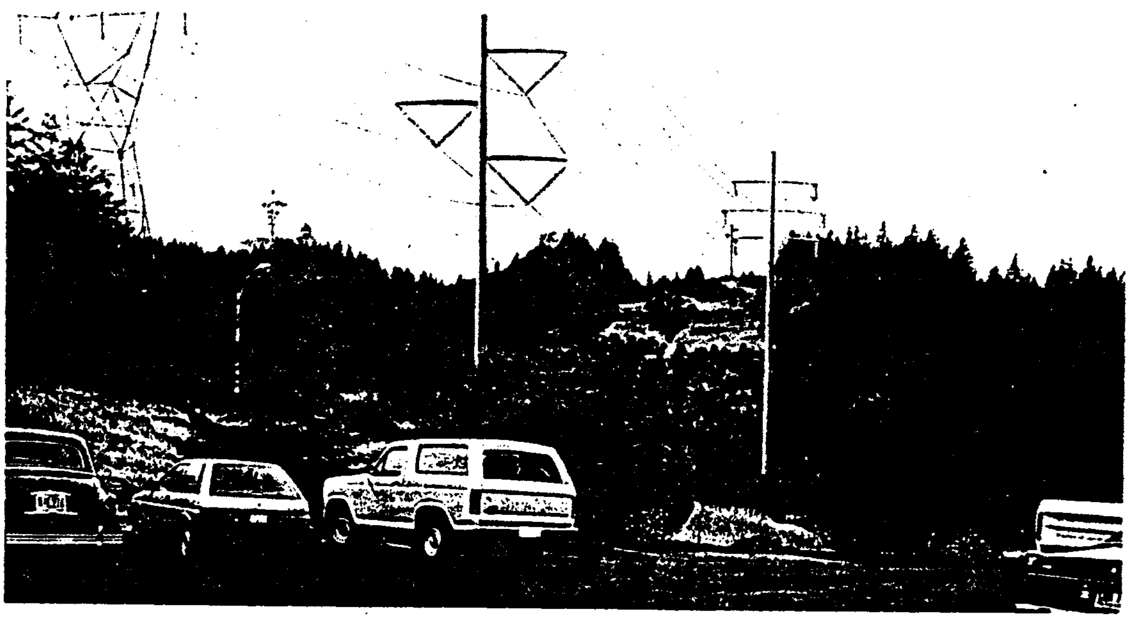
Alternative/Segment	Electric Field (kV/m)1/ On ROW	Electric Field Edge ROW Left	Electric Field Edge ROW Right	Magnetic Field (mG)1/2/ On ROW	Magnetic Field Edge ROW Left	Magnetic Field Edge ROW Right
Alternative C5/						
Segment 1						
Existing	3	0.1	1	18	1	6
Future	8	2	1	32 to 33	9	1 to 3
Change	5	1.9	0	14 to 15	8	-5 to -3
Segment 2						
Existing	3	1	1	18	6	6
Future	8	2	1	32 to 33	9	1 to 3
Change	5	1	0	14 to 15	3	-5 to -3
Segment 3						
Existing	(no existing lines)					
Future	8	2	2	32	9	9
Change	8	2	2	32	9	9
Segment 4						
Existing	8	0.4	2	83	6	22
Future	8	2	2 to 3	78 to 80	9 to 10	21 to 22
Change	0	1.6	0 to 1	-5 to -3	-3 to 4	-1 to 0
Segment 5						
Existing	8	2	0.2	78	24	8
Future	8 to 9	2	0.2	73 to 79	5 to 10	7 to 8
Change	0 to 1	0	0	-5 to 1	-19 to -14	-1 to 0
Alternative D6/						
Segment 1						
Existing	1	0.4	0.4	11	3	3
Future	8	1	2	32 to 33	2 to 4	9
Change	7	0.6	1.6	21 to 22	-1 to 1	6
Segment 2						
Existing	(no existing lines)					
Future	8	2	2	32	9	9
Change	8	2	2	32	9	9
Segment 3						
Existing	8	0.4	2	83	6	22
Future	8	2	2 to 3	78 to 80	9 to 10	21 to 22
Change	0	1.6	0 to 1	-5 to -3	3 to 4	-1 to 0
Segment 4						
Existing	8	2	0.2	78	24	8
Future	8 to 9	2	0.2	73 to 79	5 to 10	7 to 8
Change	0 to 1	0	0	-5 to 1	-19 to -14	-1 to 0

kV/m = kilovolts per meter
mg = milligauss
ROW - right-of-way

1/ Left and right refer to the side of the right-of-way if looking east from the Lane Substation toward the Alvey Substation.
2/ Magnetic fields are based on average current levels (load) estimated for the year 2001.
3/ Segments shown on Figures 6 and 7.
4/ Segments shown on Figures 6 and 8.
5/ Segments shown on Figures 6 and 9.
6/ Segments shown on Figures 6 and 10.

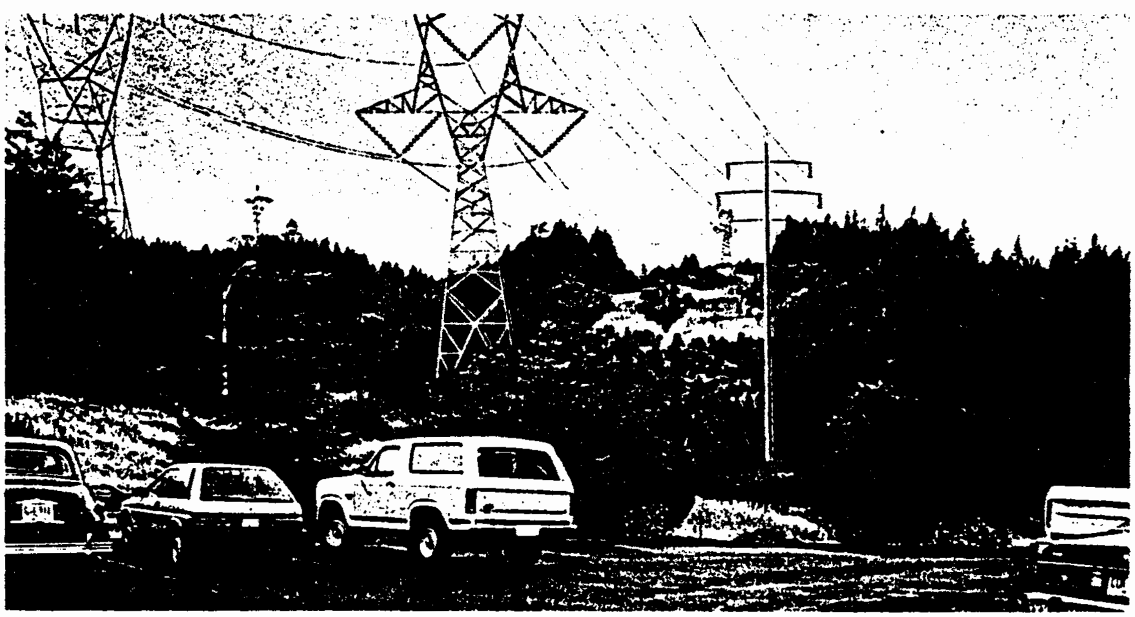
Figure F-1. Existing and conceptual views, South Eugene, Alternative A, Segment 3.

a. Existing view, looking west from the parking lot of an apartment complex near the intersection of Donald Street and Fox Hollow Road. The existing right-of-way has 230-kV steel lattice structures and two 115-kV H-frame, wood pole structures.

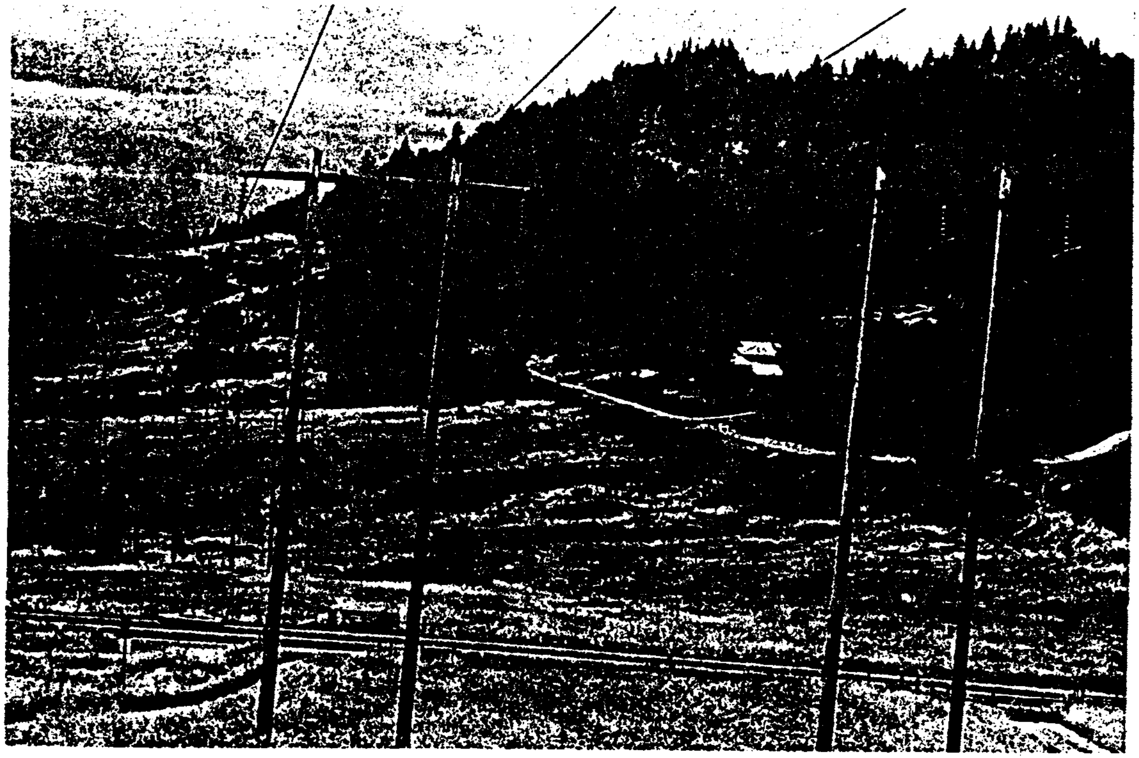


b. A conceptual view looking west from the same location. As proposed under Alternative A, the two wood pole structures have been replaced by double-circuit improved appearance structures. A 500-kV improved appearance structure has been added.

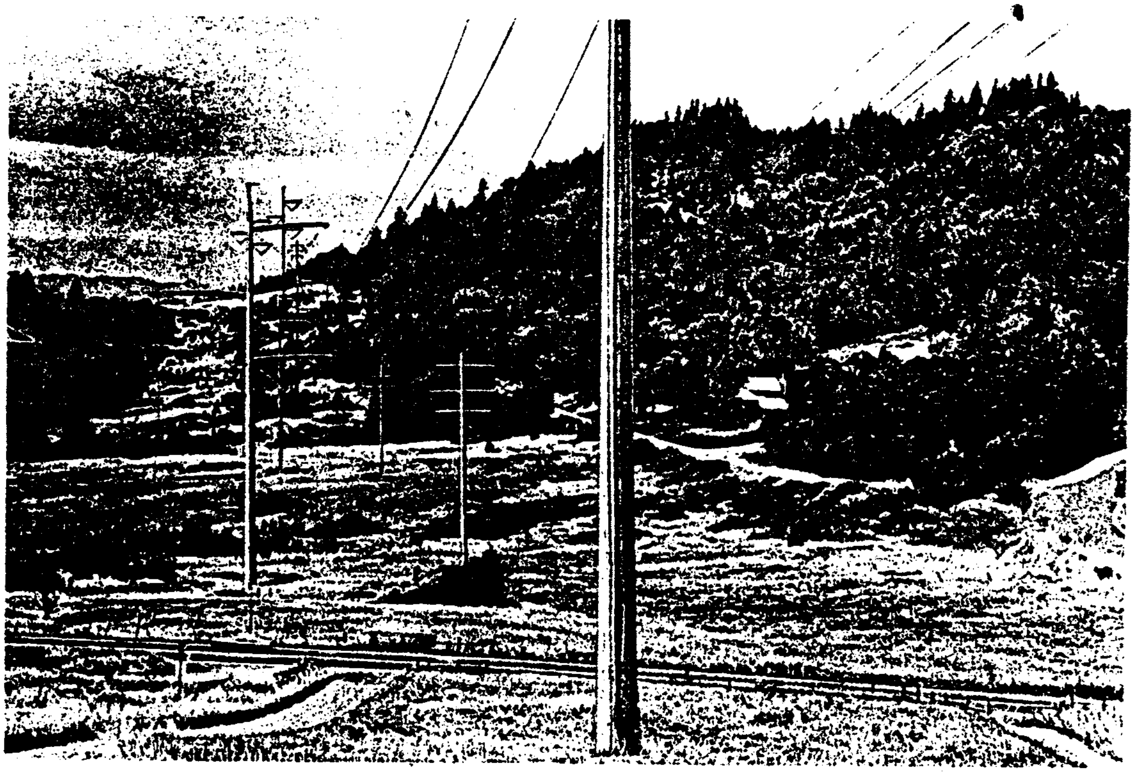
c. Existing view, looking west from the parking lot of an apartment complex near the intersection of Donald Street and Fox Hollow Road. The existing right-of-way has 230-kV steel lattice structures and two 115-kV H-frame, wood pole structures.



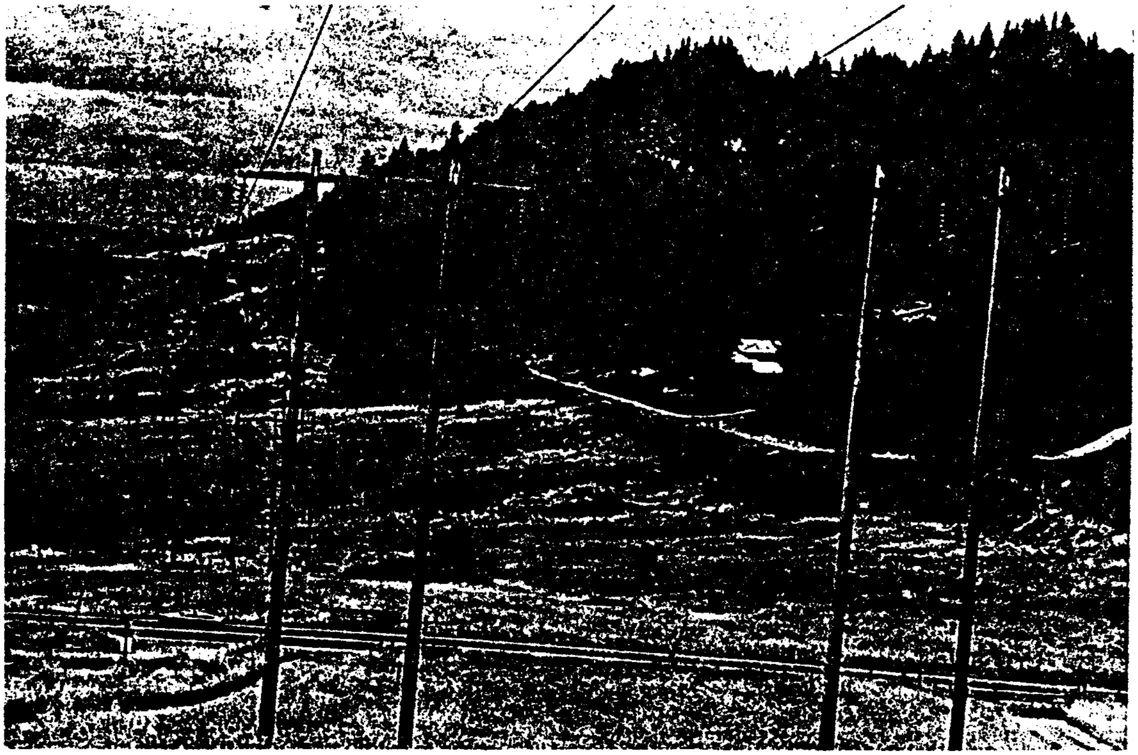
d. A conceptual view looking west from the same location. As proposed under Alternative A, the two wood pole structures have been replaced by double-circuit improved appearance structure. A 500-kV steel lattice structure has been added.



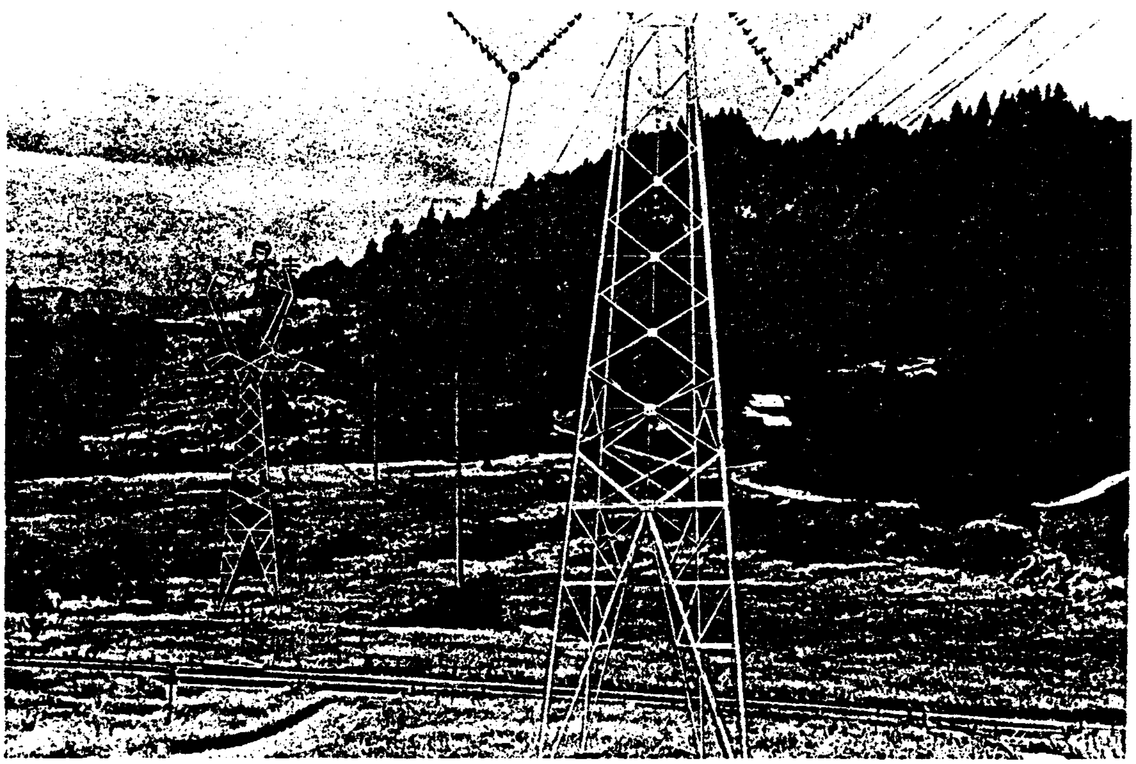
e. Existing view looking west from Willamette Street near 52nd Avenue and the SoJar Heights development, showing the H-frame, wood pole structures and the steel lattice 230-kV line.



f. A conceptual view looking west from the same location. As proposed under Alternative A, the two wood pole structures have been replaced by a double-circuit improved appearance structure. A 500-kV single-circuit improved appearance structure has been added.



g. Existing view looking west from Willamette Street near 52nd Avenue and the Solar Heights development, showing the H-frame, wood pole structures and the steel lattice 230-kV structure.



h. A conceptual view looking west from the same location. The two wood pole structures have been replaced by a 115-kV double-circuit improved appearance structure. A 500-kV single-circuit steel lattice structure has also been added.

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