

BP Cherry Point Cogeneration Project

Volume 1 - Draft Environmental Impact Statement
DOE/EIS-0349

Lead Agencies:

Energy Facility Site Evaluation Council



Bonneville Power Administration



Cooperating Agency:

U.S. Army Corps of Engineers



September 5, 2003



EFSEC

**Washington State
Energy Facility
Site Evaluation
Council**



September 5, 2003

Dear Reader:

Enclosed for your review is the Draft Environmental Impact Statement (DEIS) for the proposed BP Cherry Point Cogeneration Project. The proponent, BP West Coast Products, LLC, has requested to build a 720-Megawatt Gas-Fired Combined Cycle Cogeneration Facility in Whatcom County, Washington, and interconnect this facility into the regional power transmission grid. To integrate the new power generation into the transmission grid, Bonneville Power Administration (Bonneville) may need to re-build 4.7 miles of an existing 230-kV transmission line.

The Energy Facility Site Evaluation Council (EFSEC or Council) and Bonneville have completed this DEIS under contract with Shapiro and Associates. The analysis was undertaken to meet the direction of the State Environmental Policy Act (SEPA) for state and private lands, and the National Environmental Policy Act (NEPA) and other relevant federal laws and regulations for Federal permits and approvals.

The scoping phase of this project analysis has identified several issues that are addressed in the DEIS. A No Action and Action Alternative, and alternative components, including mitigation measures, are discussed in detail in the DEIS.

To ensure a complete analysis, we are asking you to help by reviewing this DEIS and providing comments. The comment period for this document closes on October 27, 2003.

We have scheduled a public meeting to discuss the findings in the DEIS. The public meeting will be held as indicated below. There will be an open house before the meeting, from 6:30 to 7:00 p.m. Comments will be received from 7:00 to 9:00 p.m.

**Wednesday, October 1, 2003
Open House: 6:30 to 7:00 p.m.
Public Comments: 7:00 to 9:00 p.m.
Blaine Performing Arts Center
975 H Street
Blaine, Washington, 98230**

For further information regarding this proposal, you may also contact Irina Makarow at (360) 956-2047 or Tom McKinney at (503) 230-4749. For copies of the DEIS, please contact Irina Makarow at (360) 956-2047, or you may access it on the Internet at www.efsec.wa.gov.

Please send your comments to either:

Allen Fiksdal, Manager
Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

BP Cherry Point Project Comments
BPA Communications Office KC-7
P.O. Box 14428
Portland, OR 97293-4428

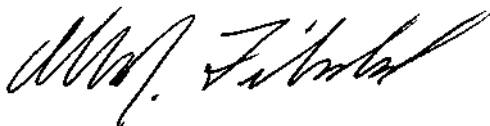
Comments on this document must be postmarked by October 27, 2003. Bonneville and EFSEC will review and respond to all comments and intend to publish a Final EIS during Winter 2003.

Please Note: Comments received in response to this solicitation, including names and addresses of those who comment, will be considered part of the public record on this proposed action and will be available for public inspection.

Please remember, for a comment to be considered to have substance, it needs to:

1. Provide new information pertaining to the proposed action or an alternative;
2. Identify a new issue or expand upon an existing issue;
3. Identify a different way to meet the underlying need;
4. Provide an opinion regarding an alternative, **including the basis or rationale for the opinion;**
5. Point out a specific flaw in the analysis; or
6. Identify a different source of credible research which, if used in the analysis, could result in different effects.

Note to Reviewers: Reviewers should provide EFSEC and Bonneville with their comments during the review period of the Draft Environmental Impact Statement. This will enable the lead agencies to analyze and respond to the comments at one time and to use information acquired in the preparation of the Final Environmental Impact Statement, thus avoiding undue delay in the decision making process.



Allen J. Fiksdal
Energy Facility Site Evaluation Council



Thomas C. McKinney
Bonneville Power Administration

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FACT SHEET

BP Cherry Point Cogeneration Project, Draft Environmental Impact Statement (EIS)
(DOE/EIS-0349)

Responsible Agencies: U.S. Department of Energy (DOE), Bonneville Power Administration (Bonneville), and Washington State Energy Facility Site Evaluation Council (EFSEC)

Cooperating Agency: U.S. Army Corps of Engineers

States Involved: Washington

Abstract: BP West Coast Products, LLC proposes to construct and operate a 720-megawatt, natural-gas-fired, combined-cycle cogeneration facility on land adjacent to its BP Cherry Point Refinery. Approximately 195 acres of undeveloped land would be converted for the cogeneration facility; gas, water, wastewater, and steam pipelines; construction laydown areas; access roads; and wetland mitigation areas.

The proposed project would be located in Whatcom County, Washington, approximately 15 miles northwest of Bellingham and 7 miles south of Blaine. The purpose of the proposed power project is to provide stable and reliable electricity and steam to meet the needs of the refinery and provide electricity to the Bonneville Federal Columbia River Transmission System.

Electrical energy from the proposed project would require construction of a new transmission line from the switchyard in the cogeneration facility to an interconnection point on Bonneville's Custer/Intalco Transmission Line No. 2. The length of the new line would be 0.8 mile.

From the interconnection point, a 230-kilovolt (kV) circuit may be constructed to the existing Custer substation. The most reliable method of adding the new line appears to be replacing approximately 5 miles of the existing 230-kV single-circuit Custer/Intalco Transmission Line No. 2 with a double-circuit line. Alternatively, preliminary studies of the transmission system indicate that the circuit might not be needed if an agreement can be reached between the Applicant and the Intalco Aluminum Corporation to interrupt electrical service at the Alcoa Intalco Works under potential transmission system overload conditions. The formal agreement would be known as a Remedial Action Scheme.

This Draft EIS assesses the existing natural and built environment, evaluates the potential environmental impacts and economic benefits of the proposed action, and identifies mitigation measures to compensate for the unavoidable impacts. Alternative project sites, power-generating and pollution-control technologies, and the No Action Alternative also are described.

Proposal's Sponsor: BP West Coast Products, LLC (BP or Applicant)

Date of Implementation: Construction activities are expected to start during the first quarter of 2004 and last approximately 25 months. The start of construction depends on the date the governor of Washington approves and signs the Site Certification Agreement for this project.

List of Possible Permits, Approvals, and Licenses: Table 2-3 of the Draft EIS lists federal and state requirements, permits, and approvals required for the proposed project, the agencies that administer the permits, and either the statute or regulation requiring the permit and approval. The EFSEC Site Certification Agreement would provide construction and operation requirements and all other relevant Washington State permits and approvals for the project. No other state or local permit is required for the proposed project.

As a federal agency, Bonneville must comply with federal permits and is precluded from participating in procedural requirements associated with state and local land use approvals or permits. The agency strives to meet or exceed the substantive standards and policies of the environmental regulations referenced above.

Authors and Principal Contributors to EIS: An independent consultant of EFSEC, Shapiro and Associates, Inc., is the principal author of the Draft EIS. The primary source of information used to prepare the Draft EIS is the Application for Site Certification, which was prepared by BP and its primary consultants Anvil Corporation, Golder and Associates, URS Corporation, and Duke Energy/Fluor Daniel. A list of contributors is included in the Draft EIS.

Subsequent Environmental Review:	Adjudicative Hearings
	Land Use Hearing
	Prevention of Significant Deterioration/
	Notice of Construction Permit Review
	404 Individual Permit Review
	401 Water Quality Certification Review
	State Waste Discharge Permit Review
	Final EIS
	Bonneville Record of Decision

Date of Final Lead Agency Action: After EFSEC deliberates on the facts, testimony, and EIS contents, it will send a recommendation to the governor of the state of Washington to approve or deny the project (expected in spring 2004). The governor has 60 days to accept or reject the recommendation or to remand the recommendation to EFSEC for further investigation.

Contact for Additional Information:

Irina Makarow
Siting Manager
Energy Facility Site Evaluation Council
925 Plum Street SE, Building 4
P.O. Box 43172
Olympia, WA 98504-3172
(360) 956-2047
irinam@ep.cted.wa.gov

Thomas McKinney
Environmental Lead
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208
(503) 230-4749
tcmckinney@bpa.gov

Location of Background Information: You may access this Draft EIS and find more information about the project and the responsible agencies on the Bonneville Web site at www.efw.bpa.gov and the EFSEC Web site at www.efsec.wa.gov. Copies of the BP Cogeneration Project Application for Site Certification, EFSEC No. 2002-01, and this Draft EIS also are available for public review at the following locations:

Washington State Library
Joel M. Pritchard Library
Point Plaza East
6880 Capitol Blvd
Tumwater, WA, 98504-2460
360-704-5200

Ferndale, WA 98248
Bellingham Library
Attn: Gayle Helgoe
210 Central Avenue
Bellingham, WA 98225-4421

Energy Facility Site Evaluation Council
925 Plum Street SE, Building 4
Olympia, WA, 98504-3172
360-956-2121

Ocean Park Library
City of Surrey
Attn: Isabelle Hay
12854 17th Avenue
Surrey, BC V4A 1T5
Canada

Whatcom County Library
Attn: Kathy Richardson
610 Third Street
Blaine, WA 98230

White Rock Public Library
Attn: Barb Hynek
15342 Buena Vista Avenue
White Rock, BC V4B 1Y6
Canada

Whatcom County Library
Attn: Dave Menard
P.O. Box 1209

Cost of EIS Copy to the Public: There will be no cost for the Draft EIS.

For information on Department of Energy (DOE) NEPA activities, please contact Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, EH-25, U.S. Department of Energy, 1000 Independence Avenue SW, Washington, DC 20585; by telephone at 1-800-472-2756; or visit the DOE website at www.eh.de.gov/nepa.

CHAPTER 1: SUMMARY

1.1 INTRODUCTION

BP West Coast Products, LLC (BP or the Applicant) proposes to construct and operate a nominal 720-megawatt (MW), natural-gas-fired, combined-cycle cogeneration facility next to the existing BP Cherry Point Refinery in Whatcom County, Washington. The Applicant also owns and operates the refinery, but the cogeneration facility and the refinery would be operated as separate business units.

The cogeneration facility and its ancillary infrastructure would provide steam and 85 MW of electricity to meet the operating needs of the refinery and 635 MW of electrical power for local and regional consumption. The proposed cogeneration facility would be located between Ferndale and Blaine in northwestern Whatcom County, Washington (see Figure 1-1). The Canadian border is approximately 8 miles north of the proposed project site.

The Washington State Energy Facility Site Evaluation Council (EFSEC) has jurisdiction over the evaluation of major energy facilities including the proposed project. As such, EFSEC will recommend approval or denial of the proposed cogeneration facility to the governor of Washington after an environmental review.

On June 3, 2002, the Applicant filed an Application for Site Certification (ASC No. 2002-01) with EFSEC in accordance with Washington Administrative Code (WAC) 463-42. On April 22, 2003, the Applicant submitted an amended ASC that included, among other things, a change from air to water cooling.

With the submission of the ASC and in accordance with the State Environmental Policy Act (SEPA) (WAC 463-47), EFSEC is evaluating the siting of the proposed project and conducting an environmental review with this Environmental Impact Statement (EIS). Because the proposed project requires federal agency approvals and permits, this EIS is intended to meet the requirements under both SEPA and the National Environmental Policy Act (NEPA). The Bonneville Power Administration (Bonneville) and U.S. Army Corps of Engineers (Corps) also will use this EIS as part of their respective decision-making processes associated with the Applicant's request to interconnect to Bonneville's transmission system and proposed location of the project within wetland areas. Therefore, this Draft EIS serves as the environmental review document for SEPA and for NEPA as required by Bonneville for the interconnection and the Corps for its 404 individual permit. The EIS addresses direct, indirect, and cumulative impacts of the proposed project, and potential mitigation measures proposed by the Applicant, as well as measures recommended by EFSEC.

The information and resulting analysis presented in this Draft EIS are based primarily on information provided by the Applicant in the ASC No. 2002-01 (BP 2002). Where additional information was used to evaluate the potential impacts associated with the proposed action, that information has been referenced. EFSEC's environmental consultant, Shapiro and Associates, Inc., did not perform additional studies during the preparation of this Draft EIS.

Figure 1-1:

Figure 1-2:

1.2 PURPOSE AND NEED FOR THE PROJECT

The proposed project has two purposes. First, it would provide the BP Cherry Point Refinery with reliable and affordable steam and electrical energy to maintain cost-effective operations. Second, it would provide electrical energy to the northwest power grid, which is needed to meet the projected growing regional demands for electricity.

1.2.1 BP Cherry Point Refinery Need

Steam is generated throughout the refinery as a byproduct of a number of refinery processes, but primarily by gas-fired utility boilers. These more than 30-year-old boilers are used to increase or decrease steam supply volume and to maintain steam pressure as needed for various refinery operations. The proposed project could produce steam for the refinery more efficiently and cheaper than the existing three utility boilers. With the proposed project, the refinery would be able to shut down the older boilers, thereby reducing air emissions from the refinery.

Two economic incentives exist for the Applicant to remove the three older refinery boilers. The first is to operate the cogeneration project at peak efficiency in cogeneration mode, thereby producing power at lower cost. The second is to use steam in the refinery that has been cost effectively produced by the cogeneration facility.

The cogeneration facility would be designed to operate at maximum efficiency at normal baseload conditions, which include a nominal 510,000 pounds per hour of steam being exported to the refinery. Although the steam turbine would have an operating range, it must be designed for a specific operating point for peak efficiency based on the normal expected baseload operating conditions, which include steam export to the refinery. The second incentive for the Applicant is to operate the cogeneration facility in cogeneration mode to lower the cost of producing power. Cogeneration uses waste heat more efficiently and therefore produces power using less fuel and at a lower cost than the same facility in non-cogeneration mode.

The refinery currently produces steam for use in its petroleum product processing operations through two processes: waste heat recovery and the use of utility steam boilers. Steam produced through waste heat recovery depends on the level of refinery operation, with greater amounts of steam being produced when the refinery process unit rate is high. However, the amount of steam needed by the refinery is well in excess of the steam produced by waste heat recovery alone; the utility boilers are operated to make up the difference. The operation of the utility boilers is increased or decreased according to the overall level of operation of the refinery. The older utility boilers were installed during the refinery's original construction in 1971 and currently operate at about 85% efficiency. Economic incentive exists for the Applicant to accept as much cogeneration project steam as the refinery can use because the cost of the steam would be lower if produced at 100% efficiency by the cogeneration project. This incentive is reduced if the refinery accepts less than the cogeneration steam baseload (BP 2002).

Refinery operations require approximately 85 MW of electricity. Historically, the refinery has relied on electricity purchased from third parties. This reliance on third-party sources has exposed the refinery to cost volatility in the electricity markets. For example, high prices for

electricity in late 2000 and early 2001 placed the viability of the refinery at risk. While the volatility has decreased significantly, the projected growth in regional power needs and the volatility in hydropower will require new power generation to balance supply and demand.

1.2.2 National and Regional Power Need

Recent national and regional forecasts predict increasing consumption of electrical energy will continue into the foreseeable future, requiring development of new generation resources to satisfy the increasing demand. The Energy Information Administration published a national forecast of electrical power through the year 2025. In it, the administration projected that total electricity demand would grow between 1.8 and 1.9% per year from 2001 through 2025. Rapid growth in electricity use for computers, office equipment, and a variety of electrical appliances in the residential and commercial sectors is only partially offset by improved efficiency in these electrical applications. Power generation from natural gas, coal, nuclear, and renewable fuels is projected to increase through 2025 to meet the growing demand for electricity and offset the projected retirement of existing generation facilities (U.S. Energy Information Administration 2003).

The Western Electricity Coordinating Council (WECC) forecasts electricity demand in the western United States. According to WECC's most recent coordination plan, the 2001-2011 summer peak demand requirement is predicted to increase at a compound rate of 2.5% per year (WECC 2002).

Based on data published by the Northwest Power and Conservation Council (NWPCC), electricity demand for the Council's four-state Pacific Northwest planning region (Washington, Oregon, Idaho, and Montana) was 20,080 average megawatts in 2000 (NWPCC 2003).

As shown in Table 1-1, the Council's recently revised 20-year demand forecast projects that electricity demand in the region will grow from 20,080 average megawatts in 2000 to 25,423 average megawatts by 2025 (medium forecast), an average annual growth rate of just less than 1% per year. While the Council's forecast indicates that the most likely range of demand growth (between the medium-low and medium-high forecasts) is between 0.4 and 1.50% per year, the low to high forecast range used by the Council recognizes that growth as low as -0.5% per year, or as high as 2.4% per year, is possible although relatively unlikely (NWPCC 2003).

Table 1-1: Projected Pacific Northwest Electricity Demand, 2000-2025

Forecast Scenario	Electricity Demand (Average Megawatts)			Growth Rates (Percent Change)	
	2000	2015	2025	2000-2015	2000-2025
Low	20,080	17,489	17,822	-0.92	-0.48
Medium Low	20,080	19,942	21,934	-0.05	0.35
Medium	20,080	22,105	25,423	0.64	0.95
Medium High	20,080	24,200	29,138	1.25	1.50
High	20,080	27,687	35,897	2.16	2.35

Source: NWPCC 2003

Generated power typically requires interconnection with a high-voltage electrical transmission system for delivery to purchasing retail utilities. Bonneville owns and operates the Federal Columbia River Transmission System (FCRTS), comprising more than three-fourths of the high-voltage transmission grid in the Pacific Northwest. Bonneville operates the FCRTS in part to integrate and transmit “electric power from existing or additional Federal or non-Federal generating units” (16 USC 838b). Interconnection with the FCRTS is essential to deliver power from many generating facilities to loads both within and outside the Pacific Northwest. The Applicant has asked to integrate power from the proposed project into the FCRTS.

In summary, electrical consumers served by the Northwest Power Pool and in other western states need increased power production to serve the predicted long-term increasing demand and high-voltage transmission lines to deliver the power.

1.3 DECISIONS TO BE MADE

This document is a joint SEPA/NEPA Draft EIS intended to meet the environmental review needs of EFSEC, Bonneville, and the Corps. EFSEC has jurisdiction over all of the evaluation and licensing steps for siting major energy facilities in the state of Washington. EFSEC's Site Certification Agreement acts as an umbrella authorization that incorporates the requirements of all state laws and regulations. EFSEC will jointly issue the Final EIS with Bonneville, and EFSEC will make a recommendation to the governor of Washington to approve or deny the proposed project.

Bonneville will use the Final EIS to meet NEPA requirements and will prepare a Record of Decision for the proposed project. If the governor approves the project, Bonneville will need to decide whether and how to provide transmission interconnection and service to and from the proposed project.

Bonneville intends to base its comparison of project alternatives and its final decision on the following criteria:

- Provide an adequate, economical, efficient, and reliable transmission system for the Pacific Northwest;
- Follow Bonneville's Open Access Transmission Tariff for non-discriminatory access;
- Comply with federal environmental and energy laws and policies;
- Achieve cost and administrative efficiency; and
- Minimize impacts on the natural and human environment through site selection and transmission line design.

A list of permits and requirements for the proposed project is included in Chapter 2, Table 2-4.

Based on the wetland impact analysis, proposed mitigation measures, and information contained in Appendix A of this EIS (Siting and Wetland 401[b] 1 Alternative Analysis), the Corps will decide whether or not to issue the 404 individual permit for the proposed project.

1.4 DESCRIPTION OF ALTERNATIVES

1.4.1 Proposed Action

The proposed project includes a cogeneration facility and ancillary facilities that would be located on an approximately 265-acre site. The cogeneration facility would be designed, constructed, and operated as a stand-alone facility that would have a number of systems integrated with the facilities and operations of the BP Cherry Point Refinery.

The cogeneration facility would occupy approximately 33 acres of Applicant-owned, unimproved property, which is zoned Heavy Impact Industrial. The 230-kilovolt (kV) transmission line would include approximately 15 acres of transmission right-of-way, and proposed construction laydown areas would include an additional 36 acres of land. Wetland mitigation sites proposed for the project north of Grandview Road would occupy approximately 110 acres.

Whatcom County Public Utility District No. 1 (PUD) would supply industrial water to the facility under a new contract between the Applicant and the PUD. Electrical transmission towers and lines from the cogeneration facility to the Bonneville electrical transmission system would be on Applicant-owned land. Natural gas would be supplied to the cogeneration facility from either the Arco Western Natural Gas Pipeline (Ferndale pipeline) or the Cascade Natural Gas Pipeline, both of which run through Applicant-owned land. The onsite stormwater detention pond would be within the boundary of the cogeneration facility. A second stormwater detention pond would be adjacent to the western boundary of Laydown Area 2. Sanitary wastewater would be sent to the refinery and then to the Birch Bay Wastewater Treatment District Plant for treatment and discharge to Birch Bay. Wastewater from the cogeneration facility would be sent to the refinery for treatment and discharge at the refinery's Outfall 001 at the existing marine pier in the Strait of Georgia.

In this EIS, individual systems and/or components of the proposed project have been grouped into five major project elements to facilitate the analysis and discussion of potential environmental impacts associated with the proposal. The components of each major project element are briefly listed below.

Project facilities that would be constructed or installed within the boundary of the cogeneration plant are collectively referred to as the "cogeneration facility," and include:

- A steam turbine generator;
- Three combustion gas turbine generators;
- Three heat recovery steam generators (HRSGs);
- Three HRSG exhaust stacks;
- Three 150 million volt amp (MVA) step-down transformers;
- An emergency diesel generator;
- An evaporative cooling tower;
- Various holding, storage, and transfer tanks and sumps;
- Stormwater collection, detention, and treatment facilities;

- An administration and control and warehouse building complex;
- Perimeter security fence and gates;
- A primary access road (Access Road 1)

Project facilities that would be constructed or installed in the BP Cherry Point Refinery to support integration and operation of the cogeneration facility are referred to as “refinery interface,” and include the following:

- Steam and condensate system connections and associated piping;
- Natural gas supply connection and associated piping;
- Natural gas compressor station;
- Industrial water supply connection and associated piping;
- Potable water supply connection and associated piping;
- Industrial wastewater connection and associated piping;
- Sanitary wastewater connection and associated piping;
- Elevated piperack assembly for supporting pipes connecting the two facilities;
- An intermediate voltage (69 kV or 115 kV) electrical distribution substation;
- Electrical distribution transformers;
- Stormwater collection, detention, and treatment facilities;
- Construction Laydown Areas 1, 2, and 3; and
- A connecting east-west access road (Access Road 2).

A new 230-kV double circuit electrical distribution line would be installed to connect the cogeneration facility with the existing Bonneville transmission system approximately 0.8 mile to the east. Throughout the EIS, this line is referred to as the “transmission system.”

Bonneville has determined that modifications to the Custer/Intalco portion of the existing Bonneville transmission system would be required to accommodate connection of the cogeneration facility. Two options have been identified to provide the required modifications. Option 1 is to install a Remedial Action Scheme (RAS). A RAS would install additional electrical equipment within the Custer and Intalco substations, and would require an operating agreement between the Applicant, Alcoa Intalco Works, and Bonneville for load-reduction protocols to be implemented under certain conditions. Option 2 is to reconstruct the Custer/Intalco Transmission Line No. 2 between the Custer substation and the point of interconnection with the transmission system, a distance of approximately 5 miles. Reconstruction of the transmission line would involve installation of a second transmission line and replacement of existing towers between the interconnection point and the Custer substation. For purposes of this EIS, the element of the project dealing with modification of the Custer/Intalco portion of the Bonneville transmission system is referred to as “Custer/Intalco Transmission Line No. 2.”

Other elements of the project that would be constructed or installed in other locations as part of the project are referred to as “other project components,” and include:

- Water supply connections, equipment, and piping to be installed at the Alcoa Intalco Works facility;

- Construction Laydown Area 4 (located at the northeast of the cogeneration facility site);
- Compensatory Mitigation Areas (CMAs) 1 and 2 (immediately north of Grandview Road); and
- A southern cogeneration facility access road (Access Road 3).

Figure 1-3 shows the relationship of project elements between the cogeneration facility, refinery, and supporting infrastructure. Chapter 2 contains a complete description of the systems and/or components of the proposed project.

Alternatives Considered but Rejected

Alternative Sites

In addition to the proposed cogeneration facility site, four other potential sites on the Applicant's property were evaluated for the facility location. They are as follows:

- East of Blaine Road and north of Brown Road adjacent to an existing cooling tower.
- Within the Cherry Point Refinery boundary fence near refinery components.
- Immediately north of Grandview Road. This area was evaluated because it contains a moderately sized upland area adjacent to Grandview Road.
- Within the refinery boundary just south of Grandview Road and west of Blaine Road. This site currently has a contractor parking lot and open areas.

Locations outside refinery-owned property were not evaluated because the primary purpose of the proposed project is to supply reliable, stable, and cost-efficient electricity and steam to the refinery.

Alternative technologies and cooling systems also were considered; a list of those considered but rejected is shown below. The reasons for their rejection are described in more detail in Chapter 2.

Alternative Power Generation

- Stand-alone combined cycle
- Conventional boiler and steam turbine
- Fluidized bed combustion and steam turbine
- Other technologies such as geothermal, hydroelectric, biomass fuels, solar and wind, and coal and heavy fuel oil.
- "Refinery Load Only" Alternative

"Refinery Load Only" Alternative

The Applicant examined a number of alternative facility configurations for the cogeneration project, including a facility that would generate only enough electricity to meet the operating needs of the refinery (approximately 85 MW) and would therefore not require interconnection with Bonneville's power transmission facilities.

Figure 1-3:

Potential facility configurations were evaluated against a set of performance requirements that the Applicant established for the project. These considerations included:

- Steam supply reliability to the refinery;
- Flexibility to accommodate larger future steam demands; and
- Economy of scale to provide suitable capital risk.

The Applicant determined that an 85-MW facility would not provide suitable steam reliability, lacked the ability to accommodate increases in future steam demand, and had a higher capital risk profile than the proposed configuration. The "Refinery Load Only" Alternative was therefore eliminated from further consideration.

Alternative Cooling Systems

- Dry cooling system: air cooled condenser
- Wet/dry cooling system: evaporative wet/dry cooling tower
- Wet/dry cooling: hybrid cooling system

Alternative Air Emission Controls

- SCONOX
- XONON

Alternative Wastewater Disposal Methods

- Refinery industrial wastewater treatment system
- New wastewater treatment facilities
- Zero discharge facility

Alternative Electrical Interconnection

- Reconductoring Custer/Intalco Transmission Line No. 2

1.4.2 No Action Alternative

Under the No Action Alternative, the proposed cogeneration facility and ancillary infrastructure would not be constructed and existing utility boilers at the refinery would remain in operation. The refinery would continue to purchase electricity or use onsite turbines to generate electrical power needed for refinery operations. Under the No Action Alternative, the Applicant has no immediate plans to use the area proposed for the project site, but because the site is zoned Heavy Impact Industrial, it could be used for other future industrial development.

Under this alternative, the impacts described for the proposed action would not occur. Approximately 110 acres of wetlands would not be enhanced, and if the Alcoa Intalco Works remained closed, the current withdrawal of approximately 2,200 gallons per minute (gpm) of

water from the Nooksack River would not occur. Finally, without an additional and redundant electrical power supply, the refinery would continue to be subject to market energy prices.

The refinery's demand for both steam and electrical power is expected to grow in the future as other projects are implemented within the refinery. Although the refinery boilers would continue to operate, additional heat generation capability would be required, and this likely would be produced by new boilers and/or fired heaters.

A list of potential impacts and mitigation measures of the Proposed Action Alternative and the No Action Alternative is shown in Table 1-2.

1.5 SUMMARY OF PUBLIC INVOLVEMENT, CONSULTATION, AND COORDINATION

The Applicant has been communicating and meeting with agencies, Indian tribes, the public, and non-governmental organizations throughout development of the proposed project. EFSEC and Bonneville have also conducted joint public comments and scoping meetings. The first public meeting was held on May 2, 2001 in the Blaine High School Center for the Performing Arts in Blaine, Washington. Prior to this meeting, public notices were mailed to local and regional newspapers, and press releases were issued to local and regional radio stations and newspapers. From May 2001 through 2003, meetings were held with local and state public agencies and committees, and agencies and regional committees of Canada. Formal meetings to inform stakeholders and solicit comments with these entities are listed in Chapter 2, Table 2-5.

Project documents are available to the public on the EFSEC and Bonneville Web sites and in local libraries. Further opportunities for public involvement will occur throughout the remainder of the siting evaluation process. A public comment hearing for the Draft EIS will be scheduled during the 45-day comment period, and additional public comment will be received by EFSEC through adjudicative and land use hearings to be held before the Final EIS is issued. Concurrent with these activities will be review of permit applications, specifically the Corps of Engineers' 404 Individual Permit, a 401 Water Quality Certification, a Prevention of Significant Deterioration/Notice of Construction Permit, and a State Waste Discharge Permit.

1.6 ISSUES TO BE RESOLVED

The following unresolved issue requires further evaluation and decision by the Applicant, EFSEC, and Bonneville.

1.6.1 Interconnection of the Cogeneration Project

The Applicant has asked Bonneville to provide an electrical connection with the Federal Columbia River Transmission System. The proposed point of interconnection is along one of Bonneville's existing 230-kV transmission lines between the Custer substation and Intalco substation (Custer/Intalco Transmission Line No. 2) near Brown Road. Preliminary transmission system studies indicate that to ensure reliable operation of the transmission system, integration of the project would require construction of an additional 230-kV circuit from the point of

interconnection to Custer substation. The most feasible method of adding the new line appears to be replacing the existing 230-kV single-circuit Custer/Intalco Transmission Line No. 2 with a double-circuit line.

Alternatively, the preliminary transmission system studies indicate that the new circuit might not be needed if agreement (a RAS) can be reached with the Alcoa Intalco Aluminum Corporation to interrupt electrical service at the Alcoa Intalco Works under certain potential transmission system overloads.

However, as of early summer 2003, there is uncertainty about continuing operation of the Alcoa Intalco Works. Extended loss of load at the aluminum smelter could present other problems for operation of the transmission system. Also, there is uncertainty about whether and when other electrical generation projects planned in northwest Washington would be constructed and how that would affect transmission system operations. Bonneville must further study how to interconnect the proposed project under this complex set of scenarios.

1.6.2 Firm Transmission Service from the Cherry Point Cogeneration Project

The Applicant has asked Bonneville to provide firm, guaranteed transmission service from the point of interconnection to the Northwest Hub (Central Washington) and John Day substations. Bonneville needs to resolve uncertainty about existing available transmission capacity to serve the Applicant's request before the appropriate system study can be completed.

1.6.3 Natural Gas Supply

The Applicant has not entered into a purchase agreement for natural gas supply to the proposed project. It is likely that the Ferndale pipeline would not have sufficient available capacity to meet the natural gas requirements of both the cogeneration facility and the refinery during periods of peak demand. The Applicant has indicated that if needed, additional natural gas would be obtained from a local supplier with available capacity. However, the additional supplier and associated new natural gas transmission/distribution facilities that would be required have not been identified at this time.

1.6.4 BP Refinery NPDES Permit Changes

The BP Cherry Point Refinery's existing National Pollutant Discharge Elimination System (NPDES) permit will require revision to allow the refinery to accept industrial wastewater discharge from the cogeneration facility. Ecology, the agency with jurisdiction over this permit, would address water quality issues that have been raised for the cogeneration project such as impacts of increased salinity and temperature on the herring population, the age and condition of the existing diffuser, and potential cumulative impacts on water quality through this refinery NPDES permit revision process.

1.6.5 Water Use

Letters of intent have been signed by the Applicant, Alcoa and Whatcom PUD to effectuate the contract water right purchases between the three entities that would allow the cogeneration facility to purchase water from the PUD regardless of whether the Alcoa Intalco Works aluminum smelter is operating or not. It is anticipated that agreements to purchase the contract water rights by the cogeneration facility would become final should all state and federal approvals be received.

1.6.6 Prevention of Significant Deterioration Permit and Best Available Control Technology

The Applicant's projected air emissions and selection of the Best Available Control Technology (BACT) are currently under review by EFSEC and EPA. It is anticipated that final permit requirements would be based on emission controls and BACT no less stringent than those presented in this Draft EIS.

1.6.7 Change of Ownership of Cogeneration Project

BP has informed the Council that TransCanada is negotiating purchase of the cogeneration project. This change of ownership could directly affect the greenhouse mitigation options offered by the Applicant.

1.6.8 Project Design Features

For some project components, additional project design and related information will be required to complete the environmental review process for the proposed project. Specific areas where additional information is required are listed below.

Additional information is required regarding who will construct and operate key project components. This includes:

- 230-kV switchyard. Ownership and operation of the cogeneration facility's 230-kV electrical switchyard would be subject to the terms of an interconnection agreement between Bonneville and the Applicant. That agreement has not been finalized.
- Industrial water supply. At this time, it has not been determined whether the Applicant or Whatcom County PUD would construct and operate the proposed industrial water supply connection and piping required within the refinery.
- Natural gas supply and compression station. At this time, it has not been determined whether the Applicant, the refinery, or the Ferndale pipeline would be responsible for construction and operation of the cogeneration facility's natural gas supply connection, associated piping, and natural gas compression station to be located within the refinery.
- Intermediate voltage substation. At this time, it has not been determined whether the Applicant or the refinery would construct and operate the intermediate voltage (69 kV or 115 kV) substation to be located within the refinery.

Additional facility design and related descriptive information are required for some project systems and components. These include:

- Refinery interface piping systems. Design characteristics for a number of piping systems that interconnect the cogeneration facility with the refinery have not yet been determined. Information regarding the size, type, route, and refinery tie-in point for the following piping systems is required to fully evaluate the potential for environmental impacts:
 - steam and condensate systems,
 - potable water supply,
 - natural gas supply,
 - industrial water supply,
 - industrial wastewater, and
 - sanitary wastewater.
- Custer/Intalco Transmission Line No. 2. At this time, many aspects of reconstruction of the Custer/Intalco Transmission Line No. 2 remain to be resolved by the Applicant and Bonneville. These include:
 - number, type, and location of transmission towers that would be installed,
 - type, length, and location of any transmission line access roads that would be constructed or improved,
 - type, size, and location of any culverts to be constructed, and
 - size and location of any temporary laydown, staging, and assembly areas that may be required.

1.6.9 Additional Studies/Evaluations Required to Complete the Environmental Review of the Proposed Project

- 404(b) 1 Alternative Analysis. The Corps of Engineers has asked the Applicant to revise and provide more details regarding the evaluation of project alternatives.

1.7 SUMMARY OF POTENTIAL IMPACTS AND MITIGATION MEASURES

Table 1-2 summarizes potential impacts resulting from construction and operation of the Proposed Action Alternative and the No Action Alternative. Also included in the table are proposed mitigation measures. The Applicant, during the preliminary design of the proposed project, has mitigated potentially significant adverse impacts such that, with the exception of the permanent loss of approximately 31 acres of wetlands, no significant adverse impact on natural resources and the built environment has been identified in the environmental review. Specific impacts and mitigation measures are discussed in each section of Chapter 3.

1.8 CUMULATIVE IMPACTS

The Pacific Northwest has short-term and long-term supply needs for electrical power. The WECC forecasts electricity demand in the western United States. According to WECC's most recent coordination plan, the 2001-2011 summer peak demand requirement is forecasted to increase at a compound rate of 2.5% per year (WECC 2002).

The NWPCC regularly prepares a 20-year forecast of electricity demand in the Pacific Northwest. NWPCC's latest long-term forecast found that the total consumption of electricity is forecasted to grow from 20,080 average megawatts in 2000 to 25,423 average megawatts by 2025, an average yearly rate of growth of just under 1% (NWPCC 2003).

In addition to evaluating the environmental impacts of proposed power projects on an individual basis, EFSEC and Bonneville have also considered potential cumulative impacts of these projects, as well as other projects and actions that could contribute to cumulative impacts. This concern of the state and federal agencies is magnified when several projects are proposed at the time in the same vicinity with schedules that overlap.

The following is a summary of the cumulative impact evaluation included in this EIS.

1.8.1 Global Warming

Most greenhouse gas emissions are in the form of CO₂, with smaller fraction of methane or nitrous oxide. Although the additional contribution of greenhouse gases on a state, regional, and national level from this proposal can be quantified, it is not possible to determine their actual impact on global warming.

1.8.2 Regional Air Quality

The results of modeling under the worst-case scenario for criteria pollutants from the proposed project indicate there would be no air quality impacts in the US or Canada when compared to the most stringent values of the National Ambient Air Quality Standards, Washington Ambient Air Quality Standards, or Canadian Objectives or Standards. Purchase of cogeneration steam by the refinery would likely lead to the refinery shutting down three older utility boilers, resulting in overall reductions of PM₁₀ and NO_x emissions in the air shed. Construction of the Georgia Strait Pipeline along Grandview Road at approximately the same time as construction of the proposed project would only temporarily affect air quality through the emission of fugitive dust.

1.8.3 Water

With the construction of the proposed project and the Georgia Strait Pipeline project scheduled at around the same time, there is a possibility of cumulative impacts. These impacts could potentially result from the use of water to control dust, pipeline testing and cleaning, and hydrotesting major pipelines.

With the shutdown of the Alcoa Intalco Works, water used at that facility would now be used by the proposed project, so there would be no net increase of water consumption when the proposed project becomes operational. If Alcoa Intalco Works operates at the same time as the cogeneration facility, there still would be no cumulative impacts because the once-through cooling water from Alcoa Intalco Works would be used by the cogeneration facility, thereby precluding the need for additional withdrawal of water from the Nooksack River.

Several industrial dischargers are located in the general vicinity of the proposed cogeneration project. These include the BP Cherry Point Refinery, the Conoco-Phillips Refinery, Tenaska Washington Cogeneration Power Plant, and Alcoa Intalco Works. All of these facilities currently discharge to the Strait of Georgia. Also, the Birch Bay Sewer District Treatment Plant discharges to Birch Bay, an embayment of the Strait of Georgia. Although discharge from the proposed project would represent a relatively small increase to the regional discharge to the Strait of Georgia, it adds to the overall burden on water quality.

1.8.4 Natural Gas Supply

The projected annual consumption of natural gas by the proposed project is approximately 42,457,000 million British thermal units (MMBtu). The proposed project would result in an incremental contribution to the regional demand for natural gas. However, there is sufficient capacity in the gas supply and distribution system serving the Pacific Northwest to supply the proposed cogeneration project and existing and planned natural-gas-related projects such that the overall effect on available supplies would be negligible.

1.8.5 Transmission Lines

Construction of the cogeneration facility's transmission line and the possible reconstruction of the Custer/Intalco Transmission Line No. 2 would not have a cumulative impact on the natural resources within western Whatcom County. The short 0.8-mile cogeneration transmission line would connect the project to Bonneville's existing transmission system. The Bonneville line would not need to be extended and, except for the 230-kV switchyard at the cogeneration facility, no new substations would need to be constructed as a result of the proposed project. Bonneville is continually conducting studies to determine the need to extend their transmission system. It is not known at this time what other transmission lines would be needed in the future.

1.8.6 Transportation

Construction of the proposed project and the construction of the Georgia Strait Pipeline project would occur at about the same time. It is expected that some increased traffic congestion and delays at intersections along Grandview Road would occur over the two-year period. Based on traffic modeling completed for the proposed project, the results indicate that the level-of-service at all major regional intersections would operate at acceptable levels as defined by Washington State Department of Transportation design standards.

1.8.7 Population, Housing, and Economics

A workforce analysis conducted by the Applicant suggests that there is an adequate labor pool available for construction of the proposed project. If additional projects, such as the Georgia Strait Pipeline project, were to be constructed within the region, some workers likely would relocate to the area, temporarily affecting the local housing market, population, and local services. This potential future condition is not expected to be a significant cumulative impact on communities in the project vicinity.

Table 1-2: Summary of Impacts and Mitigation Measures

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Earth			
Construction	· Extensive grading of the site is not anticipated to be required, however some unsuitable materials may require removal from the site for disposal at approved locations. · The total quantity of imported fill material is estimated to be approximately 126,000 cubic yards (75,600 tons). · Site grading and stockpiling activities would expose soils and would increase the potential for erosion. · The potential exists for contacting contaminated soils during excavation activities at the BP Cherry Point Refinery and at the Alcoa Intalco Works facilities because of industrial practices that have occurred at these sites since the 1970s.	· Under the No Action Alternative, the project would not be constructed, therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> · Best Management Practices (BMPs) would be implemented for erosion control and prevention. The BMPs would be described in a Stormwater Pollution Prevention Plan (SWPPP) and Temporary Erosion and Sedimentation Control Plan (TESC) to be submitted to EFSEC prior to construction. · Soils would be sampled and inspected for the presence of contaminants before and during site clearing, grading, and trenching. · Excavated materials of acceptable quality would be reused as much as possible. · Excess materials would be disposed of at permitted fill sites or would be placed where they would not easily erode. · Disturbed areas would be revegetated by seeding or hydroseeding. · Seed mixes would be selected that are known to effectively stabilize erodible soils in the northwestern portion of the State of Washington. · Soil stockpiles would be seeded or covered with an emulsion and surrounded by silt fences and straw bales or sand bags, where necessary, to prevent excessive erosion by wind or rain. · Sprinkler systems may be employed to sustain vegetation on bermed areas with high exposure to the erosive forces of wind. · Erosion control measures for construction, such as silt fencing, straw bales, and tarps, would be inspected and maintained. · A Spill Prevention Control and Countermeasure (SPCC) Plan would be prepared. The plan would include procedures to implement structural, operational, and treatment BMPs.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
			- Stormwater runoff from the construction site would be collected and routed to a sediment control system. - Sediment control measures, such as an oil-water separation system and detention ponds, would be sized for storm events ranging from 6-month, 24-hour up to the 100-year, 24-hour event.
Operation	- During operation, there would be the potential for a large seismic event to impact cogeneration facility operations (i.e., the production of electricity). - During operation, the greatest risk to the project from volcanic activity would be from tephra (ash) fall.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any operation impacts for this element of the environment.	<u>Mitigation Proposed by Applicant</u> - The characteristics of the soils would be determined during the geotechnical analysis completed during detailed project design. If the soils prove to be susceptible to induced amplification, the project design would incorporate protection measures against such seismic events. <u>Additional Recommended Mitigation Measures</u> - In the event of tephra fall at the cogeneration facility, all activities would be suspended until the tephra fall has ceased. Mechanical and electrical components and water supply containment structures would be cleared of ash before resuming operations.
Air Quality			
Construction	Emissions during the construction process would consist of fugitive dust and combustion exhaust emissions from construction equipment and vehicles. It is not anticipated that these emissions would exceed the NAAQS.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> - Roads would be covered with gravel to minimize the potential for fugitive dust emissions from vehicle traffic. - Late in construction, gravel roads would be paved to further reduce emission of fugitive dust. - Spraying exposed soil with water would reduce PM₁₀ emissions and particulate matter deposition. - Planting vegetative cover as soon as possible after grading would reduce windblown particulate matter in the area.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
			<u>Additional Recommended Mitigation</u> · Covering all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck) would reduce PM₁₀ and deposition of particulate matter during transportation. · Providing wheel washers to remove particulate matter that would otherwise be carried offsite by vehicles would decrease deposition of particulate matter on area roads and subsequent entrainment from those roads. · Routing and scheduling construction trucks so as to reduce delays to traffic during peak travel times would reduce secondary air quality impacts caused by a reduction in traffic speeds while waiting for construction trucks. · Requiring appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel would reduce CO and NO_x emissions in vehicular exhaust. Using relatively new, well-maintained equipment would reduce CO and NO_x emissions.
Operation	· During operation, emissions from the cogeneration facility would include SO₂, PM₁₀, PM_{2.5}, VOCs, CO, and NO₂, however all pollutant concentration levels would be well below National Ambient Air Quality Standards. · Emissions of toxic air pollutants would result from the combustion of natural gas in the cogeneration facility, however, modeled maximum concentrations are less than the state's Acceptable Source Impact Levels. · The cogeneration facility would provide steam to the refinery and allow existing refinery boilers to be shut down, thereby providing an offsetting air quality benefit.	· Under the No Action Alternative, the project would not be constructed, therefore there would not be any operation impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> · Only natural gas would be burned in the combustion turbines and duct burners, and only low-sulfur diesel fuel in the emergency generator and firewater pump. · BACT would be used at the cogeneration facility. BACT to control criteria pollutant emissions include: - Dry low NO_x combustion technology; - Selective catalytic reduction technology; - Oxidation catalyst controls incorporated into the HRSGs to reduce CO emissions and VOCs.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
	· Cogeneration emissions are projected to contribute to a decrease in visibility at the Olympic National Park. · Fogging from the cooling tower vapor plume may occur for up to 650 to 1,650 feet for a total of 2.5 hours a year in the northeast or northwest directions from the tower.		· BACT to control toxic emissions include: - Use of clean natural gas as the only fuel for the combustion gas turbines and HRSG duct burners; and - Use of oxidation catalyst unit on each HRSG duct burner. · As long as the Applicant owns the cogeneration facility, mitigation of greenhouse gases (GHG) would be offset by GHG reduction within BP West Coast Products, LLC worldwide operations. · If the cogeneration facility is owned by another owner, then mitigation of GHG emissions would be provided by: - the proposed CO₂ emission standard would be 0.675 lbs. CO₂/kWh, - emissions in excess of the emission standard would be mitigated either by (a) an annual payment of \$0.85/ton CO₂, or (b) GHG reductions obtained by the new owner, or (c) a combination of both. - mitigation would be satisfied annually for 30 years.
Water Resources			
Construction	· Water from various sources would be used to support construction, including: - Approximately 7 million gallons of trucked water from the refinery would be used for dust control; and - Approximately 21.5 million gallons of fresh water from the public utility district would be used for steam blow testing and hydrostatic testing. · Stormwater flow would be altered to control erosion and sedimentation during construction · Groundwater recharge would be reduced under the project site during construction, but would increase in the wetlands north of Grandview Road.	· Under the No Action Alternative, the project including proposed wetland mitigation areas would not be constructed. Therefore, there would not be any construction impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> · Stormwater would be collected, treated, and discharged off-site within the same drainage basin allowing groundwater recharge in the same hydrological system. · A stormwater pollution prevention (SWPP) plan would be developed prior to construction, the SWPP plan would include Temporary Erosion and Sedimentation Control (TESC) plans. · The SWPP and TESC would specify Best Management Practices for erosion control during construction. All erosion control BMPs would be in place and functioning prior to construction.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
			- Stormwater runoff from project site roads and other impervious areas would be collected in an oil-water separator to draw off any trace oil and then route the stormwater to a detention pond to allow sediment to settle out. - Stormwater runoff from around the site would be continue to be routed to existing ditch along the Blaine Road and then discharged to Terrell Creek. - Diversion ditches would prevent surface water runoff from areas outside the cogeneration site from entering the site. - Stormwater runoff from within the cogeneration site will be contained, collected, and routed to the stormwater treatment and detention system.
Operation	- During operation, the cogeneration facility would use between 2,244 and 2,316 gpm of process water for cooling and other facility functions. The water would either be recycled cooling water from the Alcoa Intalco Works aluminum smelter if that facility is in operation, or water received directly from the PUD if the Alcoa Intalco facility is not in operation. - The cogeneration facility would use between 1 and 5 gpm of potable water supplied by the Birch Bay Water and Sewer District. - During operation, the cogeneration facility would generate industrial wastewater from - Treatment of raw water to produce high quality boiler feedwater (BFW) and refinery return condensate treatment; - Collection of water and/or other minor drainage from various types of equipment; - Cooling tower blowdown; and - Sanitary waste collection. - Runoff from surfaces containing contaminants could impact surface and groundwater. - Groundwater recharge impacts would be the same as for construction.	Under the No Action Alternative, the project including proposed wetland mitigation areas would not be constructed, therefore there would not be any operation impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> - Wastewater would not discharge directly into any watercourses (including creeks, lakes, wetlands, ditches, or the marine environment), or storm drains, nor will it require any new outfalls. - Stormwater runoff quantities would be controlled by the stormwater collection and treatment system. - Stormwater collected from the cogeneration site would be routed to an unlined surface detention pond and allowed to infiltrate or discharge to wetlands within the same hydrologic basin. The net effect would be returning the collected stormwater to the same hydrologic system for recharge. - The SWPP plan for operation would include structural and operational BMPs, a Spill Prevention, Control and Countermeasure (SPCC) plan, a final stormwater management plan, and general operating procedures. - Industrial wastewater would be treated in the refinery's wastewater treatment system prior to discharge to the Strait of Georgia.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
	During operation of the project, surface water from the cogeneration facility would be discharged to the CMA 2 site, increasing flows to the site. Increased flows the site, combined with topological modifications proposed for the site, is expected to increase hydraulic residence time on the site, thus enhancing existing wetlands and restoring wetlands that have been effectively drained.		Sanitary wastewater would be routed to the Birch Bay Sewer District's wastewater treatment plant for treatment and discharge to the Strait of Georgia.
Water Quality			
Construction	- Wastewater containing contaminants would be generated during plant construction and pre-operation testing. - During construction of the project, potential water quality impacts could be caused by: -Sediment-laden stormwater discharged from the project site during construction; and -Spills and leaks of chemicals, especially a large volume spill, during construction could impact stormwater, surface water (wetlands), and groundwater. - Water used for HRSG steam-blow tests would be discharged as steam to the atmosphere. If contaminants are present in the water, the contaminants may be discharged to the atmosphere with the steam. - Runoff from surfaces containing contaminants could impact surface and groundwater. - Sanitary waste generation is anticipated to be 500 gallons per day during construction of the project.	Under the No Action Alternative, the project would not be constructed; therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> - Hydrostatic test water would be discharged to the refinery's wastewater treatment system and then discharged to the Strait of Georgia. - SWPP plan for construction activities would be prepared for the various elements of the project, and would include stormwater management procedures, temporary erosion and sedimentation control (TESC) plan for each phase of project, the specification of all necessary BMPs for construction activities as specified in the Stormwater Management Manual for Western Washington (Ecology 2001), and include general operation and maintenance descriptions of the BMPs used on site. - All erosion control BMPs would be in place and functioning prior to the start of construction. - To minimize the potential release or spills of chemicals during construction, best management practices, as specified in the SWPP plans, would be employed. These would include good housekeeping measures, inspections, containment facilities, minimum onsite inventory, and spill prevention practices.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
			<u>Additional Recommended Mitigation Measures</u> EFSEC is currently developing State Waste Discharge Permit conditions for construction of the cogeneration facility. The permit would specify construction stormwater effluent limits and monitoring requirements intended to reduce or eliminate water quality impacts. Monitoring of stormwater would commence at the beginning of construction.
Operation	- Spills and leaks of chemicals, especially a large volume spill, during operation could affect stormwater, surface water (wetlands), and groundwater. - The cogeneration facility would produce 190 gpm on average (assuming 15 cycles of concentration in the cooling tower) of non-recyclable process wastewater which would be sent to the BP refinery's wastewater treatment system. - Between 1 and 5 gpm of sanitary waste would be generated by the cogeneration facility. - Periodic washing of the gas turbines would generate up to approximately 2,300 gallons of wash water per turbine per quarter. The wash water would likely contain dirt deposits removed from the blades, along with detergents used for the cleaning operation. - Operation and maintenance of the industrial water supply pipeline and associated components at the Alcoa Intalco Works could result in potential erosion/sedimentation and chemical spills that could impact surface water and groundwater quality.	Under the No Action Alternative, the project would not be constructed; therefore there would not be any operation impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> - SWPP plan for operational activities would be prepared for the cogeneration facility, and would include stormwater management procedures. The SWPP plan for operation would include structural and operational BMPs; a SPCC plan; and a final stormwater management plan. - Prior to operation of the cogeneration facility, a SPCC plan would be prepared the plan would contain procedures for spill response, containment, and prevention procedures; and structural, operational, and treatment BMPs. - Safeguards incorporated to mitigate the risks of a release to the environment from stored operational chemicals include secondary containment, tank overfill protection, routine maintenance, safe handling practices, supervision of all loading/unloading by plant personnel and truck drivers, and appropriate training of operation and maintenance staff. - Industrial wastewater from the cogeneration facility would be treated in the refinery's wastewater treatment system prior to discharge to the Strait of Georgia. - Sanitary wastewater would be routed to the Birch Bay wastewater treatment plant for treatment and discharge to the Strait of Georgia.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
			<u>Additional Recommended Mitigation Measures</u> EFSEC has developed Draft State Waste Discharge Permit conditions for operation of the Cogeneration Facility. Permit conditions include discharge limitations, monitoring requirements, reporting and record keeping requirements, operation and maintenance plan for water quality treatment facilities, development of SPCC and hazardous waste management plans, and SWPP plan.
Wetlands			
Construction	- Construction of the project would disturb 35.52 acres of existing wetland areas, including 30.66 acres that would be permanently disturbed and 4.86 acres that would be temporarily disturbed. Affected wetlands would be located at the cogeneration facility site (Wetlands A, B1, B2, B3, C, and D), the refinery interface (Wetlands F, G, J, and H), and the transmission system. - Reduced wetland functions would include floodwater detention and retention, flood flow desynchronization, groundwater recharge and discharge, and water quality improvement.	Under the No Action Alternative, the project including proposed wetland mitigation, would not be constructed. Therefore no construction impacts or wetland enhancement would occur.	<u>Mitigation Proposed by the Applicant</u> - Mitigation measures consistent with those generally required by the Corps and Ecology for Category III wetlands within Western Washington would be implemented during construction to protect wetlands that would not be filled. Wetlands not disturbed would be protected using silt fencing and haybales. Wetlands temporarily disturbed and would be restored after the project construction is completed. - To compensate permanently disturbed wetlands the Applicant has designed a compensatory mitigation plan in consultation with state, and federal agencies. The proposed plan outlines the enhancement of 110 acres north of Grandview Road. - To minimize and control the spread of noxious weed species, all equipment would be cleaned before leaving the site.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Operation	Other than those communities affected by construction, operation of the project would not affect existing wetland systems.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the environment. The proposed wetland enhancement and the creation of new wetlands would not occur.	<u>Mitigation Proposed by the Applicant</u> A 10-year monitoring plan would be implemented to measure mitigation success.
Agricultural Land, Crops, and Livestock			
Construction	- The proposed project elements would result in the development or modification of land that Whatcom County has identified as Category I and II prime farmland soils and mapped as APO soils and Agricultural Open Space. - Reconstruction of Custer/ Intalco Transmission Line No. 2 would likely result in the conversion of some prime farmland to utility uses within the existing Bonneville Transmission Corridor. - Construction of the cogeneration facility, Access Road 1, and Laydown Areas 2 and 4 would result in a direct and permanent loss of approximately 2.6 acres of existing hybrid black cottonwood. - The proposed compensatory wetland mitigation plan would preclude the continued use of mitigation area CMA 1 for cattle grazing.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the construction environment.	<u>Mitigation Proposed by the Applicant</u> No mitigation measures for agricultural land, crops, and livestock are proposed.
Operation	Emissions from the cogeneration facility are expected to have a negligible effect on agricultural crops and livestock.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the operation environment.	No operational mitigation measures for agricultural land, crops, and livestock are proposed.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Upland Vegetation, Wildlife and Habitat, Fisheries, and Threatened and Endangered Species			
Construction	- Construction of the project would disturb up to 33.53 acres of existing upland vegetation, including: including grassland, shrubland, mixed coniferous/deciduous forest, coniferous forest, and deciduous forest. Potential additional clearing associated with the transmission lines have not been quantified at this time but will be incorporated into the Final EIS. - The primary effect from project construction would be removal and loss of habitat. Grassland and wetland communities are the primary habitats that would be cleared under the proposed alternative. Other habitats that would be cleared include shrubland, mixed coniferous/deciduous forest, coniferous forest, and deciduous forest. - Disturbances caused by construction on the site may affect wildlife in adjacent habitats by disrupting feeding and nesting activities. Increased noise levels created by heavy machinery could cause birds to abandon their nests and may temporarily displace wildlife during construction. - Proposed wetland enhancement and the creation of new wetlands associated with proposed wetland mitigation sites CMA 1 and CMA 2 would result in an increase in habitat quality, would benefit wildlife species that currently use the area, and would likely attract a more diverse assortment of wildlife species.	- Under the No Action Alternative, new facilities would not be constructed at the site, and impacts on upland vegetation, wildlife and habitat, fisheries, and threatened and endangered species associated with the proposed project would not occur. No impacts or construction would occur that would entail removal or alteration of existing habitat within the proposed project site. - The proposed wetland enhancement and the creation of new wetlands associated with proposed wetland mitigation sites CMA 1 and CMA 2 would not occur.	<u>Mitigation Proposed by the Applicant</u> - BMPs would be implemented to protect upland vegetation communities within the proposed project site that are not disturbed during construction. - Native vegetation, including seed mixes with native grasses, would be used to replace vegetation, particularly areas infested by weedy species. - A landscaping plan would be prepared and implemented that includes long-term weed control measures. - Plant native trees and shrubs parallel to the south side of Grandview Road, north of the cogeneration facility site and north of the laydown areas, to the west of Blaine Road. - Development of the stormwater control system would maintain water quality and fishery resources in Terrell Creek - Development and implementation of the SWPPPs would also protect water quality and fishery resources. - Mitigation requirements as conditions of permits or government approvals would be implemented. - Construction Laydown Area 4 would be restored following construction 1. - The Applicant would restore, rehabilitate and enhance wetlands north of Grandview Road, identified as mitigation sites CMA 1 and CMA 2.
Operation	- Some areas currently dominated by noxious weed species may be converted to landscaped areas that would require maintenance. The establishment of noxious weed species may occur within the proposed plant site. - Operation and maintenance associated with the transmission corridors would include removing or topping trees to maintain a safe distance between trees and electrical lines.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the environment.	<u>Additional Recommended Mitigation Measures</u> Implement weed control program approval by the Whatcom County Noxious Weed Control Board.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
	- Existing access and maintenance roads associated with transmission corridors would be maintained to prevent vegetation from growing in these areas. Vegetation that becomes established in disturbed areas such as unpaved roads are often nonnative invasive species. - Some wildlife habitat loss, noise, and disturbance could occur during maintenance activities within the transmission corridors. - Maintenance and operation activities associated with the transmission corridors could result in chemical spills that potentially could impact fish habitat.		- The primary mitigation measure applicable to the proposed project is to use best engineering practices and construct the transmission towers at the minimal height allowable with no guy wires or lighting to avoid impacts on birds. The transmission lines and tower design would be defined by the Bonneville interconnection agreement. - See also Air Quality, Water Resources, and Water Quality.
Energy and Natural Resources			
Construction	- Construction of the cogeneration facility would consume non-renewable resources, including: - 126,000 cubic yards of imported fill - 7,500 cubic yards of sand - 18,150 cubic yards of gravel - 25,200 cubic yards of concrete - 1,050 tons of steel - Construction of the cogeneration facility would consume electrical energy for lighting and heating in construction offices, temporary lighting at the facility, and powering various pieces of construction equipment. The estimated peak electrical demand during construction is approximately 2.5 MVA at 480 V. - Construction of the cogeneration facility would consume approximately 592,000 gallons of petroleum products, including diesel fuel and gasoline.	Under the No Action Alternative, the cogeneration facility would not be constructed and the consumption of energy or natural resources associated with construction of the project would not occur.	<u>Mitigation Proposed by the Applicant</u> - Conservation of energy and natural resources during construction would take place through the use of industry standard BMPs. These may include the use of energy-efficient lighting, lighting of only critical areas during non-working hours, encouraging car-pooling, efficient scheduling of construction crews, minimizing idling of construction equipment, recycling of used motor oils and hydraulic fluids, and implementation of signage to remind construction workers to conserve energy and other resources. <u>Additional Recommended Mitigation Measures</u> - Construction activities would be coordinated with energy and natural resource providers to ensure that other users in the area would not experience any service interruptions.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Operation	During operation, the cogeneration facility would: - Consume approximately 42.5 million MMBtu of natural gas per year. - The proposed project may exceed the transmission capacity of the Ferndale Pipeline during periods of peak demand. The Applicant estimates that up to approximately 40,000 decatherms per day of additional capacity may be needed. - Operation of the cogeneration facility would consume petroleum products, primarily lubricants associated with the operation of equipment and gas and diesel fuel for vehicles around the facility - The cogeneration facility would use various chemicals during operation to facilitate desired chemical reactions, control water quality, and for other facility operational purposes. - Transmission line maintenance would require relatively small quantities of fuel for vehicles and helicopters engaged in transmission line surveillance and monitoring, and electricity to maintain and operate equipment at Custer Substation. Transmission corridor road maintenance would require the use of crushed rock, gravel, and sand during the life of the project on an as-needed basis. Periodic replacement of conductor wires, ground wires, fiber optic cables, insulators, and structural elements may be required over time. - Generate a nominal 720 MW of electricity, of which, approximately 85 MW would be used by the BP Cherry Point Refinery, 21 MW would be used by the natural gas compression station and other cogeneration facility auxiliary systems, and 635 MW would be exported to the Northwest power grid for use by other customers. - Supply approximately 4,200 million pounds (MMlb) of steam per year to the refinery.	- Under the No Action Alternative, the project would not be constructed; therefore there would not be any construction impacts for this element of the environment. - Under the No Action Alternative, the Applicant would likely continue to meet the electrical power needs of the refinery with a combination of onsite electrical power generation and purchasing electrical power from other sources. The existing refinery boiler system would continue to be used to meet the refinery's steam demand. Under this alternative, the cogeneration facility would not generate and transmit electrical power for use on the Northwest power grid.	<u>Mitigation Proposed by the Applicant</u> - Boiler blowdown water would be routed to the cooling tower as make up water to reduce fresh water consumption. - Existing utility boilers would be taken out of service and replaced with more efficient cogeneration steam generation cycle, reducing the use of natural gas resources.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Noise			
Construction	- Noise produced during construction would vary depending on the construction phase underway. Maximum noise levels from most construction equipment could range from 69 to 106 decibels or dB(A) at 50 feet. - In addition to noise produced from onsite construction equipment, traffic volumes would increase as construction employees commute to and from work at the site. Additional transient noise would occur as a result of increased volumes of delivery and service vehicles (including trucks of various sizes) doing business at the site.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Proposed by Applicant</u> - To reduce construction noise, the construction industry's management practices would be incorporated into construction plans and contractor specifications. - Limiting noisier construction activities to the hours of 7 a.m. and 10 p.m. would reduce construction noise during sensitive nighttime hours. - Construction equipment would be equipped with adequate mufflers, intake silencers, or engine enclosures. <u>Additional Recommend Mitigation Measures</u> - Turn off construction equipment during prolonged periods of nonuse. - Require contractors to maintain all equipment. - Locate stationary equipment away from receiving properties.
Operation	Modeling results indicate that none of the receivers would experience a perceptible increase (above 3 dBA) in noise during the daytime or evening.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> - The cogeneration placement and design of the facility has integrated noise mitigation measures for sound reduction. - Stack silencers would be incorporated into the design of the HRSG. - The three gas turbine generators and the steam turbine generator will be housed within enclosures.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Land Use			
Construction	Construction of all project elements would entail the conversion of approximately 195 acres of land from predominantly undeveloped, vacant land to developed industrial uses. This acreage includes 110 acres of undeveloped and agricultural land north of Grandview Road that would be permanently altered to provide for wetland mitigation.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> No mitigation measures related to land use are proposed.
Operation	Construction and operation of the project would be consistent with Whatcom County Land Use Plans and generally consistent with the Whatcom County zoning code. The two transmission line elements would require County approval of conditional use and substantial development permits.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> No mitigation measures related to land use are proposed.
Visual Resources, Light, and Glare			
Construction	Visual impacts resulting from construction are expected to be low to moderate. Construction activities would be visible from Grandview Road, and farm buildings and residences located along Kickerville Road near the transmission system interconnection with Custer/Intalco Transmission Line No. 2. Clearing of the new transmission corridor and installation of transmission towers could be viewed temporarily while the transmission lines are under construction.	Under the No Action Alternative, the proposed project would not be constructed and existing views of the project site would be maintained. Views to the site could be altered when the hybrid poplar trees are harvested. Because the land is zoned for industrial uses, future industrial development on the project site would be likely to occur.	<u>Mitigation Measures Proposed by the Applicant</u> A Site Management Plan would be prepared and implemented to minimize overall visual impacts of construction activities.
Operation	- Once constructed, the project is expected to introduce low to moderate visual impacts in the immediate vicinity of the project site, depending on the viewer type and viewing distance. - There would be an occasional visible water droplet plume related to the operation of the cooling tower at the cogeneration facility. The visibility of the plume would depend on the ambient temperature and relative humidity.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any impacts for this element of the environment.	<u>Mitigation Proposed by the Applicant</u> - Project elements would be painted gray. This color is intended to reduce surface glare from direct sunlight. - The cogeneration facility located approximately 340 feet south of the centerline of Grandview Road, creating an opportunity to plant screening trees and shrubs.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
	- From the intersection of Blaine and Grandview roads, the proposed cogeneration facility would be moderately visible due to its close proximity to the road. - Under Option 1, there would be no visual impacts associated with the Custer Intalco Transmission Line No. 2. Under Option 2a, the use of larger steel lattice towers may result in a slight increase in effects over the existing towers near residences because of their greater height. Under Option 2b, the closer spacing of the steel monopole towers may reduce the visual effects of individual towers, but the decreased spacing would result in a greater number of towers and may offer a slightly greater interruption of views.		Project site lighting would be designed to minimize light spillover and glare.
Population, Housing, and Economics			
Construction	- During construction monthly employment on site would average 372 people, with peak employment of 706 individuals. - The indirect workforce associated with the construction stage of the project would be approximately 210 people - Including relocated employees from indirect labor, relocation could be as high as 180 workers - Tax revenue from construction of the project would accrue to Whatcom County and Washington State, from the following sources: - sales/use tax on equipment: \$22.8 million. - sales/use tax on construction services and materials: \$4.9 million.	Under the No Action Alternative, the cogeneration facility would not be constructed. No additional employment or tax revenues would be created, and no workers would relocate to the project area.	<u>Mitigation Measures Proposed by the Applicant</u> No mitigation measures are proposed.
Operation	- Operation of the cogeneration facility would create approximately 30 full time jobs, and approximately \$200,000 per year worth of temporary positions. - Operation of the cogeneration facility would generate Washington State brokerage tax revenues of between \$4.5 and \$5.3 million annually. - Operation of the facility would generate approximately \$6 million in property tax revenues annually	Under the No Action Alternative, the project would not be constructed; therefore there would not be any impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> No operational mitigation measures are proposed.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
	During operation, the cogeneration facility would also pay business and occupation (B&O) and public utility tax to the state of Washington. The total tax paid would likely be on the order of several million dollars per year.		
Public Services and Utilities			
Construction	- Construction traffic associated with the project could affect the use of recreational facilities near the project site. Such effects however would be relatively short term, and would not be likely to significantly affect the public's ability to use these facilities. - It is possible that families choosing to reside within the boundaries of the Blaine School District could add a relatively small number of students to that district's enrollment, which is currently at capacity, however individual family decisions regarding where to reside would determine which schools students in those families would be eligible to attend.	Under the No Action Alternative, the project would not be constructed, therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> The Applicant would develop response protocols with the Jurisdiction Having Authority, Fire District #7, to ensure that additional support and resources are available from the district and other fire jurisdictions through the District Mutual Aid Agreements.
Operation	- Operation of the cogeneration facility is projected to create 30 new jobs. It is possible that some families who choose to relocate and reside within the boundaries of the Blaine School District could add a relatively small number of students to that district's enrollment, which is currently at capacity. - The Applicant proposes to provide its own security, emergency medical, and fire response infrastructure. It is anticipated that only in an emergency, would local community fire, police, medical services, and other government resources be called upon to help respond to an event at the facility.	- Under the No Action Alternative, the project would not be constructed, therefore there would not be any construction impacts for this element of the environment. - Tax revenue associated with construction and operation of the project would not be realized by the state of Washington and Whatcom County.	<u>Mitigation Measures Proposed by the Applicant</u> No mitigation is proposed.
Cultural Resources			
Construction	The Lummi Indian Nation's second native plant survey has not been completed and the results of this study and its associated archaeological survey may identify important resources or sites in the various project facility areas.	Under the No Action Alternative, the project would not be constructed; therefore there would not be any construction impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> Monitor construction activities would occur within 100 feet of the boundaries of the recorded archaeological site discovered in Laydown Area 3.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
	- One recorded archaeological site in laydown area 3 in the refinery interface area appears to be insignificant and therefore would not be adversely affected by project construction. - Archaeological surveys have not been conducted for the following project facilities, therefore impacts to cultural resources in these areas are not known: various components in the refinery interface area; 0.8-mile long Bonneville transmission line; Alcoa water pipeline; Access Road 1 area; and the wetland mitigation area.		- A pedestrian survey is planned for the wetland mitigation areas where the ground would be disked to control reed canary grass. <u>Additional Recommended Mitigation</u> - If intact archaeological resources or human burials were encountered during construction, activities that could further disturb the deposits would be directed away from the find. The Washington State Archaeologist and Lummi Indian Nation cultural resource staff would be contacted. - An archaeological survey should be conducted in areas not previously surveyed. If no significant archaeological resources are discovered, construction activities would not affect cultural resources. If significant resource were found that could be impacted by the project, it is recommended that appropriate mitigation measures be devised before construction begins.
Operation	Operation of the project would not result in adverse impacts on cultural resources at any of the project components.	Under the No Action Alternative, the project would not be constructed; therefore there would not be any operation impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> No operational mitigation measures are proposed.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Transportation			
Construction	- Construction of the proposed project would generate 650-1200 average weekday trips during the 25-month construction period. - During construction, some onsite soil would be removed and disposed of at approved sites. Various quantities of fill, including sand and gravel, would also be imported to the site. In addition, construction materials would be brought to the site that would include concrete, sheet and metal piping. Assuming trucks with a 20-cubic-yard capacity, this would result in 7,583 one-way truck trips. - The SR 548/Portal Way intersection would operate at Level of Service (LOS) F during the PM peak hour during peak construction conditions without any mitigation.	Under the No Action Alternative, traffic volumes in the area would be expected to increase at approximately a 5% per year. Intersections on SR 548 would continue to operate at LOS B or C. The only exception is the SR 548/Portal Way intersection, which would operate at LOS D, which is considered acceptable by WSDOT.	<u>Mitigation Measures Proposed by the Applicant</u> - A Traffic Control Plan would be developed and implemented to ensure safe travel conditions within the Grandview Road and SR 548 rights-of-way. - A responsible person would be designated as the Transportation Coordinator. - The Transportation Coordinator would serve as the point of contact for county and state agencies. - Preferential parking for carpools and vanpools would be established at the site during construction, where practical. - Shift hours would be staggered or adjusted as appropriate to minimize traffic impacts. <u>Additional Recommended Mitigation Measures</u> - All mitigation measures should be carried out by the Applicant to maintain a positive and safe traffic flow. These could be formulated into a Transportation Management Program that would be applicable during both construction and operation of the proposed project. - The Applicant would keep and maintain county roads and SR 548 free of any debris or hazardous material related to the project. Any spilled material would be cleaned up. - A traffic signal would be installed at the intersection of Grandview Road (SR 548)/Portal Way.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
Operation	- Operation of the cogeneration facility would generate approximately 140 weekday trips - The level of service at the SR 548/Portal Way intersection would decrease to LOS D, but delays would be low, and no substantial traffic queuing or congestion is expected.	Under the No Action Alternative, the project would not be constructed; therefore there would not be any impacts for this element of the environment.	<u>Mitigation Measures Proposed by the Applicant</u> - An eastbound and a westbound left-turn lane would be installed on SR 548 at the Blaine Road intersection. - An access road would be located approximately 1,000 feet east of Blaine Road. The access road would be constructed and paved to meet applicable geometric and safety standards. <u>Additional Recommended Mitigation Measures</u> - Intersection improvements to accompany traffic signalization should be investigated at the Portal Way/Grandview Road (SR 548) and Blaine Road/Grandview Road (SR 548) intersections. Traffic signalization may warrant changes to intersection operation such as left- or right-turn lanes.
Health and Safety			
Construction	Potential health and safety risks present during construction are generally typical of the risks present on major industrial/commercial construction site. Health and safety concerns include the risk of fire and explosion, chemical storage and handling, spill response, collection, storage and disposal of hazardous wastes, the installation of transmission lines, sanitary waste handling, the presence of natural gas, and worker exposure to radiation.	The Ferndale natural gas pipeline and the BP Cherry Point Refinery have been adjacent to the project site for decades. If the proposed project were not constructed, the worker and public health and safety risks related to the use, storage, collection and treatment of non-hazardous and hazardous chemicals at the refinery would still exist. Under the no action alternative, there would be no additional health and safety risks related to the construction and operation of the proposed project.	<u>Measures Proposed by Applicant</u> - Prior to construction the Applicant would require the engineering, procurement, and construction contractor to prepare an Environmental Health and Safety Program designed to reduce the potential impacts related to risks of fire and explosion, spills, hazardous or toxic materials management and handling. Individual plans to be prepared include: - Fire Prevention and Response Plan, - Medical Emergency Plan, - Spill Prevention Plan , - Hazardous Construction Material Management Plan, and - Explosion Risk Management Plan. - As appropriate, the Applicant's existing health and safety resources may augment the EPC contractor's first aid, fire response, and security personnel.

Table 1-2: Continued

Element of the Environment	Impacts of the Proposal	Impacts of No Action	Measures to Mitigate Impacts
			The EPC contractor would coordinate with the Refinery Fire Marshal and the Whatcom County Fire Department during construction of the proposed project.
Operation	The potential risks present during operation, maintenance and standby of the proposed project are similar to those present during construction. Types of accidents that could occur that would pose a health and safety risk to individuals at the cogeneration facility, the BP refinery, or in the project vicinity include: the release of anhydrous ammonia, a natural gas explosion or fire, and the release/spill of a hazardous chemical(s).	The Ferndale pipeline and the BP Cherry Point Refinery have been adjacent to the project site for decades. If the proposed project were not constructed, the worker and public health and safety risks related to the use, storage, collection and treatment of non-hazardous and hazardous chemicals at the refinery would still exist. Under the no action alternative, there would be no additional health and safety risks related to the construction and operation of the proposed project.	<u>Mitigation Measures Proposed by Applicant</u> - Plans, procedures, and protocols for managing worker and public health and safety would be developed. These may include: - Safety and Health Manual - Emergency Preparedness Response Plan, and - Fire Emergency Response Operations (FERO) Plan - In addition to the plans, procedures, and protocols listed above, the following plan would be prepared to protect worker and public health and safety during the operation of the proposed project: - Fire Prevention and Response Plan, - Spill Prevention Plan, - Hazardous Waste Management Plan, - Prevention of Natural Gas Plan, and - Explosion Risk Management Plan

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The Applicant proposes to construct and operate a nominal 720-MW, natural-gas-fired, combined-cycle cogeneration facility adjacent to the existing BP Cherry Point Refinery in Whatcom County, Washington. The cogeneration facility would provide steam and electricity to meet the operating needs of the refinery and produce electrical power for local and regional consumption.

The Washington State Energy Facility Site Evaluation Council (EFSEC) has jurisdiction over the evaluation of major energy facilities including the proposed project and as such will recommend approval or denial of the proposed cogeneration facility to the governor of Washington after an environmental review.

All project components within the proposed cogeneration facility boundary, including the facility's primary access road (Access Road 1), are considered the "principal facility" and would be under EFSEC jurisdiction during project construction and operation. In addition, the proposed wetland mitigation sites and restoration areas would be under EFSEC jurisdiction for the life of the project.

Other facilities and equipment would be required to interconnect the cogeneration facility to the refinery for exchange of steam and steam condensate (e.g., piping and piperacks) or to connect the cogeneration facility with existing utility infrastructure (i.e., natural gas, industrial water supply, and electrical transmission lines). These connections would be made by modifying existing facilities or constructing new facilities on property that would not be under EFSEC jurisdiction. Such facilities, equipment, and property are referred to as "ancillary facilities."

For the purposes of this EIS, all principal and ancillary facility locations, temporary construction laydown areas, and wetland mitigation and restoration areas are collectively referred to as the project site.

2.2 DESCRIPTION OF PROPOSED ACTION

2.2.1 Project Location

The proposed cogeneration facility would be located near Ferndale and Blaine in northwestern Whatcom County, Washington (see Figure 1-1). The cogeneration facility would be sited at the eastern edge of the BP Cherry Point Refinery between Grandview and Brown roads. The project site is approximately 6 miles northwest of Ferndale, 7 miles southeast of Blaine, and 15 miles northwest of Bellingham. The nearest community is Birch Bay, approximately 2 miles northwest of the site. The Canadian border is approximately 8 miles north of the proposed site.

The cogeneration facility and associated systems and components that interface with the refinery, including new natural gas and water supply connections, stormwater detention and treatment facilities, construction laydown areas, and wetland mitigation sites, would be located on

Applicant-owned property. The project site is within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone as defined in the Whatcom County Comprehensive Plan. The cogeneration facility would occupy approximately 33 acres of unimproved land, which is zoned Heavy Impact Industrial. Proposed construction laydown areas would include an additional 36 acres of land. Wetland mitigation sites proposed for the project north of Grandview Road would occupy approximately 110 acres.

The land surrounding the cogeneration facility site is relatively flat and owned by the Applicant for at least 0.5 mile in all directions. The closest residence is about 0.75 mile east of the site. Prior to construction of the refinery in 1969, the surrounding land was used for agriculture. Vegetation in the area mainly consists of grasses with areas of hybrid poplar trees that the Applicant planted between 1989 and 1991. The only relatively mature forests near the project site are small patches in the vicinity of the cogeneration facility site that developed from abandoned homesteads and riparian areas along Terrell Creek. The Applicant owns the land north of the refinery site and the cogeneration facility and uses it for habitat enhancement and as a visual buffer for industrial operations. Some portions of Applicant-owned land in the area are leased to local farmers for livestock grazing and hay production. Terrell Creek is about 0.5 mile north of the proposed cogeneration facility site within the Applicant's habitat enhancement area. Other industrial sites near the proposed project site include the Chemco wood treatment facility (located about 0.75 mile east), the Praxair industrial gas plant (located 0.5 mile south), and the Puget Sound Energy peaking power plant (located 1 mile west) (see Figure 2-2).

The new 230-kV electrical transmission line that would connect the cogeneration facility with the Bonneville transmission system also would be constructed on Applicant-owned land between the cogeneration facility site and Bonneville's Custer/Intalco Transmission Line No. 2 approximately 0.8 mile to the east. The new transmission line would require a 150-foot utility right-of-way (ROW) encompassing approximately 15 acres.

Bonneville has determined that modifications to the existing Custer/Intalco Transmission Line No. 2 would be required to allow the proposed project to connect to the existing power transmission system. The project portion of the transmission line is located within an existing 125-foot Bonneville transmission ROW, which extends for approximately 5 miles through predominantly agricultural lands, and covers approximately 70 acres (see Appendix B for a map and description of the existing corridor).

Figure 2-3 shows the infrastructure necessary to support the cogeneration facility. The Whatcom County Public Utility District No. 1 (PUD) would supply industrial water to the facility. The electrical transmission towers and corridor from the cogeneration facility to the Bonneville electrical transmission system would be on Applicant-owned land.

Natural gas would be supplied to the cogeneration facility from either the Arco Western Natural Gas Pipeline (Ferndale pipeline) or the Cascade Natural Gas Pipeline, both of which run through Applicant-owned land. The onsite stormwater detention pond would be within the boundary of the cogeneration facility. Sanitary wastewater would be sent to the Birch Bay Wastewater Treatment Plant for treatment and discharge to the Strait of Georgia.

Figure 2-1:

Figure 2-2: Project Site and Surrounding Area

Figure 2-3: Existing Utility Infrastructure

The Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone is approximately 6,500 acres, of which approximately 2,500 acres is currently occupied by heavy impact industries. Land use and zoning maps of western Whatcom County and of the Cherry Point subarea from the Whatcom County Comprehensive Plan are presented in Section 3.10 Land Use. The northern boundary of the proposed cogeneration facility would be 337 feet south of the centerline of Grandview Road. This setback provides space for landscaping and a buffer from the existing gas pipeline easements that are 100 feet south of the centerline of Grandview Road.

2.2.2 Project Facilities

The proposed project includes a cogeneration facility and related components that would be located on an approximately 265-acre site. The cogeneration facility would be designed, constructed, and operated as a stand-alone plant that would have a number of systems integrated with the facilities and operations of the BP Cherry Point Refinery, including electrical power, steam and condensate systems, potable water, and industrial and sanitary wastewater (see Figure 1-3).

In this EIS, individual systems and/or components of the proposed project have been grouped into five major project elements to facilitate the analysis and discussion of potential environmental impacts associated with the proposal. The five major elements are defined below. The components of each element are briefly described in Table 2-1. A more detailed description of these facilities is provided in the text that follows.

Project facilities that would be constructed or installed within the boundary of the cogeneration plant are collectively referred to as “cogeneration facility,” and include:

- A steam turbine generator (STG);
- Three combustion gas turbine generators (CGTs);
- Three heat recovery steam generators (HRSGs);
- Three HRSG exhaust stacks;
- Three 150 million volt amp (MVA) step-down transformers;
- An emergency diesel generator;
- An evaporative cooling tower;
- A variety of holding, storage, and transfer tanks and sumps (see Table 2-2);
- Stormwater collection, detention, and treatment facilities;
- An administration, control, and warehouse building complex;
- Perimeter security fence and gates; and
- A primary access road (Access Road 1).

Project facilities that would be constructed or installed in the BP Cherry Point Refinery to support integration and operation of the cogeneration facility are referred to as the “refinery interface,” and include the following:

- Steam and condensate system connections and associated piping;
- Natural gas supply connection and associated piping;
- Natural gas compressor station;

- Industrial water supply connection and associated piping;
- Potable water supply connection and associated piping;
- Industrial wastewater connection and associated piping;
- Sanitary wastewater connection and associated piping;
- Elevated piperack to support pipes that connect the two facilities;
- An intermediate voltage (69 kV or 115 kV) electrical distribution substation;
- Six electrical distribution transformers;
- Stormwater collection, detention, and treatment facilities;
- Construction Laydown Areas 1, 2, and 3; and
- A connecting east-west access road (Access Road 2).

A new 230-kV double-circuit electrical distribution line would be installed to connect the cogeneration facility with the existing Bonneville transmission system approximately 0.8 mile to the east. Throughout the EIS, this line is referred to as the “transmission system.”

Bonneville has determined that modifications to the Custer/Intalco portion of the existing Bonneville transmission system would be required to accommodate connection of the cogeneration facility. Two options have been identified to provide the required modifications. Option 1 is a Remedial Action Scheme (RAS). A RAS would install additional electrical equipment within the Custer and Intalco substations, and would require an operating agreement among the Applicant, Alcoa Intalco Works, and Bonneville for load-reduction protocols under certain conditions. Option 2 is to reconstruct the Custer/Intalco Transmission Line No. 2 between the Custer substation and the point of interconnection with the transmission system, a distance of approximately 5 miles. Reconstruction of the transmission line would involve installation of a second transmission line and replacement of existing towers for this portion of the corridor. Existing single-circuit towers would be replaced with either double-circuit steel lattice towers (Option 2a) or double-circuit steel monopole towers (Option 2b). For purposes of this EIS, the element of the project dealing with this modification is referred to as “Custer/Intalco Transmission Line No. 2.”

Other elements of the project that would be constructed or installed in other locations as part of the project are referred to as “other project components,” and include:

- Water supply connections, equipment, and piping at Alcoa Intalco Works;
- Laydown Area 4 (located at the northeast corner of the cogeneration facility site);
- Compensatory Mitigation Area (CMA) 1 and 2 (immediately north of Grandview Road); and
- A southern access road (Access Road 3) at the cogeneration facility.

Cogeneration Facility

The cogeneration facility would occupy approximately 33 acres immediately east of the BP Cherry Point Refinery. The combined-cycle cogeneration (steam and electricity) facility would produce a nominal 720 MW of power and export steam and electricity to the refinery.

Table 2-1: BP Cherry Point Cogeneration Project Components

Component	Component Description	Construction Responsibility ¹	Owner/Operator	Permits and Approvals
Cogeneration Facility				
Power Generation Block	Includes one STG, three CGTs, three HRSGs, and associated emission stacks, evaporative cooling tower, and administration building complex.	Applicant	Applicant	EFSEC Corps
230-kV Electrical Switchyard	Located at the east end of the cogeneration facility, it serves as the generation/transmission interface point.	Applicant	Ownership subject to terms of a Bonneville interconnection agreement. Applicant would own underlying land.	EFSEC Corps Bonneville
Stormwater Facilities	Includes stormwater detention pond 1 and associated oil-water separation system and drainage ditch system.	Applicant	Applicant	EFSEC Corps
Emergency Generator	Approximately 1,500-kW diesel generator.	Applicant	Applicant	EFSEC Corps
Electrical Distribution and Control Systems	Includes power distribution centers, switchgear, and associated metering and control systems for 480V and 4160V systems, and universal power supply and 125V backup systems.	Applicant	Applicant	EFSEC Corps
Fire Protection Systems	Includes a perimeter fire suppression water loop, detection, and alarm system, and an approximately 265-hp diesel-powered emergency water pump for fire suppression.	Applicant	Applicant	EFSEC Corps
Cogeneration Facility Roads and Parking Areas	Includes a permanent perimeter road, branch roads to access facility components, and parking area at administration building complex.	Applicant	Applicant	EFSEC Corps
Physical Site Security	Includes an 8-foot-high perimeter fence, automatic and manual gates, and personnel access controls.	Applicant	Applicant	EFSEC Corps
Other Systems and Equipment	Includes continuous emissions monitoring system, auxiliary closed cooling water system, and a distributed control system.	Applicant	Applicant	EFSEC Corps
Primary Access Road 1	Access Road 1, the northern access road and primary entrance, would be approximately 400 feet long and constructed from Grandview Road.	Applicant	Applicant	EFSEC

¹ “at fence line” indicates the refinery is responsible for the elements within its fence line, and the cogeneration facility is responsible for elements within its fence line.

Table 2-1: Continued

Component	Component Description	Construction Responsibility ¹	Owner/Operator	Permits and Approvals
Refinery Interface				
Water Supply Connection and Piping	The PUD delivers water to the refinery via an existing 24-inch underground pipeline along Aldergrove Road. New 16-inch piping (location to be determined) would be installed at one of the existing but unused flanges on the 24-inch pipeline.	Applicant or Whatcom PUD – to be determined	Applicant or Whatcom PUD – to be determined	EFSEC if Applicant constructs and operates
Natural Gas Connection and Pipes	A new connection and natural gas pipes would be installed at the existing metering station for the Ferndale pipeline to support both cogeneration and refinery operations. The new pipes would be routed underground from the metering station to the new compressor station approximately 300 feet west. A connection from the compressor station to the refinery would be made with approximately 300 feet of new piping routed back under Blaine Road to connect with existing piping at the metering station. The connection from the compressor station to the cogeneration facility would be via new piping routed along the elevated piperack.	Applicant, Refinery, or Ferndale pipeline – to be determined, at fence line	Applicant, Refinery, or Ferndale pipeline – to be determined, at fence line	EFSEC if Applicant constructs and operates as part of the cogeneration facility - County, Ecology, and/or Northwest Air Pollution Authority otherwise. Any components on the cogeneration facility site would be regulated by EFSEC.
Natural Gas Compressor Station	A new compressor station would be installed within the refinery approximately 450 feet west of the cogeneration facility, and would include three electrically driven natural gas compressors enclosed in a single building.	Applicant, Refinery, or Ferndale pipeline – to be determined	Applicant, Refinery, or Ferndale pipeline – to be determined	EFSEC if Applicant constructs and operates as part of the cogeneration facility - County, Ecology, and/or Northwest Air Pollution Authority otherwise.
Ferndale Pipeline Metering Station Modifications	The existing Ferndale pipeline metering station located between the refinery and the cogeneration facility would require some modifications to accommodate metering for the cogeneration project and to reconnect the natural gas pipeline to Alcoa Intalco Works.	Ferndale pipeline	Ferndale pipeline	Whatcom County

1 “at fence line” indicates the refinery is responsible for the elements within its fence line, and the cogeneration facility is responsible for elements within its fence line.

Table 2-1: Continued

Component	Component Description	Construction Responsibility ¹	Owner/Operator	Permits and Approvals
Intermediate Voltage (69 kV) Substation and Associated Power Lines	A new intermediate voltage (69 kV or 115 kV) substation would be installed within the refinery approximately 500 feet west of the cogeneration facility to facilitate power distribution. The substation would be connected to the 230-kV switchyard in the cogeneration facility and three existing substations elsewhere in the refinery via new overhead or underground power lines.	Applicant or Refinery	Refinery	EFSEC if Applicant constructs and substation remains part of the cogeneration facility
Modifications to Refinery Substations MS 1, MS 2, and MS 3	New distribution transformers would be installed at existing refinery Substations MS 1, MS 2, and MS 3.	Refinery	Refinery	
Steam and Condensate Systems	New steam and condensate system piping would be installed between the cogeneration facility and the refinery. Steam and condensate pipes would be routed above ground between the two facilities along the elevated piperack. The location and route of piping within the refinery are to be determined.	Applicant, Refinery, at fence line	Applicant, Refinery, at fence line	EFSEC for cogeneration facility to fence line
Elevated Piperack	A new elevated piperack would be constructed between the cogeneration facility and the refinery to support steam, condensate, and natural gas pipes between the two facilities. The piperack would be approximately 3,000-3,500 feet long.	Applicant, Refinery, at fence line	Applicant, Refinery, at fence line	EFSEC for cogeneration facility to fence line
Laydown Areas 1, 2, and 3	These laydown areas would be located within the refinery. Areas 1 and 3 and the southern portion of Area 2 would be permanently converted to industrial uses. The northern 273 feet of Area 2 would be restored upon completion of project construction.	Applicant	Refinery	The portion of Laydown Area 2 to be restored after construction would remain under EFSEC jurisdiction.
Potable Water Pipeline	The PUD supplies potable water to the refinery. New potable water piping (location to be determined) between the refinery and the cogeneration facility would deliver potable water to the cogeneration facility. The Applicant anticipates that the pipe would be routed along Access Road 2.	Applicant, Refinery, at fence line	Applicant, Refinery, at fence line	EFSEC for cogeneration facility to fence line
1 "at fence line" indicates the refinery is responsible for the elements within its fence line, and the cogeneration facility is responsible for elements within its fence line.				

Table 2-1: Continued

Component	Component Description	Construction Responsibility ¹	Owner/Operator	Permits and Approvals
Industrial Wastewater Pipeline	Cogeneration facility industrial wastewater would be conveyed to the refinery for treatment via new piping (location to be determined) to be constructed between the refinery and the cogeneration facility. The Applicant anticipates that the pipe would be routed along Access Road 2.	Applicant, Refinery, at fence line	Applicant, Refinery, at fence line	EFSEC for cogeneration facility to fence line
Sanitary Wastewater Pipeline	Cogeneration facility sanitary wastewater would be conveyed to the refinery's sanitary wastewater system via new piping (location to be determined) to be constructed between the refinery and the cogeneration facility. The Applicant anticipates that the pipe would be routed along Access Road 2.	Applicant, Refinery, at fence line	Applicant, Refinery, at fence line	EFSEC for cogeneration facility to fence line
Stormwater Detention and Treatment Facilities	Includes stormwater detention pond 2 (170 feet by 150 feet by 6 feet), associated oil/water separation facilities, perimeter access road, and Ditch C-4 (approximately 1,500 feet long).	Applicant	Refinery	Construction: EFSEC Operation: County/Ecology
Access Road 2	Access Road 2, an east-west access road, would be constructed between Blaine Road and the western edge of the cogeneration facility; it would be 24 feet wide and approximately 300 feet long.	Applicant	Refinery	Construction: EFSEC Operation: County/state agencies
Transmission System				
230-kV Double-Circuit Transmission Line	A new 230-kV double-circuit transmission line would be installed between the cogeneration facility switchyard and existing Custer/Intalco Transmission Line No. 2. The new transmission line, which would be approximately 0.8-mile long, would require four lattice-style towers and one monopole-style tower.	Applicant	Ownership subject to terms of a Bonneville interconnection agreement. Refinery would own underlying land.	Bonneville
Custer/Intalco Transmission Line No. 2				
Option 1: Remedial Action Scheme	A RAS would involve the installation of new breakers and other electrical equipment and wiring at the Custer and Intalco substations. Agreement among Alcoa Intalco Works, the Applicant, and Bonneville would be required.	Bonneville	Bonneville	Bonneville
1	“at fence line” indicates the refinery is responsible for the elements within its fence line, and the cogeneration facility is responsible for elements within its fence line.			

Table 2-1: Continued

Component	Component Description	Construction Responsibility ¹	Owner/Operator	Permits and Approvals
Option 2: Reconstruct Transmission Line	Option 2 would reconstruct an existing Bonneville transmission line between the Custer substation and the cogeneration facility interconnection point (approximately 5 miles in length). The existing single-circuit line with lattice steel towers would be replaced with a double-circuit line using either lattice steel or monopole towers.	Bonneville	Bonneville	Bonneville
Other Project Components				
Industrial Water Supply Pipeline and Modifications at Alcoa Intalco Works	New piping would connect the Alcoa Intalco Works air compressor building with a new sump or wet well (10 feet by 40 feet by 10 feet deep) on the south side of the Alcoa facility. An enclosure (12 feet by 20 feet) containing three 150-hp electric pumps would be constructed and connected to the PUD control system. A new 16-inch pipe approximately 1,600 feet long (location to be determined, presumably within the Alcoa facility) would connect the wet well to an existing PUD water line.	Whatcom PUD	Whatcom PUD	Whatcom County
Access Road 3	Access Road 3, a permanent road, would provide access to the cogeneration facility from the south, and would be constructed between the facility and Brown Road by widening and extending the existing transmission corridor's maintenance road south of the site. The road would be 30 feet wide and approximately 1,500 feet long.	Applicant	Refinery	Construction: EFSEC Operation: County/other state agencies
Compensatory Wetland Mitigation Areas	CMA 1 and CMA 2 (approximately 110 acres total) would be located north of the cogeneration facility on each side of Blaine Road immediately north of Grandview Road.	Applicant	Applicant	EFSEC
Laydown Area 4 and Wetlands Mitigation	This temporary laydown area would be located at the northeast corner of the cogeneration facility. This area would be restored upon completion of construction.	Applicant	Applicant	EFSEC

1 "at fence line" indicates the refinery is responsible for the elements within its fence line, and the cogeneration facility is responsible for elements within its fence line.

Table 2-2: Cogeneration Facility Tanks and Sumps

Service/Purpose	Tank Type	Working Capacity (gallons)	Diameter (feet)	Height (feet)	Secondary Containment
Anhydrous Ammonia Storage Tank - Store liquefied ammonia for use in selective catalytic reduction air pollution control system	Horizontal, cylindrical pressure vessel	12,000	7	45	Concrete Wall
Boiler Feedwater and Condensate Storage Tank - Storage for boiler feedwater (BFW) and condensate returned from the refinery before polishing treatment in demineralizer system	Vertical, cylindrical, atmospheric aboveground tank	500,000	52	32	--
Demineralized Water Storage Tank - Provide makeup BFW in case water delivery or treatment is temporarily interrupted	Vertical, cylindrical, atmospheric above ground tank (open vented)	100,000	--	--	--
Neutralization Tanks - Collect demineralizer regeneration wastes to adjust pH as necessary for discharge to refinery's biological wastewater treatment system	Vertical, cylindrical, atmospheric aboveground tank (open vented)	50,000 ea; 100,000 total	16	34	--
Fire Suppression Water Pump - Diesel Fuel Storage Tank	Horizontal tank	Approx. 460	4	5	Curbed Area
Diesel Generator - Diesel Fuel Storage Tank	Vertical tank	Approx. 1,500	6	8	Curbed Area
Steam Turbine - Lube Oil Storage Tank	Rectangular tank	Approx. 7,200	24L by 12W	7	Curbed Area
Three Combustion Turbines - Lube Oil Storage Tanks	Rectangular tank	Approx. 6,200	28L by 10W	4.0	Curbed Area
Oxygen Scavenger Tank - Storage for BFW treating chemical	Vertical, cylindrical, atmospheric	1,000	5'-2"	7'-4"	Curbed Area
Neutralizing Amine Tank - Storage for BFW treating chemical	Vertical, cylindrical, atmospheric	1,000	5'-2"	7'-4"	Curbed Area
Phosphate Tank - Storage for BFW treating chemical	Vertical, cylindrical, atmospheric	500	4	6'-3"	Curbed Area
Acid Storage Tanks - Storage for demineralizer cation; regeneration and cooling tower circulating water treatment	Horizontal, cylindrical, atmospheric	8,000 ea 16,000 total	9	12'-6" S/S	Concrete Wall
Caustic Storage Tank - Storage for demineralizer anion; regeneration	Horizontal, cylindrical, atmospheric	8,000	9	12'-6" S/S	Concrete Wall
Blowdown Sump - Gravity drain collection point for HRSG boiler blowdown drain, pumped from sump to neutralization tank	Below ground, concrete sump	5,865	14L by 8W	7	--
Oily Water Sump (G'TG and STG Area) - Collection point for potential oily runoff from wash water and precipitation, pumped to refinery treatment system	Below ground, concrete sump	5865	14L by 8W	7	--
Wastewater Equalization Tank	Vertical, cylindrical, atmospheric aboveground tank (open vented)	400,000	52	26	--
Sodium Hypochlorite - 15% solution for cooling tower circulating water treatment	Vertical, cylindrical, atmospheric aboveground tank (open vented)	8,000	9	12'-6"	Curbed Area
Filtered Water and Firewater Storage Tank	Vertical, cylindrical, atmospheric aboveground tank	425,000	43	40	--
CGT Wash Water Sump - Temporary storage of used wash water from periodic offline CGT cleaning	Below ground, concrete sump	5,865	14L by 8W	7	--

Source: BP 2002, Appendix D

Major Structures

Major structures at the cogeneration facility would include the STG enclosure; the administration, control, and warehouse/maintenance building; the water treatment building; and the switchgear building. The STG enclosure would house the STG, the condenser pumps, and other equipment associated with the STG; it would be approximately 190 feet by 90 feet by 50 feet tall.

The major buildings would be single-story metal buildings built on concrete slabs at grade. The administration, control, and warehouse/maintenance building would be approximately 220 feet by 65 feet. The water treatment building would be approximately 35 feet by 80 feet, and the switchgear building would be approximately 70 feet by 50 feet (BP 2002; Torpey, pers. comm., 2003).

Major outdoor equipment includes the cooling tower, the HRSGs, the CGTs, and the 230-kV electrical switchyard. The cooling tower would be approximately 110 feet by 330 feet by 60 feet tall and would be used to remove heat by circulating water to the condenser downstream of the steam turbine. Each of the three HRSGs would be approximately 110 feet by 30 feet by 95 feet tall with a 150-foot-tall exhaust stack.

Power Plant Processes

Electrical Power Generation

The power generation portion of the facility (power plant) would be configured with three 205-MVA natural-gas-fired CGTs, three HRSGs, and a single 243-MW STG. Thermal energy produced through the combustion of natural gas would be converted into mechanical energy in each CGT to drive an electric generator. Hot combustion gases from the CGTs would enter the HRSGs, which would transfer heat from the CGT exhaust gases to condensate and boiler feedwater to produce steam. Steam from the HRSGs would enter the STG, where it would expand and drive the steam turbine and its electric generator.

Electricity generated by the CGTs and STG would be transmitted to the 230-kV switchyard located on the east side of the cogeneration facility for further transmission to the refinery and the Bonneville transmission system. Major equipment within the 230-kV switchyard would consist of 230-kV breakers and associated controls, two outgoing circuits to the Bonneville transmission system, and three step-down transformers with overhead lines or cables to a new intermediate voltage substation to be constructed in the refinery.

Steam, Condensate, and Boiler Feedwater Systems

Systems within the Cogeneration Facility. The HRSGs would transfer heat from the CGT exhaust gases to condensate and boiler feedwater to produce high-pressure, intermediate-pressure, and low-pressure steam. The steam produced by the HRSGs would flow to the STG, where process steam would be extracted from the steam turbine and conditioned before it is exported to the refinery. Each HRSG would be equipped with duct burners for supplementary

firing with natural gas. The duct burners would reheat the CGT exhaust gases to generate additional steam at times when additional electricity and/or process steam would be needed.

A selective catalytic reduction (SCR) emission control system would be integrated within each HRSG. The mechanical components of the system would include a catalyst bed and an ammonia storage and distribution system. Other than the replacement of spent catalyst every three to five years, the emission control system would produce no solid or liquid waste products. See Section 3.2 Air Quality for additional discussion of the cogeneration facility's emission controls. Each HRSG would have a 150-foot-tall exhaust stack.

Integration with the Refinery. The cogeneration facility would supply the refinery with steam required for refinery operations. During typical operation, steam would be provided at a flow rate of 510 thousand pounds per hour (kpph) and a pressure of 650 pounds per square inch absolute (psia). In return, the cogeneration facility would receive approximately 459 kpph of water that has been condensed from the steam after use (condensate) from the refinery (approximately 90% of the steam supplied). This stream is actually a mix of demineralized water and condensate that comes from the refinery. Steam from the cogeneration facility to the refinery and condensate from the refinery to the cogeneration facility would be transmitted through a piping system mounted on an aboveground rack that would be constructed south of the new east-west access road between the cogeneration facility and the refinery.

Cooling System

Exhaust from the steam turbine (steam not used by the refinery) would be discharged into an exhaust duct that leads to a surface condenser for cooling. The water-cooled condenser would use circulating water to condense the exhaust steam to condensate (water) for return to the HRSGs. Water from the circulating water-cooling system would be pumped to the evaporative cooling tower, where heat would be emitted to the atmosphere through the evaporation of a portion of the cooling water stream. The remaining cooling water would then be returned to the condenser to repeat the cooling process.

Approximately 145,000 gpm of circulating water would be required to pass through the surface condenser to condense the exhaust steam at maximum plant load. An additional closed loop cooling water system would use a mixture of 45% propylene and 55% demineralized water to provide auxiliary cooling in the facility.

Wastewater Treatment and Disposal

During normal operation, the cogeneration facility would generate wastewater from the following activities:

- Treatment of industrial water and refinery condensate to produce high-quality boiler feedwater;
- Collection of water and/or other minor drainage from various types of equipment and secondary containment areas;
- Sanitary wastes from employee water use; and

- Blowdown of water from the cooling tower.

A wastewater stream also would be generated periodically when a gas turbine is shut down to wash the compressor blades to restore peak operating efficiency. This would be done several times per year per gas turbine depending on need. The washing operation would generate approximately 2,300 gallons of water that contains airborne dirt removed from the blades, oil residue, and cleaning detergents. Wash water would be collected and temporarily stored in the CGT wash water sump. At this time, the Applicant assumes that the wash water would need to be moved offsite for treatment and disposal unless and until the spent wash water can be characterized and determined to be acceptable for treatment in the refinery wastewater system. The contractor in charge of washing the compressor blades would be responsible for transporting the wash water offsite for treatment and proper disposal.

Periodically, the HRSGs must be purged of their contents (“blowdown”) to remove trace dissolved inorganic constituents that build up in the steam generation process. This blowdown is cooled and routed to the refinery’s cooling system to be recycled. Recycling the HRSG blowdown reduces the overall amount of freshwater necessary to operate the refinery.

Demineralization Plant Wastewater and Refinery Condensate Treatment System Waste

Pressure filters would be used to remove suspended solids in the water coming into the cogeneration facility. Filtration would be required as a first step in the production of high-quality boiler feedwater. After 24 hours of use, each of the filters would be backwashed to remove the solids from the filter media. The backwash water would be collected in the wastewater equalization tank, which would be periodically pumped to the refinery for treatment.

Ion exchange units, which require periodic chemical regeneration with dilute sulfuric acid and sodium hydroxide, also would be used for water quality treatment. These chemicals, along with the removed ions and rinse waters, would be collected and neutralized to a pH of between 6.5 and 8.5 and pumped to the refinery’s wastewater treatment system.

Water produced from condensed steam returned from the refinery would be treated with a system that uses powdered cellulose and activated carbon to remove any trace oil before the water is used as boiler feedwater at the cogeneration facility. The cellulose used in this process would require periodic regeneration. The regeneration waste, including oily water and spent cellulose material, would be collected in a sump and drained for disposal. The Applicant estimates that the cogeneration facility would generate about 1,200 pounds per day of spent precoat filter material with roughly equal distributions of water, oil, and cellulose. The sump would be designed to hold approximately 10 days’ capacity, or approximately 1,500 gallons. Oily water recovered from the sump would be pumped to the refinery’s wastewater treatment plant. The remaining cellulose material would be disposed of at the non-hazardous land treatment farm in the refinery (Torpey, pers. comm., 2003).

Equipment Drains and Secondary Containment Areas

Pumps, compressors, turbines, and other equipment generate wastewater in the form of wash water, rainwater runoff, leakage, or periodic flushing operations. Since this wastewater has the potential to carry traces of free oil, it would be collected separately and pumped to the refinery's oily water sewer for treatment before discharge unless testing confirms it can be discharged into the stormwater treatment system.

All chemical feed and chemical storage areas would have secondary containment curbs to capture spills and tank overflows. Containment designs would be established assuming manual cleanup. Spill containment at the chemical truck unloading areas would be provided to contain small spills only at hose connection points with curbs for manual cleanup. Water from these areas would be transferred to the refinery's wastewater treatment system for treatment and disposal unless testing confirms it can be discharged into the stormwater treatment system.

Sanitary Waste

The cogeneration facility would have lavatories and showers, which would generate sanitary waste requiring treatment. This waste would average between 1 and 5 gpm and would be collected and pumped to the refinery's sanitary system for disposal. The refinery's sanitary waste is sent to the Birch Bay Water and Sewer District for treatment and disposal.

Cooling Tower Blowdown

Approximately 7-10% of the water used by the cogeneration cooling tower (292,320 gpd base operating case) would be drained to control the cooling tower's water quality. The drained water would be pumped to the refinery's wastewater treatment system for treatment and disposal.

Wastewater Discharge

Refinery wastewater is treated and discharged to the Strait of Georgia under the National Pollutant Discharge Elimination System (NPDES) permit number WA-002290-0, effective November 1, 1999 until November 1, 2004 (BP 2002, Appendix D). Wastewater from the cogeneration facility would be sent to the refinery's wastewater treatment system for treatment and discharge to the Strait of Georgia along with wastewater from the refinery. The proposed project would discharge 190 to 260 gallons per minute (approximately 8% of existing refinery flow discharge) assuming 15 cycles of cooling water concentration in the cooling tower (BP 2002, Appendix D).

Refinery-treated wastewater is discharged at the mooring area of the refinery's marine pier, approximately 2,000 feet from the shoreline at an approximate depth of 60 feet below mean lower low water level. The existing discharge diffuser, constructed in 1971 along with the refinery, is supported by pilings that also support the pier. The diffuser is a 20-inch-diameter pipe with 13 4-inch-diameter ports spaced 8 feet apart. The diffuser ranges from 3 to 6 feet above the seafloor.

Stormwater Collection, Treatment, and Discharge

Most of the cogeneration facility site would be paved with asphalt or covered with crushed rock, grass, buildings, or enclosures. The finished surfaces would be sloped from a high point near the center of the facility toward low points along the edge of the facility's internal roads. Runoff would sheet flow across the site toward a collection system consisting of swales and catch basins. All surface runoff would be captured by the surface drainage system and directed through an underground piping system to the onsite stormwater treatment and detention system. The stormwater treatment and detention system consists of an oil-water separation system equipped with a shutoff valve for containment in case of an accidental release. Stormwater would be discharged from the oil-water separation system into a final treatment and detention pond properly sized in accordance with Whatcom County and Washington Department of Ecology (Ecology) requirements. Stormwater would be discharged from the detention pond to the proposed wetland mitigation sites. The detention pond would either be constructed as a lined pond, or a monitoring program would be established to ensure that stormwater composition does not adversely affect groundwater quality. See Section 3.3 Water Resources for additional information about the discharge of stormwater to the wetland mitigation sites.

Stormwater from the secondary containment structures for outside tanks and chemical storage areas would be kept separate from other stormwater because of releases that could potentially occur from the tanks. This stormwater would be collected and routed to the cogeneration facility's wastewater system and then on to the refinery's wastewater treatment system for treatment and disposal along with other cogeneration facility wastewater.

Ammonia Storage System

The cogeneration facility would use ammonia to facilitate required chemical reactions in the SCR emission control system. An ammonia storage and distribution system would be located onsite to supply 100% anhydrous ammonia to the SCR catalyst beds. The system would include a 12,000-gallon aboveground storage tank, a delivery truck unloading and containment area, and interconnecting valves and piping to feed the ammonia flow control unit. The working capacity of the storage tank would be sufficient for storing ammonia for approximately four weeks of operation. Safety devices such as pressure/vacuum relief valves, liquid overflow protection devices, isolation block valves, alarms, water spray (above storage tank), and associated instruments would be incorporated into the detailed design of this storage system. The cogeneration facility would receive anhydrous ammonia by tanker truck and would use up to 870,300 pounds (approximately 168,500 gallons) of ammonia per year. The number of round trips for ammonia delivery is estimated to be 23 per year.

Ancillary Systems

The cogeneration facility would include a number of emergency ancillary and support systems, including auxiliary cooling, control and communications, emissions monitoring, electrical distribution and control, security, and fire protection.

A new approximately 1,500-kilowatt (kW) emergency diesel generator would provide power to maintain the critical lubrication system if the total power grid ever fails. An approximately 265-horsepower (hp) diesel-driven pump would be provided to ensure adequate water pressure for fire suppression at the cogeneration facility in case of a power failure or low water pressure situation. The generator and pump would only operate in emergency situations or during periodic equipment tests.

Water Supply System

Water Sources

The Whatcom County PUD and the Birch Bay Water and Sewer District would supply water to the cogeneration facility. Two streams of freshwater would be required: (1) potable water, and (2) non-potable cooling tower and boiler makeup water.

The Birch Bay Water and Sewer District provides potable water to the refinery. A new water pipe routed between the refinery and cogeneration facility would supply potable water to the cogeneration facility. Potable water required for drinking, personal washing, and sanitation at the cogeneration facility would average between 1 and 5 gpm. The Applicant anticipates that the route of the piping between the two facilities and point of entry to the cogeneration facility would be adjacent to Access Road 2, however the exact route and refinery tie-in point have not been determined.

The Whatcom County PUD provides non-potable industrial water to the refinery. The refinery has a contract with Whatcom County PUD to purchase industrial water through December 31, 2030. Alcoa Intalco Works has a similar contract to purchase industrial water from Whatcom County PUD. Whatcom County PUD obtains water from the Nooksack River for both of these contracts under a certified water right.

Letters of intent have been entered into by the Applicant, Whatcom County PUD, and Alcoa Intalco Works to allow the cogeneration facility to purchase industrial water that is currently allocated to the aluminum smelter. If Alcoa Intalco Works is operational, Whatcom County PUD would supply industrial water to the cogeneration facility from recycled water used for once-through cooling at the nearby aluminum smelter. If Alcoa Intalco Works is not operational, the cogeneration facility would purchase the industrial water directly from the PUD, which would have otherwise provided it to the aluminum smelter. A maximum amount of approximately 2,780 gpm of water from the PUD would be used. The cogeneration facility would require an average of 2,244 to 2,316 gpm of industrial water, and when the aluminum smelter is operational, the remaining 484 to 556 gpm of recycled water would be used by the refinery to provide for a similar reduction in the amount of freshwater that needs to be withdrawn from the Nooksack River.

The Whatcom County PUD currently supplies freshwater to the refinery by an existing 24-inch pipeline, which enters the refinery at the southeast corner of the property. Freshwater or recycled industrial water would be conveyed to the cogeneration facility through a new 16-inch underground pipe to be constructed within the refinery. The Applicant anticipates that the route

of the new industrial water supply pipe between the two facilities and point of entry to the cogeneration facility would be adjacent to Access Road 2, however the exact route and refinery tie-in point have not been determined at this time.

Water Treatment

Water for the HRSGs must meet stringent specifications for suspended and dissolved solids. The recycled industrial water from the Alcoa Intalco Works aluminum smelter or freshwater from the Whatcom County PUD does not meet the specifications required for steam generation. In order to meet these specifications, the water would be run through two pressure filters at the cogeneration facility. Demineralized water from the polisher would flow to the demineralized water tank, which would provide an uninterrupted supply of demineralized makeup water to the steam cycle and would have eight hours of boiler feedwater storage capacity.

A steam sampling and analysis system would monitor the water quality at various points in the facility's steam cycle. The water quality data would be used to guide adjustments in water treatment processes and to determine the need for other corrective operational or maintenance measures.

Access Road 1

The cogeneration facility's primary access road (Access Road 1) would connect the site to Grandview Road to the north. Access Road 1 would be approximately 300 feet long, 30 feet wide, and surfaced with asphalt (Torpey, pers. comm., 2003d). Access roads would also be constructed to Brown Road on the south and Blaine Road on the west. Three access roads are proposed to provide flexibility for access in case of an emergency. Access Road 2 is discussed as part of the refinery interface, and Access Road 3 is discussed as part of other project components. In addition, a permanent road would be constructed around the site perimeter with branch roads providing access to specific plant areas such as the CGTs, STG, HRSGs, water treatment facility, administration building, and cooling tower.

All roadwork within the plant would be constructed to facilitate plant access and maintenance in accordance with standards of the American Association of State Highway Transportation Officials (AASHTO). Roadwork outside the plant boundary would be constructed in accordance with the Washington State Department of Transportation (WSDOT) and emergency vehicle requirements. Figure 2-1 shows the proposed access roads for the cogeneration facility.

Refinery Interface

Steam and Condensate System

Steam from the cogeneration facility to the refinery and condensate from the refinery to the cogeneration facility would be transmitted through new pipes mounted on an elevated piperack that would be constructed between the facilities south of the new east-west access road (see Figure 2-1). The Applicant has not yet determined the exact route and tie-in point for the piping within the refinery.

Natural Gas Fuel System

Natural gas would be used as the fuel source for the CGTs and HRSG duct burners. Although the Applicant has not made a commitment to purchase natural gas from a particular provider, it is anticipated that natural gas would be supplied by the existing Ferndale or Cascade pipelines, which are routed through the refinery in the utility corridor immediately east of Blaine Road.

A new connection and natural gas pipes would be installed within the refinery at the existing metering station for the Ferndale pipeline to support both cogeneration and refinery operations. From the connection at the metering station, a new underground pipe would be routed approximately 300 feet west under Blaine Road to the new compressor station to be constructed within the refinery. A second pipe providing the compressed natural gas from the compressor station to the refinery would be routed back under Blaine Road to the refinery tie-in at the metering station. A third pipe providing compressed natural gas from the compressor station to the cogeneration facility would be routed above ground for approximately 450 feet along the new piperack. The Applicant has not yet determined the exact size, type, and route of the natural gas pipes (Torpey, pers. comm., 2002).

Natural gas would be delivered to the project at a pressure of approximately 250-300 pounds per square inch gauge (psig). The CGTs and some refinery operations require a higher fuel pressure, so natural gas compressors would raise the pressure of this gas to approximately 500 psig. The compressor station would include a building to enclose three electrically driven compressors, acoustic protection, and gas and fire detection and extinguishing systems. At this time, it has not been determined who would construct and operate the compressor station.

Industrial Water Supply

The Whatcom County PUD currently supplies freshwater to the refinery via an existing 24-inch pipeline, which enters the refinery at the southeast corner of the property. Freshwater or recycled industrial water from Alcoa Intalco Works would be conveyed to the cogeneration facility through a new 16-inch underground pipe to be constructed within the refinery. The Applicant anticipates that the route of the new industrial water supply pipe between the two facilities would be adjacent to Access Road 2, however the exact route and tie-in point within the refinery have not been determined.

Potable Water Supply

The Birch Bay Water and Sewer District provides potable water to the refinery via an existing 6-inch potable water pipeline that enters the refinery near the contractor's gate from a utility ROW along Grandview Road. Potable water to the cogeneration facility would be provided by a new water pipe routed between the refinery and cogeneration facility. The Applicant anticipates that the route of the piping between the two facilities would be adjacent to Access Road 2, however the exact size, route, and tie-in point for piping within the refinery have not been determined at this time.

Industrial Wastewater Connection and Associated Piping

Cogeneration facility industrial wastewater would be conveyed to the refinery for treatment via a new wastewater pipe. The Applicant anticipates that the route of the piping between the two facilities would be adjacent to Access Road 2, however the size, route, and tie-in point for piping within the refinery have not been determined at this time.

Sanitary Wastewater Connection and Associated Piping

Cogeneration facility sanitary wastewater would be conveyed to the refinery's sanitary wastewater system for transmission to the Birch Bay wastewater treatment plant via a new sanitary wastewater pipe. The Applicant anticipates that the route of the piping between the two facilities would be adjacent to Access Road 2, however the exact size, route, and tie-in point within the refinery have not been determined at this time.

Elevated Piperack

An elevated piperack would be constructed between the cogeneration facility and the refinery to support steam, condensate, and natural gas pipes between the two facilities. The piperack would most likely be made of steel with vertical supports spaced at approximately 20-foot intervals and I-beams anchored to pile-supported concrete footings measuring approximately 3 feet by 3 feet. The piperack would be between 3,000 and 3,500 feet long, with height to be determined based on utility corridor maintenance requirements, locations of existing overhead power lines, and vehicle access requirements. Pile type, length, and configuration would be based on geotechnical investigations not yet conducted by the Applicant.

Intermediate Voltage Substation

An intermediate voltage (either 69 kV or 115 kV) substation for distribution of electrical power produced by the cogeneration facility would be constructed within the refinery at a site approximately 500 feet west of the cogeneration facility. The substation would be connected to the 230-kV switchyard in the cogeneration facility and to three existing transformers (MS 1, MS 2, and MS 3) elsewhere in the refinery via new overhead or underground lines.

New distribution transformers at Substations MS 1, MS 2, and MS 3 would facilitate the distribution of power within the refinery. The distribution transformers would be installed and operated by the refinery.

Stormwater Facilities

The Applicant would construct stormwater facilities in the refinery for the collection, detention, and treatment of stormwater runoff from laydown areas during project construction. Stormwater facilities to be constructed in the refinery would include a 0.6-acre stormwater detention pond (detention pond 2) and associated oil-water separation facility, a stormwater system perimeter access road, and approximately 1,500 feet of conveyance ditch (Ditch C-4). Upon completion of

construction, the refinery would be responsible for maintenance and operation of these stormwater components.

Laydown Areas

Figure 2-1 presents the construction laydown areas that would be created within the refinery, which total approximately 28 acres. Laydown Areas 1, 2, and 3 would be located in the northeast corner of the refinery, immediately west of Blaine Road and immediately south of Grandview Road. In addition, the refinery's existing 3.2-acre contractors' parking lot in the same area would also be used as a construction laydown area. Laydown areas would be unpaved or surfaced with aggregate.

Once construction is completed, Laydown Areas 1 and 3 would be retained as material and/or equipment storage areas for the refinery. The northern 273 feet of Laydown Area 2 would be restored to native wetland and upland communities.

Access Road 2

Figure 2-1 depicts Access Road 2 to be constructed within the refinery. Access Road 2 would be constructed between Blaine Road and the western edge of the cogeneration facility. The road would be 24 feet wide and approximately 300 feet long, and would provide direct vehicular access between the refinery and the cogeneration facility. Access Road 2 would be constructed with aggregate placed over a compacted, engineered subbase, and would meet WSDOT and emergency vehicle requirements. The access road also would carry a variety of pipe and utility connections between the cogeneration facility and the refinery.

Transmission System

The cogeneration facility would be connected to Bonneville's Custer substation for transmission of power not used by the refinery. A double-circuit 0.8-mile-long transmission line from the cogeneration facility's 230-kV switchyard to the Custer/Intalco Transmission Line No. 2 would export power from the cogeneration facility to the Bonneville system. Figures 2-1 and 2-2 show the existing Bonneville transmission lines and the new electrical transmission system corridor.

Two 230-kV transmission lines would connect the cogeneration facility to the Bonneville transmission lines for redundancy. Each line would be capable of safely carrying the exported power to the Bonneville system. The cogeneration facility would use two types of towers for the electrical transmission lines between the facility and the Bonneville connection point. A monopole steel tower would be used at the 230-kV switchyard within the cogeneration facility. Within the electrical transmission corridor, lattice steel towers would be used. See Figure 1-2 for typical views of both tower designs.

Ownership of the 230-kV switchyard and new electrical transmission towers and lines connecting this switchyard to the existing Bonneville transmission lines would be subject to the terms of an interconnection agreement between the Applicant and Bonneville. The Applicant would retain ownership of the land underlying the switchyard and the transmission system.

Custer/Intalco Transmission Line No. 2

Two existing 230-kV transmission lines connect Bonneville's Custer substation to Bonneville's Intalco substation at the Alcoa Intalco Works aluminum smelter. These transmission lines are routed in separate corridors with lattice steel towers supporting one transmission circuit each. Near the refinery, these corridors both run in a north-south direction (see Figure 2-2).

In February 2001, the Applicant submitted an interconnection request to Bonneville to allow the cogeneration facility to connect to the Bonneville system. In response to that request, Bonneville completed a contingency analysis for the cogeneration project and refinery load along with the potential Alcoa Intalco Works load on the two existing Bonneville 230-kV transmission lines. The analysis showed that under certain conditions, one or more portions of the Bonneville system could exceed acceptable thermal operating limits with the proposed project. Two modification options for the Bonneville transmission system have been identified to address the potential condition.

Option 1 – Remedial Action Scheme

Option 1 would involve a RAS. The RAS would install additional electrical equipment within the Custer and Alcoa substations, which would automatically reduce the load at the Alcoa facility if thermal operating limits are exceeded on the Bonneville transmission lines. This option would not require any changes to the 230-kV lines or towers, but would require agreement among the Applicant, Alcoa Intalco Works, and Bonneville. This is the Applicant's preferred option.

Option 2a – New Transmission Line with Lattice Towers

Under both Option 2a and Option 2b, a second 230-kV transmission line would be installed inside the existing 125-foot ROW of Custer/Intalco Transmission Line No. 2 from the cogeneration interconnection point to the Custer substation to increase the transmission capacity along this segment. The existing single-circuit steel lattice towers in this approximately 5-mile-long segment are not strong enough to carry a second circuit so the 24 towers would be replaced with new double-circuit towers (see Figure 1-2 for typical single-circuit and double-circuit tower designs). Appendix C provides annotated aerial photographs that depict the existing tower locations and selected environmental features within the transmission corridor.

Under Option 2a, the new double-circuit towers would have a lattice steel design. The towers likely would be replaced one at a time by temporarily supporting the existing wires while each tower is installed. Some foundation work likely would be required to accommodate the new towers, which would be approximately 120 feet tall and spaced an average of 1,150 feet apart (Torpey, pers. comm., 2003). Figure 1-2 provides a typical view of a lattice steel tower.

Two basic types of 230-kV steel lattice towers would be used: tangent or light-angle structures and dead-end structures. Tangent structures are used to elevate wires a safe distance above the ground on relatively straight stretches of a line without sharp angles. Dead-end structures elevate the conductors above the ground and equalize tension of the conductors between two segments

of transmission line when the line makes a turn. Dead-end structures are much stronger, heavier, and more expensive than tangent structures.

Option 2b – New Transmission Line with Monopole Towers

Option 2b is similar to Option 2a except that steel monopole double-circuit transmission towers would be installed instead of lattice steel towers. The monopole towers would be approximately 120 feet tall and spaced an average of 900 feet apart (Torpey, pers. comm., 2003). More towers would need to be constructed under this option because of the closer spacing requirement for the monopole tower design. Figure 1-2 provides a typical view of a monopole tower.

Transmission Line Components

The following section briefly describes typical transmission line components.

Conductors are the wires that carry electrical current in a transmission line.

Insulators are used to suspend the conductors from towers. Insulators are made of non-conductive materials (porcelain or fiberglass) that prevent electric current from passing through the towers to the ground. Porcelain insulator strings would be non-reflective to reduce their visibility.

Transmission towers elevate conductors to provide safety within the ROW for people and buildings. The National Electrical Safety Code establishes minimum conductor heights. Minimum conductor-to-ground clearance for a 230-kV line is 22.4 feet depending on the type of land use under the line. Greater clearance would be provided over highway, railroad, and river crossings and some agricultural areas. Lines are generally strung above the minimum height to allow for future sag. As power lines (conductors) carry increasing amounts of power, electrical resistance causes the conductors to get warmer, expand, increase in length, and hang lower to the ground.

A **fiber-optic cable** may be attached to provide a communication link. The 0.5-inch-diameter fiber-optic cable would be hung below the conductors.

Overhead ground wires are two smaller wires attached to and strung between the tops of the towers to protect the transmission line against lightning damage. The width of each wire is typically 0.5 inch.

Counterpoise is a set of wires buried in the ground surrounding each tower to provide lightning protection by providing a low resistance path to the earth.

At this time, several aspects of the reconstruction of the Custer/Intalco Transmission Line No. 2 remain to be resolved by Bonneville and the Applicant. These include:

- Number, type, and location of transmission towers that would be installed;

- Type, length, and location of transmission line access roads to be constructed or improved; and
- Size and location of any temporary laydown, staging, and assembly areas that may be required.

Other Project Components

Alcoa Intalco Works Industrial Water Supply Piping and Equipment

To facilitate the cogeneration facility's use of recycled industrial water when the Alcoa Intalco Works aluminum smelter is operating, the Applicant would fund the construction of a recycled water pipeline and associated equipment within the Alcoa Intalco Works facility, approximately 2.5 miles south of the cogeneration facility site. The new facilities would be constructed and operated by Whatcom County PUD, and would consist of new piping that would connect the Alcoa Intalco Works air compressor building with a new 10-foot by 40-foot sump or wet well, which would be installed on the south side of the Alcoa Intalco Works facility. A 12-foot by 20-foot enclosure containing three 150-hp electric pumps would be constructed and connected to the PUD control system. A new 16-inch pipe approximately 1,600 feet long would connect the wet well to an existing PUD water transmission line located at Alcoa Intalco Works, which in turn connects to the BP Cherry Point Refinery.

Compensatory Wetland Mitigation Areas

The Applicant proposes to rehabilitate approximately 110 acres of wetland and wetland buffer to compensate for losses in wetland function expected from construction of the proposed project. Figure 2-1 depicts the location of the CMAs proposed for the project.

The Applicant would create two wetland mitigation areas on Applicant-owned land immediately north of Grandview Road near the cogeneration facility. CMA 1 would cover approximately 50 acres and would be located in the northeast quadrant of the intersection of Grandview Road and Blaine Road, extending to the vicinity of Terrell Creek to the north. CMA 2 would cover approximately 60 acres and would be located in the northwest quadrant of the same intersection, also extending to the vicinity of Terrell Creek to the north.

The wetland mitigation areas would be rehabilitated by restoring historical drainage patterns by rerouting treated stormwater runoff and plugging existing ditches, removing and suppressing non-native, invasive plants such as reed canarygrass, and establishing native plant communities. Rerouting stormwater runoff would include installing pipes, culverts, and an inlet channel with diffuse-flow outlets to direct runoff from the proposed detention pond at the cogeneration facility to CMA 1 rather than letting all of it go through a roadside ditch directly to Terrell Creek. All runoff from the other detention pond would be directed through an existing culvert to a series of ponds, known as the BP duck ponds, connected by natural channels and swales. The rerouted stormwater runoff would be directed to large natural areas that would provide additional hydrologic storage and water quality treatment.

Laydown Area 4

Figure 2-1 depicts Laydown Area 4, a 4.74-acre temporary construction laydown area in the northeast corner of the cogeneration facility immediately south of Grandview Road. The laydown area would be unpaved or surfaced with aggregate, and would be used to support project construction.

Once construction is completed, the western 2.94 acres of the laydown area would be part of the cogeneration facility and would be restored with natural wetland and upland vegetation. The eastern 1.81 acres of Laydown Area 4 would be outside of the cogeneration facility and would be planted as upland forest to be maintained by the refinery.

Access Road 3

Figure 2-1 depicts Access Road 3 to be constructed between Brown Road and the southern edge of the cogeneration facility. Access Road 3 would be constructed by widening and extending the existing maintenance road previously built to provide access to a future refinery power transmission corridor. The existing unsurfaced, two-track access road would be widened to 30 feet and extended to a length of approximately 1,500 feet to provide access to the facility from Brown Road. The road would be constructed with aggregate placed over a compacted, engineered subbase, and would meet WSDOT and emergency vehicle requirements.

2.2.3 Construction

The construction of the BP Cherry Point Cogeneration Project would involve:

- The cogeneration facility;
- The systems and components that interface with the BP Cherry Point Refinery;
- The 230-kV power transmission system;
- Modifications to Bonneville's Custer/Intalco Transmission Line No. 2; and
- Other offsite project components.

Cogeneration Facility and Refinery Interface

The existing terrain at the cogeneration facility site is relatively flat. Site grading would use onsite fill to the extent possible to reduce the need for imported fill. Site preparation would be completed using conventional methods of construction and conventional construction equipment, including bulldozers, front-end loaders, trucks, tractor scrapers, and graders. During site preparation, an erosion control and temporary stormwater drainage system would be installed. This system would convey surface water runoff into the storm drainage control system. To the extent possible, excavated material of acceptable quality would be retained on the site in designated locations using proper erosion protection methods for reuse as backfill. Excess material to be removed from the site would be disposed of at an acceptable location. The Applicant estimates the amount of imported fill required for site preparation would be 126,000 cubic yards. The fill material would be obtained from permitted, local sources (see Section 3.1 for additional discussion of the potential sources for required fill material).

Temporary roads, perimeter roads, laydown and parking areas, and other work areas would be surfaced with gravel as required. The Applicant estimates that the total amount of gravel aggregate and sand base material required for site preparation would be 28,200 cubic yards. The construction contractor would determine the source of these materials, but it is expected to be from local, permitted sources (see Section 3.1 for additional discussion of the potential sources for required aggregate material).

Undeveloped areas to the north and the west of the cogeneration facility have been identified for use as construction staging areas, known as laydown areas. These areas (Laydown Areas 1 through 4) would be graded and left unpaved or surfaced with aggregate during construction as required. Approximately 36 acres of land would be used for construction laydown (see Figure 2-1). Construction laydown and parking areas would be adjacent to the site. A security fence would be installed around the perimeter of the site and the perimeter of the laydown areas. Construction workers would enter through a security gate on Blaine Road on the Applicant's property.

Originally, the Applicant identified a Laydown Area 5 that could be used if additional laydown space was needed (BP 2002, Appendix D). The Laydown Area 5 site, which is approximately 10 acres of uplands owned by the Applicant, is 1.5 miles southwest of the cogeneration facility site. The Applicant has subsequently determined that Laydown Area 5 would not be required (Torpey, pers. comm., 2003).

After site preparation and rough grading is completed, the construction contractor would install the piling and concrete foundations required to support the combustion and steam turbine generators, HRSGs, stacks, pipe supports, electrical equipment, and other miscellaneous equipment items, tanks, and support facilities. Although the Application for Site Certification indicates that pile-supported concrete foundations would be used for all major equipment items, major building columns, and piperack supports, the Applicant now believes that only the STG building would require a pile-supported concrete foundation. Piles may be as long as 100 feet (Torpey, pers. comm., 2003). Pile type, length, and configuration would be based on geotechnical investigations not yet completed. Construction of these foundations would require the use of heavy equipment, including pile-driving equipment, excavation and backfill equipment, concrete-pumping equipment, and concrete-finishing equipment. In addition, light and medium trucks, air compressors, generators, and other equipment with internal combustion engines would be used. Onsite roads and parking areas would be constructed with asphalt over a compacted and engineered subbase. The perimeter and equipment access roads would be constructed with aggregate placed over a compacted and engineered subbase. Blasting is not expected to be required for construction of foundations.

The facility installation work would include underground systems, such as pipes, sewers, duct banks, and grounding grids. Construction materials such as concrete, structural steel, pipe, wire, cable, fuels, reinforcing steel, small tools, and consumables likely would be delivered to the project site by trucks using existing roadways. Some of these materials could be delivered by rail. These materials would be segregated and stockpiled in designated laydown areas. Fueling of construction equipment would occur at a designated location with appropriate spill containment provisions.

Combustion turbines and other large equipment would be transported to the site by rail (preferably) or barge. This large, heavy equipment would then be transferred by cranes to an oversize truck for delivery to the project site. Rail deliveries would be off-loaded and transported to the site by a heavy-haul contractor using specialized transports. The existing refinery's rail spurs could be used to unload heavy equipment transported by rail.

After the underground systems and foundations are installed, the excavated areas would be backfilled, compacted, leveled, and finished with gravel as required for the aboveground portion of the facility. The aboveground portion would include the piperack, CGTs, HRSGs, the STG, cooling tower, 230-kV switchyard, and monopole transmission tower and lines. For each HRSG, the exhaust stack would be assembled in the field and erected last. The underground piping system may have cathodic protection, as determined by the soil resistivity tests and piping material. Detailed pipe routes, surveys, and plans have not been prepared at this time for the piping systems that would interface with the refinery. Applicable regulations include U.S. Department of Transportation (DOT) 49 Code of Federal Regulations (CFR) 192, which specifies the required depth, fill, and cover for pipelines. In general, pipeline trenches would be 6 to 10 feet deep depending on soil conditions and the water table, and considering the engineering analysis of expected load conditions. Minimum fill would be 3 to 4 feet over the pipe, but also would depend on the evaluation of loads from vehicle traffic that may pass over the pipeline at designated points.

Construction of the natural gas supply piping would begin with the survey and staking of the natural gas pipeline route. Following the survey, work crews would begin excavation of the route. The natural gas piping would be connected to the existing Ferndale natural gas transmission line located within the refinery after the new piping and associated equipment have been constructed and pressure tested. Normal gas pipeline construction includes the following steps:

- clearing and grubbing;
- topsoil movement/stockpiling;
- trenching;
- lining the trench with a gravel bed and a water barrier on steep hills;
- pipe assembly and welding;
- X-ray of welds;
- hydrostatic testing;
- installing pipe in the trench;
- repeat testing (optional);
- backfilling;
- replacing topsoil; and
- seeding and restoring the site.

Once construction is completed, the final grading would be performed. The roads, parking lot, and other designated areas in the power block, maintenance, and warehouse areas would be paved while the balance of the site would be finished with gravel as required. The switchyard

would be surfaced with gravel. All side slopes and embankments would be protected against erosion with landscaping or seeded with grasses common to the local area.

Transmission System

The 0.8-mile 230-kV double-circuit transmission line would be installed within a new 150-foot transmission ROW on Applicant-owned land. The corridor is relatively flat and would be accessible from Brown Road via previously constructed transmission line maintenance roads. Site preparation and the construction of gravel foundation pads would need to be accomplished for Tower 1. This work was previously performed under a separate project for Towers 2, 3, and 4.

Site Preparation and Clearing

Clearing around the towers would include removal of all brush and debris and possibly grading to level the working area. An area of approximately 0.25 acre would be cleared or disturbed for tower placement. Cleared or disturbed areas that are not directly covered by transmission towers, facilities, or accessories would be reseeded with naturally occurring shrubs and grasses at the end of the construction period. Vegetation within the transmission line ROW would be low growing to allow safe and uninterrupted operation of the transmission line.

Tower Footings

Transmission towers are attached to the ground by burying a metal footing assembly at each of four structure corners. A trackhoe is used to excavate the soil to allow footing placement. The excavation is usually 1 to 2 feet larger than the footing to be installed. Additional footing excavation could be required in certain soil types. The soil and rock materials removed are later used to backfill the excavation once the footings are installed. Excess material would be stockpiled and spread along the ROW.

Transmission Towers

Transmission towers would normally be assembled in sections at the structure site and lifted into place by a large crane (30- to 100-ton capacity). Occasionally, transmission towers may be assembled at a remote staging area, then lifted, transported, and placed on foundation footings at the structure site by large sky-crane helicopters. Using helicopters enables towers to be constructed more quickly and reduces ground disturbance. Helicopter construction could be more costly than conventional crane construction, but time saved by faster structure assembly sometimes reduces the cost differential. The construction contractor would decide when helicopter-assisted assembly is appropriate. The construction contractor would not be selected until the Record of Decision (ROD) is completed for the proposed project.

Conductors, Overhead Ground Wire, Fiber-Optic Cable, and Insulators

Workers would first attach a small steel cable called the “sock line” to the towers. The other end of the sock line would be attached to the conductor. As the sock line is pulled through pulleys on

the towers, it would pull the conductor from large reels mounted on trucks equipped with a brake system. This allows the conductor to be unwound and pulled through the towers under tension, usually by a helicopter. The conductors would be attached to the tower using glass, porcelain, or fiberglass insulators. The conductor would be pulled through pulleys that are attached to the bottom of these insulators on each tower.

The overhead ground wires would be attached to the top of the transmission towers. Bonneville may also attach a 0.5-inch-diameter fiber-optic cable to the transmission towers to provide a communication link. The counterpoise would be buried in the ground at each tower.

Staging, Assembly, and Refueling Areas

Construction contractors usually establish staging areas near the transmission line to stockpile materials for towers, spools of conductor, and other construction materials until they are needed. Steel for towers would be delivered in pieces and would need to be assembled onsite. Optionally, general assembly yards could be used to erect the tower, which could then be moved into place by truck or helicopter. Because trucks would need to refuel often, these areas would also likely be used for refueling.

Custer/Intalco Transmission Line No. 2

Option 1 - Remedial Action Scheme

Under Option 1, additional electrical equipment and cabling would be installed within the Custer and Intalco substations, which would automatically reduce the load at Alcoa Intalco Works if thermal operating limits are exceeded on the Bonneville transmission lines. This option would not require any changes to the existing 230-kV lines or towers for Transmission Line No. 2.

Option 2a - New Transmission Line with Lattice Towers

Under both Option 2a and Option 2b, Bonneville would construct and operate a second 230-kV transmission line within the existing 125-foot ROW of Custer/Intalco Transmission Line No. 2 from the cogeneration interconnection point to the Custer substation (a distance of approximately 5 miles). This would require the replacement of 24 existing towers.

Under Option 2a, the new towers would be of the lattice steel design, and the method of construction would be similar to that described previously for the 230-kV transmission system. However, the towers would require relatively little additional ground disturbance for foundation work and structure placement because the existing tower foundations would most likely be able to be reused with only minor modifications. Existing towers would be removed from their foundations by crane or helicopter, and disassembled either onsite or at a nearby laydown area. The old wire, steel lattice towers, and other structures to be removed may be salvaged or made available for reuse, as appropriate. Other transmission line materials (such as hardware, cross arms, and insulators) would be removed from the ROW and properly disposed of. During replacement of each tower, the existing transmission lines would need to remain in service. The

existing towers and lines would most likely be temporarily supported until the new tower is installed and the lines can be attached to the new tower (McKinney, pers. comm., 2003).

To the extent practicable, existing maintenance roads would be used for access during the construction effort. It is anticipated that the county roads would be of sufficient quality to allow equipment and personnel movement to the construction site without significant road improvement. Any damage to county roads from equipment movement or operation would be repaired to county standards prior to equipment demobilization.

Some improvement to agricultural roads may be required. If necessary, improvements to existing roads would generally be limited to a zone 20 feet wide (for a 16-foot roadbed and adjacent ditches). No permanent access road construction would be allowed in cultivated or fallow fields. Any roads in cropland would be removed and the ground may be restored to its original contour when the transmission line is completed depending on the landowner's needs. Dips and culverts would be installed within the access roadbeds to provide drainage. If the road were temporary, any disturbed ground would be repaired and reseeded with grass or other seed mixtures as appropriate. At the conclusion of construction, access roads would likely be used for transmission line maintenance. If the ground were disturbed by maintenance activities, the roadbed would be repaired and reseeded if necessary. Fences, gates, cattle guards, and additional rock would be added to these roads when necessary to maintain access.

Option 2b - New Transmission Line with Monopole Towers

Option 2b would involve the replacement of existing lattice towers with steel monopole towers. The construction process for this option would be similar to Option 2a. Although it is possible that some existing tower foundations could be reused with modifications, the closer spacing requirement for the monopole tower design would require the construction of a greater number of towers than currently exist, therefore some new foundations would be required.

Tower installation would require vegetation to be cleared in an area sufficient for pole installation. Holes would be dug with a backhoe or power auger and a concrete foundation pier would be poured in place. In some cases, rock drills may be required to excavate a foundation hole to sufficient depth. Where drilling is required, unsuitable construction debris would be removed and backfilled with suitable material. The poles would be bolted to the foundation piers, steel cross-arm and insulators installed, and the towers prepared for conductor stringing.

Other Project Components

Compensatory Wetland Mitigation Areas

Wetland mitigation construction activities would consist of several key components, as follows:

- Creating a pipe or ditch to carry stormwater discharge from detention pond 1 on the cogeneration facility site to a new culvert under Grandview Road, several hundred feet west of Blaine Road;

- Constructing a level inlet trench extending approximately 1,000 feet in a northerly direction across the eastern side of CMA 2;
- Filling existing ditches on both CMA 1 and 2;
- Eradicating noxious weeds, primarily reed canarygrass and blackberry, using mowing, discing, and herbicide treatment if necessary; and
- Replanting with native vegetation.

A temporary irrigation system may also be installed to support initial establishment of planted vegetation.

Methods for the construction of industrial water supply modifications at Alcoa Intalco Works, and construction of Laydown Area 4 and Access Road 3 would be similar to the construction methods for piping systems, laydown areas, and roads discussed above under refinery interface.

2.2.4 Schedule and Workforce

Construction

Cogeneration Facility, Refinery Interface, and Other Project Components

Construction and commissioning of the cogeneration facility and system that interfaces with the refinery are scheduled to start in February 2004 and would take approximately 25 months. Operation of the facility is scheduled to begin in 2006. The construction schedule assumes an average work week of 40 to 48 hours for construction workers. Table 2-3 provides an estimate of the workforce anticipated during construction of the facility.

Construction activities would be primarily conducted on single shifts with overtime as necessary to meet specific schedule milestones. A second shift could be instituted as necessary to accommodate a particular construction activity or meet a critical milestone. At present, the Applicant plans for the commissioning effort to be supported with a second shift.

Dayshift hours would begin between 6:30 a.m. and 7:30 a.m. and conclude between 5 p.m. and 6 p.m. The cogeneration facility would coordinate with the refinery to stagger the workforce start/stop times to minimize traffic congestion and maximize the efficiency of support resources. Lunch hours would also be staggered to minimize congestion on the roads and supporting areas. If a second shift were needed, the number of workers assigned would be much lower than the number of workers in the first shift. The second shift would typically start at 6 p.m. and would conclude at 4 a.m. The management of the construction workforce would be coordinated with other concurrent projects within the refinery to minimize congestion and offsite impacts.

Transmission System and Custer/Intalco Transmission Line No. 2

Construction of the transmission system would be performed concurrently with construction of the cogeneration facility. The number of construction personnel needed for work on the Custer/Intalco Transmission Line No. 2 would depend on the modification option (RAS or transmission line reconstruction) selected by Bonneville and the Applicant.

Table 2-3: Expected Construction Work Force (Number of Personnel)

Craft/Trade	Months																							
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Boilermakers																								
Carpenters	1	1	12	22	34	47	19	28	38	51	69	76	79	79	76	22	13	13			11	7	3	
Electricians																								
Ironworkers																								
Laborers	10	13	23	29	26	28	11	32	45	54	54	46	22	17	9	5	4	4	3	1	1	0	0	
Pipefitters																								
Painters/Insulation Workers																								
Bricklayers/Masons																								
Millwrights																								
Operating Engineers	17	22	34	39	32	29	16	22	27	33	34	34	33	33	30	25	22	20	15	9	4	3	1	
Teamsters	6	8	13	15	12	12	6	8	10	12	13	14	14	14	14	14	13	12	10	7	4	2	1	
Total Craft	34	44	86	114	155	218	286	391	493	584	626	620	615	591	553	483	410	375	278	154	72	47	9	
Field Staff	11	18	25	32	39	41	45	45	47	47	47	56	56	56	55	55	54	51	48	39	30	17	14	
Total Site Staff	45	62	111	146	194	259	331	436	540	631	673	676	671	647	608	538	464	426	326	193	102	64	23	

Source: BP 2002

Note: This staffing represents the cogeneration project only and does not include the natural gas compression station.

Operation and Maintenance

Cogeneration Facility, Refinery Interface, and Other Project Components

The Applicant has projected that the cogeneration facility and associated infrastructure could start commercial operation in 2006. Operation of the cogeneration facility would require approximately 30 full-time employees in shifts 24 hours per day for seven days per week. The dayshift during weekdays would have the largest number of personnel at the plant with approximately 15 employees. Other shifts and weekend crew would total an additional four employees.

For scheduled maintenance, the number of personnel would increase. This number depends on the specific scheduled tasks of each maintenance period and would vary between 5 and 10 maintenance personnel per shift. The maintenance periods are expected to vary in duration from two weeks per year to 18 weeks per year (once every six years).

The cogeneration facility is designed to allow maintenance to be occur without a complete shutdown of the facility. The anticipated maximum maintenance effort would occur every sixth year of operation when approximately 3,200 staff hours (about 80 staff weeks) would be necessary for major inspection and overhaul of equipment. During this period, maintenance on each gas turbine generator would take about six weeks with only one CGT undergoing maintenance at a time (18 weeks total for all three CGTs). The facility may not be completely shut down for any of the planned maintenance periods.

Transmission System and Custer/Intalco Transmission Line No. 2

No new workers would be needed to operate and maintain the transmission system or Custer/Intalco Transmission Line No. 2. Bonneville would use its existing inspection and maintenance staff to check towers, transmission lines, and activities within the ROW.

2.2.5 Costs

Cogeneration Facility, Refinery Interface, and Other Project Components

Total capital costs for the cogeneration facility and associated components are estimated to be \$574 million. A summary of the costs by major component is provided in Table 2-4. The Applicant estimates that the annual operation and maintenance costs for the cogeneration facility, excluding the cost of natural gas, would be \$18.2 million.

Transmission System and Custer/Intalco Transmission Line No. 2

The Applicant estimates that capital costs for the transmission system would be \$6 million.

The capital costs for work associated with Custer/Intalco Transmission Line No. 2 would depend on the modification option selected. Preliminary cost estimates prepared by Bonneville indicate that Option 2 (reconstruction of the transmission line) would be \$10.4 million (Bonneville 2002).

Although costs for Option 1 (RAS) would be considerably less than those of Option 2 because the existing transmission line would not need to be reconstructed, a cost estimate for this option has not been prepared to date.

Cost estimates for operation and maintenance of the transmission line elements of the project have not been prepared to date.

Table 2-4: Cost Estimate for the Cogeneration Project

Component	Cost in U.S. Dollars
Land	\$0
Power Block Costs	
Mechanical equipment	\$200,000,000
Civil/structural/architectural	\$19,000,000
Piping, insulation, paint, and scaffolding	\$16,000,000
Electrical and controls equipment	\$32,000,000
Field construction and construction indirects	\$80,000,000
Engineering, commissioning, construction management, and fee	\$52,000,000
Total Cogeneration Facility Costs (unescalated 2001 \$)	\$400,000,000
Supporting Facilities Costs	
Gas compression/pipeline modifications	\$22,000,000
Integration projects	\$37,000,000
Other Costs	
Sales tax	36,000,000
Owner costs	35,000,000
Owner's contingency	44,000,000
Total All Components	\$574,000,000

Source: BP 2002, Appendix D

2.3 NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed BP Cherry Point Cogeneration Project and all associated features including the systems and piping that make up the refinery interface, the 230-kV transmission system, modifications to Custer/Intalco Transmission Line No. 2, and creation of proposed wetland mitigation areas would not be constructed. The refinery would either purchase electricity or use onsite turbines to generate electrical power needed for refinery operations. Under the No Action Alternative, the Applicant has no immediate plans to use the area proposed for the project site.

Under the No Action Alternative, there would be no environmental impacts from the cogeneration facility. However, because the site is zoned for industrial uses, future industrial development could occur at the site. The refinery's demand for both steam and electrical power is expected to grow in the future as other projects are implemented at the refinery. Although the existing refinery's boilers would continue to operate, additional heat generation capability would be required, and this likely would be produced by new boilers and/or fired heaters.

The No Action Alternative does not remove the long-term need for power production; it potentially transfers the impacts to another site and potentially another technology. There would be no increase in the power supply reliability for the BP Cherry Point Refinery and no contribution to new electrical generation required to meet projected long-term increasing power demand in the Pacific Northwest and adjoining regions.

2.4 ALTERNATIVES CONSIDERED BUT REJECTED

2.4.1 Alternative Cogeneration Facility Locations

Onsite Locations

In addition to the proposed cogeneration facility site (Site 3), four other potential sites on the Applicant's property were evaluated for the facility location. They are as follows (see Figure 2-4):

Site 1 East of Blaine Road and north of Brown Road adjacent to an existing cooling tower.

Site 2 Within the Cherry Point Refinery boundary fence near refinery components.

Site 4 Immediately north of Grandview Road and northwest of Site 3. This area was evaluated because it contains a moderately sized upland area adjacent to Grandview Road.

Site 5 Within the refinery boundary fence just south of Grandview Road and west of Blaine Road. This site currently has a contractors' parking lot and open areas.

Each of the sites was rated on the basis of six criteria as documented in the Applicant's Application for Site Certification (BP 2002). The criteria included:

- Sufficient area,
- Proximity to the refinery,
- Avoidance of wetlands,
- Proximity to infrastructure,
- Avoidance of other environmental impacts, and
- Security.

These criteria are discussed in more detail below.

Rating Criteria

Sufficient Area

A site of approximately 33 acres is needed to provide for all plant components including a switchyard and other ancillary features. This area allows for some buffer around the perimeter of the plant. The actual footprint of the project could vary somewhat depending on final design of the project. In addition to the plant area, additional space of 36 acres is also needed for construction laydown, fabrication yards, and access roads. These areas temporarily would be used by the project for approximately two years during the construction period and would be left in place for use by the refinery thereafter.

Figure 2-4: Alternative Cogeneration Site Locations

Proximity to the Refinery

The proposed cogeneration facility has to be located within a reasonable distance from the refinery to provide steam through relatively short pipelines that are properly insulated for steam transport. Increasing the distance of the power plant from the refinery would decrease the efficiency of the project or make it impractical. Additionally, increased pipeline length would result in increased disturbance to land and wetland areas. The project site has to take into account the delivery point of the steam at the refinery since refinery operations or other obstacles may prevent a reasonable connection.

Avoidance of Wetlands

Siting of the cogeneration facility took into account the presence of wetlands; the potential area of wetlands that would be affected; and in some cases the function and value of the wetlands. Alternative project configurations were also evaluated to reduce overall impacts. In addition, proposed future refinery construction requirements were assessed to determine if there were potential actions that would result in additional wetland impacts.

Proximity to Infrastructure

The operation of a gas-fired cogeneration plant depends on several elements of supporting infrastructure, including a natural gas pipeline, a source of water, road access, and a transmission line. Reducing the construction of new infrastructure lowers cost and reduces the impact on the environment. The refinery has the above-mentioned infrastructure already in place, and the proposed site allows use of this existing infrastructure with minimum modifications. Alternative sites would require an extension of this infrastructure to service the cogeneration facility.

A transmission line corridor has received Section 404(b) permit approvals in a previous action, including mitigation for wetland impacts. To minimize additional wetland and other environmental impacts, all of the sites were evaluated in relationship to this permitted transmission line corridor.

Avoidance of Other Environmental Impacts

Impacts on other environmental values were also considered in the analysis of alternative sites, including loss of wooded areas, upland habitat impacts, proximity to water bodies, and visual impacts.

Security

The refinery is located in a rural area and is surrounded by wooded areas and open fields that are bisected by paved roads. The Applicant owns much of the land immediately surrounding the refinery, except on the west where the property boundary is along Jackson Road. A chain-link fence topped by barbed wire surrounds the refinery, which is bounded by Grandview Road on the north, Jackson Road on the west, Blaine Road on the east, and Aldergrove Road on the south. An internal security road runs inside the fence line. A secondary chain-link fenced area encloses

other ancillary facilities east of Blaine Road and bounded by Grandview Road and Kickerville Road. Security guards patrol all roads and fence lines and all other Applicant properties.

Alternative Ratings

For each criterion, a rating of high, medium, or low was assigned, where high indicated the alternative best met the criterion, and low indicated that the alternative marginally met or did not meet the criterion.

Table 2-5 summarizes the ratings for the five alternative sites that were evaluated. Appendix A contains the siting and wetland 404(b) alternatives analysis.

Table 2-5: Summary of Ratings of Alternative Cogeneration Facility Sites

Criterion	Alternative Location				
	Site 1	Site 2	Site 3 (Proposed)	Site 4	Site 5
Sufficient area	High	Low	High	High	Medium
Proximity to refinery	Medium	High	Medium	Low	High
Avoidance of wetlands	Low	High	Medium	Medium	Medium
Proximity to infrastructure	High	High	High	Low	High
Avoidance of other environmental impacts	High	High	High	Low	Medium
Security	High	High	High	Low	High

Source: BP 2002, Section 2

Site 1

Site 1 was the first site investigated for the cogeneration project. The site was delineated for wetlands and it was determined that the site is approximately 80% wetlands (30 acres). Although this site rated high in most criteria, the Applicant did not select this site because of greater impacts on wetlands compared to the proposed site.

Site 2

Site 2 would provide only 16 acres of space for facility construction; therefore, the Applicant did not select the site because it did not meet the criterion for size.

Site 4

Site 4 was evaluated because it contains moderately sized upland area adjacent to Grandview Road. The site is located approximately 0.5-mile east of the refinery on the north side of Grandview Road. This site would require significantly longer segments of piping to deliver steam to the refinery and would also require a 0.5-mile new transmission line to the refinery. The steam pipeline to the refinery would be difficult to construct because existing gas and water pipelines and electrical transmission lines are south of Grandview Road. The Applicant did not

select Site 4 because of the distance from the refinery that would result in new utility corridors to the refinery. In addition, the new utility corridors would be less secure than other proposed sites.

Site 5

Site 5 is located within the refinery's boundary fence just south of Grandview Road and west of Blaine Road. This area is used for construction laydown and contractor parking during maintenance programs at the refinery. Portions of Site 5 were delineated for wetlands, and a reconnaissance of the remaining area indicates that the overall site is approximately 80% wetlands (23.5 acres). If Site 5 were chosen for the cogeneration facility site, Site 3 would be required for equipment laydown areas and the wetland areas east of Blaine Road would be affected. Site 5 would also affect Wetland I, which would not be affected by using Site 3 for the project. In addition, the Clean Fuels Project will be constructed by the refinery in the space that is currently used as a maintenance laydown area, which means that the refinery will need additional maintenance laydown space in the future. The Applicant did not select Site 5 as the preferred site because it would have greater wetland impacts than the proposed site and it would make future refinery activities more difficult.

In addition to the sites described above, reconnaissance surveys were conducted to evaluate two other general areas located on Applicant-owned property. These additional areas are described below (see Figure 2-4).

1. An area approximately 200 acres south of Brown Road was evaluated for the presence of wetlands. The site is approximately 90% wetlands, including herbaceous wetlands and high-quality forested wetlands, which comprise approximately 70% of the area. Additionally, several small ponded areas appear to be ephemeral, but hold water for extended periods of time. Old-growth trees were found on this site and large mammal and raptor species (including red-tailed hawk) and wading species (including great blue heron) were observed. This area rated low in all categories and was eliminated from further consideration.
2. An area east of the proposed cogeneration facility site also was evaluated. It was found to contain forested wetlands that are of high quality in terms of their functions such as sediment detention and general habitat suitability. This area was eliminated from consideration based on the high quality of the habitat and the associated cost of mitigating impacts to such an area.

Offsite Locations

Locations outside Applicant-owned property were not evaluated because the primary purpose of the cogeneration project is to supply electricity and steam to the refinery. The Applicant owns an extensive amount of property that surrounds the refinery site. These surrounding areas are the only feasible locations to ensure a reliable and efficient source of power and steam for the refinery. Offsite locations would require more pipeline interconnections, potentially affecting more priority habitat, and would significantly reduce the efficiency of steam transmission to the refinery. Securing an offsite location also would likely be more costly as an existing emergency response and security system is already in place at the refinery.

2.4.2 Alternative Power Generation Technologies

The Applicant's evaluation of alternative power generation technologies was limited to technologies that could produce both steam and electricity.

Stand-Alone Combined Cycle

This technology integrates natural-gas-burning combustion turbines and steam turbines to achieve higher efficiencies. The combustion turbine's hot exhaust is passed through an HRSG to create steam used to drive a steam turbine generator. This technology is able to achieve thermal efficiencies up to approximately 53%, considerably higher than most other alternatives. The use of clean natural gas and the high equipment efficiency also result in relatively low air emissions per kilowatt-hour generated. The capital investment for the combined-cycle plant is significantly less than either a boiler-turbine or fluidized bed combustion plant.

Because of its high efficiency and superior environmental performance, combined-cycle technology is an integral part of the proposed cogeneration project. However, the stand-alone combined-cycle facility is less efficient than a cogeneration facility and would not produce steam for use at the refinery. Because this alternative technology does not meet the project's purpose and need, the Applicant eliminated it from consideration for the proposed project.

Conventional Boiler and Steam Turbine

This technology burns fossil fuel (gas, oil, coal, etc.) in a conventional boiler to generate steam to drive a STG. Steam can be extracted directly from the STG or provided from the main steam pipe. The remaining STG exhaust steam is then condensed and returned to the boiler. Makeup water is added to the steam cycle to replace process steam not returned as condensate. This is an established technology that is able to achieve approximately 30-40% thermal efficiency when using natural gas. Because of the relatively low thermal efficiency, high emissions, and high capital and operating costs, the Applicant eliminated the conventional boiler and steam turbine technology from consideration for the proposed project.

Fluidized Bed Combustion and Steam Turbine

Fluidized bed combustion is an alternative to the conventional boiler for generating steam, especially while burning high-sulfur-bearing, difficult-to-burn fuels such as petroleum coke, a byproduct of the petroleum refining industry.

A fluidant such as limestone is added to the fluidized bed to capture in-situ sulfur oxides produced during the combustion process. The amount of limestone used is significant, about one-third of a ton of limestone for every ton of coke burned. The systems required to import, transport, crush, and size this quantity of limestone can have significant environmental impacts.

The hot combustion flue gas is cooled by rising steam, which drives a steam turbine. Thermal efficiencies are comparable to the conventional boiler technology (approximately 36% in full

condensing mode). A large quantity of calcium sulfate is generated as a byproduct. This material can be used to manufacture gypsum board or used as road fill material. If local markets do not exist for these products, potential environmental impacts from waste disposal and additional costs are high. Because of the environmental concerns with solid waste disposal, higher emissions, and the low thermal efficiency, the Applicant eliminated the fluidized bed combustion technology from consideration.

Other Alternative Technologies and Fuels

The Applicant eliminated technologies based on fuels other than natural gas because they would not allow the project to achieve the environmental and operational advantages of natural gas. Additional factors that render alternative fuel technologies unsuitable for the proposed project are as follows:

- No geothermal or hydroelectric resources exist in the area.
- Biomass fuels such as wood waste are not locally available in sufficient quantities to make them a practical alternative fuel.
- Solar and wind technologies are generally not continuous and not capable of producing the large quantities of steam needed to supply the refinery.
- Coal and heavy fuel oil technologies emit more air pollutants than technologies that use natural gas.

The Applicant selected natural gas technology based on the availability of natural gas and the environmental and operational advantages for the proposed cogeneration project.

2.4.3 Alternative Cooling Systems

The Applicant evaluated three alternative cooling technologies for rejecting heat from the steam turbine's surface condenser. These include:

- Dry cooling system: air cooled condenser;
- Wet/dry cooling: wet/dry evaporative tower; and
- Wet/dry cooling: hybrid system.

Dry Cooling System: Air Cooled Condenser

Air-cooled condensing (ACC) systems are significantly more expensive and less thermally efficient than comparable water evaporative cooling systems. They also require more land area than evaporative cooling systems and have a larger visual impact. The main benefit of the ACC system is to provide cooling with less freshwater consumption. Since ACC cooling is done without evaporation, it does not have water vapor plumes.

The Applicant initially selected a dry cooling system using an ACC for the proposed project to minimize water use, but was subsequently able to reach an agreement with the Whatcom County PUD and Alcoa Intalco Works allowing purchase of cooling water from the Alcoa Intalco Works. When the aluminum smelter is in operation, more water would be recycled on an annual

average basis than the cogeneration project would consume, resulting in a net decrease in the amount of water needed to be withdrawn from the Nooksack River. When the aluminum smelter is not in operation, the Whatcom County PUD would provide the freshwater to the cogeneration project that would have been allocated to Alcoa.

Wet/Dry Cooling System: Evaporative Wet/Dry Cooling Tower

The wet/dry cooling tower uses a conventional design but adds a tube bundle inside the tower above the fill that breaks the water column into a spray. Warm water from the cogeneration facility flows through this bundle and is cooled by air drawn through the tower by the cooling tower fan. The cooled water is then sprayed on the tower fill to achieve additional cooling through evaporation. Since the tube bundle does part of the cooling in the wet/dry design, less water is lost through evaporation than with a conventional wet cooling tower.

The ratio of dry cooling surface to wet fill can be designed for conditions ranging from a small amount of water conservation to a tower that requires the wet section only for the hottest days of summer, using 100% dry cooling most of the year. The wet/dry evaporative cooling tower can be designed to allow independent operation of the wet and dry section fans or designed to use common fans. The wet/dry cooling tower option uses less water than a conventional wet cooling tower, but is more expensive to construct and operate. The Applicant rejected this system because of the high capital costs.

Wet/Dry Cooling: Hybrid Cooling System

Another option is to use both an ACC and a cooling tower to cool water from the cogeneration unit condenser. The cooling tower is controlled to reduce water consumption and only dry cooling is used during cold months. The benefit of a hybrid cooling system is that the ACC and the evaporative cooling tower can be closer to standard manufacturer's designs, which are less costly than a custom wet/dry evaporative cooling tower design. The negative side of a hybrid cooling system is that the engineering design effort is increased since the number and interaction of components that must be designed for the two autonomous systems are greater. The land area for the evaporative cooling tower and ACC is greater than that of an ACC alone, since they both must have substantial open area around their perimeter to prevent interference with the air inlet path. The hybrid option also uses less water than a conventional wet cooling tower. For these reasons, the Applicant eliminated the evaporative cooling tower and ACC hybrid cooling system from further consideration.

2.4.4 Alternative Air Emission Controls

SCONOX

SCONOX, a brand name for a specific air emission control technology, uses a catalyst bed akin to that used in a selective catalytic reduction. SCONOX catalyst does not require ammonia to help convert nitrogen oxides to nitrogen dioxide. However, the SCONOX catalyst does get saturated during operation and requires periodic regeneration with a diluted hydrogen gas stream. A system of slide valves takes alternate beds of SCONOX catalyst in and out of service as

required for regeneration while the gas turbines are operating. The Applicant reviewed SCONOX technology with the vendor and requested a quote for the system. The SCONOX system's cost was much higher than the cost of the selective catalytic reduction system; it was rejected by the Applicant because of the high capital cost and operating and mechanical complexity of the system and because it has not been proven feasible on a facility of this size.

XONON

XONON, a brand name for a specific air emission control technology, uses a catalyst in the gas turbine combustion chambers to burn natural gas rather than using a flame. The catalytic combustion takes place at a lower temperature and thus produces lower amounts of nitrogen oxides and carbon monoxide. Enron invested in Catalytica, the creators of XONON catalyst, and agreed to test the catalyst at its Pastoria Energy Facility in southern California. This facility was subsequently sold to Calpine and the current status of XONOX technology testing is uncertain. Until proven commercially, XONON is considered to be experimental, and has been rejected by the Applicant.

2.4.5 Alternative Wastewater Disposal Methods

The cogeneration facility's wastewater stream includes process wastewater, sanitary wastewater, equipment drainage, and runoff from curbed areas that could have come into contact with oil from equipment. The preferred method for disposal of process and potential oil-bearing wastewater is to send it to the refinery's wastewater treatment system. Secondary containment water is isolated until verified acceptable for discharge to the stormwater system through testing. The existing refinery system has the capacity to handle the small wastewater stream from the proposed project. Construction of new wastewater treatment facilities for the cogeneration facility would be expensive and would not provide any additional environmental benefit; therefore, the Applicant rejected this alternative disposal method.

A zero liquid discharge facility was evaluated by the Applicant as part of an evaporative cooling system. Such a facility would combine the refinery's and cogeneration facility's wastewater and would use evaporation to separate solids from the water. The water vapor would be condensed and recycled back to the industrial water system for reuse. This system would have the advantage of conserving freshwater since the water is recycled for use within the facility. However, the separation process would generate a large volume of cogeneration facility solids per day. The solid waste, while not hazardous, would be soluble and would have to be disposed in a suitable landfill. This would be a large volume of material requiring offsite disposal on a daily basis, thereby significantly increasing truck traffic. (Trucks would have to be used to haul solids to a landfill since most landfills are not accessible by rail.) Equipment for a zero liquid discharge plant also is costly. The Applicant eliminated the zero liquid discharge option from consideration because of solid waste disposal requirements, operating complexity, and higher cost.

2.4.6 Alternative Modification of Custer/Intalco Transmission Line No. 2

Replacing Bonneville's 230-kV transmission lines with higher capacity lines was evaluated to determine whether this option would provide a technically feasible means of upgrading the

Bonneville lines without requiring replacement or extensive modification of the existing Bonneville transmission towers. This option would involve replacing the existing Bonneville transmission lines between the Custer substation and the cogeneration/Bonneville interconnection point with a wire type that provides the required capacity to address the conditions identified in Bonneville's contingency analysis, but that has the same weight as the existing wire. Although, several wires were evaluated for possible use, a suitable wire type has not been identified.

2.4.7 “Refinery Load Only” Alternative

The Applicant examined a number of alternative facility configurations for the cogeneration project, including a facility that would generate only enough electricity to meet the operating needs of the refinery (approximately 85 MW) and would therefore not require interconnection with Bonneville's power transmission facilities.

Potential facility configurations were evaluated against a set of performance requirements that the Applicant established for the project. These considerations included:

- Steam supply reliability to the refinery;
- Flexibility to accommodate larger future steam demands; and
- Economy of scale to provide suitable capital risk.

The Applicant determined that an 85-MW facility would not provide suitable steam reliability, lacked the ability to accommodate increases in future steam demand, and had a higher capital risk profile than the proposed configuration. The “Refinery Load Only” Alternative was therefore eliminated from further consideration.

2.5 BENEFITS OR DISADVANTAGES OF RESERVING PROJECT APPROVAL FOR A LATER DATE

Reserving or delaying approval of the proposed project would not provide the BP Cherry Point Refinery with the needed reliable, efficient, and cost-effective heat and power. Specifically, the BP Cherry Point Refinery would not benefit from reliable and affordable electric power and process steam, and would continue to use three more than 30-year-old boilers that contribute to air pollutants emitted from the refinery. With the new cogeneration facility, these three boilers could be taken out of operation, thereby reducing the total air emissions from the refinery. In addition, reserving or delaying approval of the proposed project would not provide the associated tax revenue and employment benefits to the local community. Also, the refinery would have to continue to purchase power at fluctuating market prices.

If the proposed project were delayed, the projected 635 MW of excess power would not be available in the short term for distribution by the Applicant over Bonneville transmission lines. However, such a delay would also avoid or delay potential thermal operating limit problems on the Bonneville transmission system in the project vicinity, as well as the need to modify the existing Custer/Intalco Transmission Line No. 2. Project delays would not increase power in the Pacific Northwest served by the Bonneville regional electrical transmission network in the short

term. However, because of several recent developments such as reduced electricity use by the aluminum industry and other electricity-intensive industries in the region, it is uncertain if there is a need for additional power in the region in the short term.

If project approval were reserved, direct, secondary, and cumulative impacts would be delayed and the refinery would continue to operate as it does today. The resources needed to construct and operate the proposed project are available at this time. Delaying approval decisions would create uncertainty for the funding of project and could delay operation beyond the requested transmission contract start date with Bonneville.

If this project were deferred for a lengthy period of time, it is uncertain whether this project would be available in time to meet regional long-term energy needs. If not, another generating facility would be required to meet these needs. That alternative project would likely not have the potential to offset emission reductions by removing older utility boilers at the refinery.

2.6 APPLICABLE FEDERAL, STATE, AND LOCAL PERMITS

If the proposed project is approved, EFSEC would specify the conditions of construction and operation, issue a Site Certification Agreement in lieu of any individual state or local permitting authority, and manage the environmental and safety oversight program of project operations. EFSEC is the sole non-federal agency authorized to permit the proposed project. The Applicant would enter contractual agreements with Bonneville to connect to Bonneville's electrical transmission system and the U.S. Army Corps of Engineers for an individual Clean Water Act Section 404 Permit. For informational purposes, Table 2-6 lists the major state and local permitting requirements preempted by EFSEC, as well as federal requirements.

2.7 COORDINATION AND CONSULTATION WITH AGENCIES, INDIAN TRIBES, THE PUBLIC, AND NON-GOVERNMENTAL ORGANIZATIONS

The Applicant has been communicating and meeting with agencies, Indian tribes, the public, and non-governmental organizations throughout the development process of the proposed project. Formal meetings and presentations held by the Applicant with these entities are listed in Table 2-7. The meetings and presentations were to inform stakeholders of the proposed project and to solicit comments.

Consultations with the public, agencies, Indian tribes, and interested parties will continue through the EIS process.

CHAPTER 3: EXISTING CONDITIONS, IMPACTS, AND MITIGATION MEASURES

This chapter presents a discussion of all elements of the proposed project (as described in the previous chapter) as they affect, or are affected by, each element of the environment. For most elements of the environment (e.g., earth, wetlands, surface water, etc.) site-specific descriptions of the affected environment corresponding to the five major project elements are presented. For some elements (e.g., air quality, groundwater), the geographic separation of major project elements is of little value to the analysis because of the landscape scale of existing conditions and potential impacts. For traffic and transportation, virtually all vehicles would arrive and depart from a single point during construction, and similarly during operation (although at a slightly different point). For cultural resources, the mitigation measure for discovering resources during construction is the same regardless of where in the overall project site they might be found.

To ease the readers' review, efforts have been made to reduce redundancy in presentation of the analysis. Affected Environment, Impacts, and Mitigation Measures have been specifically distinguished into major project elements only where it assists in understanding the effects of the project. Where the effects are the same for two or more major project elements, an effort has been made to consolidate the analysis. If a specific project element is not mentioned, it is because it has been determined that no effect, adverse or beneficial, would occur.

3.1 EARTH

3.1.1 Existing Conditions

Location and Physiography

The project site, which includes the footprint of the cogeneration facility, the refinery interface, the transmission system, Custer/Intalco Transmission Line No. 2, and other project components, is located in western Whatcom County, Washington. The Strait of Georgia is located west of the site and borders the western edge of Whatcom County. The site is located at the extreme northern end of the Puget Lowland physiographic province near where the lowland meets the southern end of the Georgia Lowland in British Columbia. Both lowlands occupy a north-south trending structural trough bordered by the Cascade and Coast Range mountains on the east and by the Olympic Mountains and Vancouver Island on the west. The Strait of Juan de Fuca separates the Olympic Mountains and Vancouver Island and connects the Strait of Georgia with the Pacific Ocean.

The project site is located on a glaciated upland. The Mountain View upland is bordered by the Strait of Georgia to the west; the Lummi Peninsula, Chuckanut Mountain, and Lookout Mountain to the south; and the Cascade Mountain foothills to the east. The upland extends northward into Canada where it terminates at the Coast Range Mountains at Vancouver. The upland is relatively flat with gently rolling hills bisected by small stream valleys tributary to major rivers or to the Strait of Georgia. Major rivers include the Nooksack, which discharges into the Strait of Georgia about 15 miles south of the site, and the Fraser, which empties into the Strait of Georgia at Vancouver about 25 miles to the north. Geologic, soils, topographic, and seismic conditions are fairly uniform over the project site.

Generalized Geologic History

It is widely held that approximately 200 million years ago, the breakup of the supercontinent, Pangaea, opened the Atlantic Ocean along a mid-ocean ridge and resulted in the westward movement of the North American continent and the subsidence of the oceanic crust beneath the western margin of the North American plate. Much of the north Cascade Range and Vancouver Island are composed of exotic terranes created during this time when subcontinents were accreted to the western margin of North America.

Approximately 57 million years ago at the beginning of the Eocene, vast alluvial floodplains covered the region with a lowland semitropical rain forest. This resulted in the deposition of the Chuckanut formation within a faulted, down-dropped basin. Subsequent displacement along the Straight Creek fault (approximately 60 miles to the west), uplift of the lowland basins, and changes in regional tectonics led to folding and thrusting of the Chuckanut formation. The sandstones, conglomerates, shales, and coal deposits of the Chuckanut formation are exposed in the Chuckanut Mountains along the southern margin of the Whatcom Basin immediately south of Bellingham (Easterbrook 1976).

The Puget Lowland has been glaciated numerous times during the Pleistocene epoch, with the last glacial advance occurring about 11,000 years ago; the Olympia interglaciation and the Fraser glaciation represent the two most important geologic units that occurred. The Fraser glaciation represents the most important in terms of the surficial deposits in the area of the proposed cogeneration project site. Successive advance and retreat of glaciers led to glaciomarine, marine, and related deposits in the coastal lowlands of southwestern British Columbia and northwestern Washington (Armstrong et al. 1965), followed by marine waters entering the area.

Topography

Topography of the proposed project is depicted in Figures 3.1-1 and 3.1-2. The proposed cogeneration facility is situated at an elevation of approximately 120 feet above mean sea level (MSL). The adjoining refinery is at an elevation of approximately 100 feet above MSL. As shown in the figures, there is a gentle downward slope (0.5% to 1%) toward the northwest. Terrell Creek is adjacent to the Applicant's habitat enhancement area north of the cogeneration facility. The creek runs through a shallow, narrow depression, which is 10 to 15 feet lower in elevation than the surrounding area.

The transmission system's interconnection elevation ranges from approximately 160 to 120 feet above MSL. The Custer/Intalco Transmission Line No. 2 ranges in elevation over its nearly 5-mile length from approximately 60 feet above MSL at the Custer substation to a high point of approximately 270 feet near the middle of the line and returns to approximately 200 feet above MSL at Intalco. The Alcoa Intalco Works is at an elevation of approximately 200 feet above MSL.

Regional Geology

The upland is underlain by unconsolidated glacial drift, including layers of till, glaciomarine drift, outwash sand and gravel, and fine-grained glaciolacustrine sediments. Drift thickness may reach several hundred feet. Recent sand and silt deposited as alluvium are associated with the Nooksack River. The drift is underlain by Eocene Chuckanut sandstone consisting primarily of thin-to-medium bedded sandstone with occasional layers of conglomerate, siltstone, shale, and coal. The coal beds extend beneath Bellingham Bay where they were extensively mined from the mid-1800s through the 1930s. The sandstone has been substantially folded and faulted and usually dips steeply where exposed. The sandstone is underlain by the Late Jurassic Darrington phyllite, a dark black, highly fractured micaceous metamorphic rock.

While the Chuckanut sandstone and Darrington phyllite have been deformed by folding and faulting, the overlying Pleistocene drift is relatively undeformed. The drift is too young to have experienced deformational forces over significant lengths of geologic time.

Project Area Geology

Figure 3.1-3 is a generalized geologic map of the project site and surrounding area. The site is underlain by glacial drift. The drift is comprised of the following deposits described in order from youngest to oldest:

Figure 3.1-1: Project Site Topography North of Grandview Road

Figure 3.1-2: Project Site Topography South of Grandview Road

Figure 3.1-3: Geologic Map

Quaternary

Glacial Outwash - Very limited thin deposits of sand and gravel occur at the land surface and overlie Bellingham drift. The sand and gravel are loosely consolidated and are well sorted to silty. This deposit is interpreted to be glaciofluvially reworked sediment from the Bellingham glaciomarine drift (Easterbrook 1976). The presence of this sand and gravel at the project site is unknown, but if present, it is not expected to be extensive. The sand and gravel are quite permeable and transmit water readily.

Bellingham Glaciomarine Drift – This deposit consists of a gray, nonsorted, and nonstratified pebbly sandy silt and pebbly clay. Published data suggest that the Bellingham drift is about 80 feet thick below the project site. The drift is generally firm to dense and may contain marine invertebrate fossils. Permeability is low and where exposed at land surface, the drift will pond water in closed topographic depressions. It was formed as sediment trapped in melting glacial ice floating in seawater accumulated on the sea bed. Bellingham drift covers the entire project site up to a thickness of 80 feet.

Deming sand – The sand is brown, stratified, well-sorted, and medium-to-coarse grained with some layers of silt, clay, and gravel. The sand is 30 to 40 feet thick below the project site and is generally dense. It is permeable and acts as an aquifer, though it appears to be discontinuous or is pinched out to the east and northeast of the project site.

Undifferentiated sedimentary deposits - This is a group of unconsolidated deposits that are not individually identified or distinguishable on project area well logs. The deposits may include the Kulshan glaciomarine drift, Vashon till, Esperance sand, and other glacial and nonglacial sediments underlying Bellingham drift. The thickness and consistency of these deposits vary substantially; however, in general, consistencies tend to be denser than those of the overlying deposits. Granular sediments have higher permeabilities than finer-grained sediments.

Pre-Quaternary

Undifferentiated sedimentary rock - The unconsolidated deposits are likely underlain by bedrock of the Chuckanut sandstone. These rocks were encountered at 210 and 256 feet below ground to the north and northeast of the project site.

Surficial Soils

Soil types in the project vicinity are shown in Figure 3.1-4 (Goldin 1992). These soil types are described below.

12 - Birch Bay silt loam (0 to 3% slopes) encompasses the northwestern portion of the project site. This deep, moderately well-drained soil is reworked glaciomarine drift material. Permeability is moderate in the upper part, very rapid in the sandy upper part of the substratum, and slow in the loamy lower part. Runoff is very slow and there is little or no hazard of erosion (Goldin 1992).

Figure 3.1-4: Soil Types

80 – Kickerville silt loam (0 to 3% slopes) is found on a low hill in the northeast section of the project site north of Grandview Road. This deep, well-drained soil is found on outwash terraces. Permeability is moderate in the upper part and little or very rapid in the substratum. Runoff is very slow and there is no hazard of erosion (Goldin 1992).

93 – Labounty silt loam (0 to 2% slopes) encompasses the eastern portion of the transmission system intertie. This deep, poorly drained soil is found on reworked glaciomarine drift material. Permeability is slow. Runoff is very slow, and surface ponding may occur during the winter and spring. There is little or no hazard of erosion (Goldin 1992).

94 – Labounty silt loam, drained, (0 to 2% slopes) is found north of the project site, north of Grandview Road. Its description is the same as 93 above, except it is artificially drained to permit fieldwork earlier in the spring and increase yields of perennial crops (Goldin 1992).

171 – Urban land is found west and southwest of the project site. It consists of areas covered by streets, buildings, parking lots, and other structures that obscure the ground so that identification of the soil type is not feasible (Goldin 1992).

184 – Whitehorn silt loam (0 to 2% slopes) encompasses most of the project site. This deep, poorly drained soil occurs in depressions on glaciomarine drift plains. Permeability is moderately slow. Runoff is very slow, and there is little or no hazard of erosion (Goldin 1992).

The erosion factor K (potential for erosion) for soils at the project site (Birch Bay – Whitehorn) ranges from 0.10 to 0.49 (low to high). The risk of erosion of undisturbed soils in the vicinity of the site is low because of the relatively flat slopes and vegetative cover.

Geologic and Natural Hazards

Geologic and natural hazards that could affect the cogeneration facility and associated infrastructure include:

- seismic hazards,
- erosion hazards as a result of flooding,
- volcanic hazards, and
- tsunami hazards.

Seismic Hazards

The site is located in seismically active western Washington. Two of the earth's crustal plates collide offshore from Washington's coast. The Juan de Fuca oceanic plate moves eastward and collides with the North American continental plate, which is moving relatively westward. Because the continental plate is less dense than the oceanic plate, the oceanic plate dives and is subducted beneath the continental plate. The stresses developed as the two plates collide release energy in the form of earthquakes. Earthquakes associated with plate collisions are generally deep (greater than 15 miles below ground surface), often at around 40 miles beneath the land

surface. Some of the energy released by these earthquakes is absorbed as it passes through the earth's crust, reducing impacts at the surface.

The plate collision induces stresses in the bedrock of the continental crust. If induced stress is sufficient, the crustal rocks will fracture, creating faults. Movement along these faults releases energy causing shallow earthquakes at less than 15 miles beneath the land surface. Two faults are recognized in northwestern Washington. The Devils Mountain Fault is located in the Cascade Mountain foothills and extends northwesterly and westerly to northern Whidbey Island. The Vedder Mountain Fault runs northeast-southwest just south of Sumas and Everson, Washington. The fault is projected to extend to the Lummi Peninsula. A third fault, the Sumas, is hypothesized to extend parallel to the Vedder Mountain fault just north of Sumas. Direct association of earthquakes with these faults is uncertain. Historical earthquakes are listed in Table 3.1-1.

Table 3.1-1: Historical Western Washington Earthquakes with a Magnitude 5.0 or Greater

Year	Location	Magnitude	Depth
1909	Friday Harbor	6.0	deep
1932	Granite Falls	5.7	shallow
1949	Olympia	7.1	deep
1965	Tacoma	6.5	deep
1976	West of Friday Harbor	5.1	deep
1990	Deming	5.0	shallow
1995	Tacoma	5.0	deep
1996	Duvall	5.6	shallow
2001	Olympia	6.8	deep

Western Washington is listed as being in a Seismic Zone 3 in the Uniform Building Code. Seismic Zone 3 areas require a certain level of design to avoid damage from earthquakes that is not required in Seismic Zones 1 and 2. Earthquakes can damage structures and utilities in several ways:

- Ground Acceleration – The initial energy wave felt during an earthquake compresses the ground as it moves. The compression can move the ground surface laterally such that the ground surface accelerates quickly beneath structures on the land surface. This acceleration can severely damage structures. Seismic Zone 3 areas can experience ground acceleration between 0.2 to 0.3 times the acceleration of gravity
- Ground Shaking – Complex energy waves follow the compression wave from an earthquake. The complex waves can impart a great deal of energy into the ground and cause severe shaking in structures. The closer a site is to the source of the earthquake, the greater the ground shaking. The degree of ground shaking is also related to the earthquake's magnitude and the soils underlying the site. Unconsolidated soils tend to slow earthquake energy waves, thereby increasing their amplitude, which in turn increases ground shaking. Earthquake waves traveling through bedrock move at a much greater velocity and have smaller amplitudes resulting in less ground motion.

- **Ground Surface Rupture** – If ground shaking is excessive, the ground surface may rupture, potentially damaging structures. Ground surface ruptures are neither areally extensive nor common during western Washington earthquakes.
- **Differential Settlement** – Strong ground motion may compress unconsolidated soils. Loads induced by structures can enhance this process. More loosely consolidated soils may settle greater amounts, thereby removing foundation support and damaging overlying structures. Underground utilities can also be damaged in this manner.
- **Landslides** – Steep slopes where unstable geologic conditions exist are prone to landslides. Triggering mechanisms, such as earthquakes, can initiate both large and small landslides in such areas. Some of the largest and most spectacular landslides in western Washington were the result of earthquakes.
- **Soil Liquefaction** – Certain soil types with a distinct combination of physical properties and moisture content are susceptible to liquefaction. In this process, the friction between the soil grains that binds the soil cohesively is overcome by the pore pressure of the water in the soil pore spaces. This results in the soil behaving like a viscous liquid. Structures located on such soils can settle substantially and suffer severe damage.

Potential impacts to the site from these hazards are addressed in the following sections.

Ground Acceleration

Compliance with design criteria outlined for Seismic Zone 3 in the Uniform Building Code would protect against damage from ground acceleration.

Ground Shaking

A useful way to describe earthquake shaking for engineering purposes is in terms of peak ground acceleration (PGA). This measure provides useful information about the forces that might be applied to engineered structures during earthquake shaking.

The U.S. Geological Survey (USGS) National Seismic Hazard Mapping Project has completed a probability seismic hazard assessment for the contiguous U.S. USGS estimates probable seismic hazards by considering the probability of occurrence of all earthquakes and ground motion associated with these earthquakes and calculating the probability that a certain level of shaking would be exceeded in a chosen time period. The 10% probability of exceeding a mean PGA value in a 50-year period is a common measure used in engineering studies. (This probability also can be expressed as a 90% probability that ground motion will not occur in 50 years.) This is equivalent to the mean ground motion with a return period of 475 years.

The proposed project site is located in an area of moderate earthquake hazard. A PGA of 0.23 (expressed in units of gravity) has a 10% chance of being exceeded in the next 50 years. Strong shaking of 0.54 gravity has a 1% chance of being exceeded in 50 years. These levels of earthquake shaking are estimated for weak rock sites. The character (frequency and duration) of earthquake shaking at the proposed project site would be different than that calculated by the USGS models because the proposed project site is underlain by more than 200 feet of sediment. Sediment layers would modify the character of earthquake ground motion.

The cogeneration facility is underlain by more than 200 feet of Quaternary-age glaciofluvial and glaciomarine deposits. The upper 100 feet of these deposits is typically soft to medium stiff glaciomarine drift to about 50 feet below ground. Below about 50 feet the drift is very stiff to hard.

The upper 50 feet of sediment is expected to have a low average “shear wave velocity.” Average shear wave velocity in the upper 100 feet of soil determines earthquake response, and shear wave velocity is used to characterize the soil profile type in the 1997 UBC. Low average shear wave velocity deposits can filter out short-term ground motion and amplify the longer duration ground motion. Amplification during longer duration motion is potentially more damaging to tall structures and requires consideration during design. The magnitude of site amplification would depend primarily on the frequency, content, and intensity of the ground motion and local soil conditions. Topographic amplification of earthquake shaking is not expected at the project site because of the low topographic relief. In addition, the impact of ground shaking on underground utilities is expected to be minimal.

Landsliding

Earthquake-triggered landslides are not a potential hazard at the proposed project site because there are no steep slopes in the area.

Soil Liquefaction

Preliminary analysis of subsurface soils close to the project site indicates that soils lack the physical properties that lead to liquefaction. Without these properties being present, the potential for liquefaction at the project site is low.

Ground Surface Rupture

No active faults are known to exist beneath the project site; however, the Vedder Mountain and Sumas faults extend across Whatcom County in a southwesterly direction (see Figure 3.1-5). Analysis indicates that the potential hazard from surface faulting at the project site is low.

Differential Settlement

Site surficial soils have the potential for settlement based on their consistency and moisture content. The foundations for various structures and equipment, particularly vibrating equipment, should be designed to compensate for potential differential settlement.

Erosion Hazards as a Result of Flooding

The proposed cogeneration facility and associated structural components are located outside any 5-, 100-, or 500-year floodplains, as designated by the Federal Emergency Management Agency (FEMA). Site soils are fairly impervious (clay/silt), and topography is relatively flat. Also, vegetation is well established. Based on these factors, there is a low risk for erosion from flooding.

Figure 3.1-5: Seismotectonic Map of Northwest Washington and Southwest British Columbia

Volcanic Hazards

Five major composite volcanoes (or stratovolcanoes) are located in the state of Washington, all of which are part of the Cascade Range, a volcanic arc that stretches from southwestern British Columbia to northern California. These five volcanoes are Mount Baker, Glacier Peak, Mount Rainier, Mount St. Helens, and Mount Adams. All Washington volcanoes except Mount Adams have erupted within the last 250 years (Pringle 1994).

Of the five Washington volcanoes, only Mount Baker, and to a far lesser degree Glacier Peak, has any potential to affect the proposed project. Mount Baker is approximately 45 miles to the east and Glacier Peak is approximately 100 miles southeast of the project site.

In the case of a volcanic eruption, tephra (ash) deposition would be the biggest concern at the proposed project site; lava and debris flow would not be a concern because of the distance of Mount Baker and other Cascade volcanoes from the project site. The annual probability for the deposition of 0.39 inch or more of tephra at the project site from any Cascade volcano is 0.02%. The annual probability for the deposition of 3.9 inches or more of tephra at the project site from any Cascade volcano is less than 0.01%. Mount Baker has not historically produced large amounts of tephra and probably will not do so in the future (Gardner et al. 1995).

Tsunami

The vulnerability of the proposed project site to tsunamis that have been historically recorded or interpreted from the geologic record is very low. The site is at an elevation of 120 feet above MSL and is 2 miles from the Strait of Georgia. Sea cliffs ranging from 60 to 100 feet high protect most of the shoreline along the Strait of Georgia closest to the project site.

The shoreline near the project site is generally protected from tsunamis generated from distant trans-Pacific sources or Cascadia subduction zone seismic events by the relatively narrow confines of the Strait of Juan de Fuca and Strait of Georgia, and the buffer of the San Juan and Gulf islands. Similar protection is afforded from tsunamis generated from a large seismic event along the Seattle fault to the south. More commonly, a tsunami could be generated from a local earthquake disturbing the sea floor or by slumping along the front of the Nooksack delta (Easterbrook 1973). Such a tsunami could have severe local shoreline impacts, but is not expected to affect the proposed project.

3.1.2 Impacts of the Proposed Action

Construction

Cogeneration Facility

Excavation and Fill Materials

The existing terrain at the cogeneration facility and refinery interface area is relatively flat. Therefore, extensive grading of the site will not be required. It is anticipated that some unsuitable

materials may require removal and that some imported fill of suitable quality will be needed for replacement, site preparation, and backfill. The imported fill, sand, and aggregate gravel would be obtained from local sources within Whatcom County. Site grading would use onsite fill to the extent possible to reduce the need for imported fill. Acquisition of fill material and sand and gravel would be the responsibility of the construction contractor.

Construction bulk materials including soil, sand, and gravel would be supplied locally from existing permitted sources and quarries. The total quantity of imported fill material is estimated to be approximately 126,000 cubic yards (75,600 tons). This quantity includes pavement base course material for the plant roadway and parking area and gravel surfacing material for the switchyard and power block areas. Impacts on the local sources and quarries of bulk construction materials will be consistent with those types of extractive land uses within the limitations of the permit requirements for these facilities. Specific sources had not been identified at the time of Draft EIS preparation. However, total gravel resources in Whatcom County that have been permitted for extraction represent 55.2 million tons. The permitted, active mines in Whatcom County are depicted in Figure 3.1-6. Based on estimates for the cogeneration project, approximately 27,000 tons of gravel would be required. Therefore, existing permitted sources of gravel (and fill material) would likely not be significantly impacted by construction of the project.

Undesirable site soils (with respect to engineering properties) would be removed and disposed of at an approved offsite location. Specific disposal locations would be determined during final project design and would be approved according to the requirements of a Whatcom County Clearing and Grading Permit for the project.

Soil Contamination

A very low potential exists for encountering contaminated soil within the proposed project site. Based on a review of historic aerial photographs and interviews with long-time BP employees, project areas were used for agriculture before the refinery was built and therefore are not expected to be sources of hazardous materials.

There is a potential for impacts on site soils through accidental spills of construction chemicals or through fuel and lubricant leaks from construction equipment. This issue is discussed in greater detail in Section 3.4 Water Quality and Section 3.16 Health and Safety. Effective implementation of the Stormwater Pollution Prevention (SWPP) plan and Spill Prevention Control and Countermeasures (SPCC) plan would limit the extent of soil contamination.

Topographic Modifications

No significant topographic modifications would be required to prepare any of the project sites because slopes range from only 0.5% to 1% (see Figures 3.1-1 and 3.1-2). Site grading would include cutting and filling with slopes directing stormwater drainage toward collection structures. Some unsuitable onsite materials would require removal, and some imported fill of suitable quality would be needed for replacement, site preparation, and backfill. This fill material would have minimal impacts on existing topography.

Figure 3.1-6: Permitted, Active Surface Mines in Whatcom County

Any clearing and grading activities would be accomplished using construction machinery such as excavators and bulldozers. Blasting to modify topography is not anticipated.

Erosion

Existing slopes range from 0.5% to 1%, with minimal potential for significant erosion. The potential for erosion would be further reduced by using the Best Management Practices (BMPs) described below in Section 3.1.5. Site grading and stockpiling would expose soils and would increase the potential for erosion. However, exposed and stockpiled soil would be controlled by the procedures and mitigation measures described below in Section 3.1.5.

Refinery Interface

Potential impacts from excavation, filling, and soil contamination described for the refinery interface components are similar to those described for the cogeneration facility construction. A greater potential exists for contacting contaminated soils during excavation activities on the refinery site because of industrial practices that have occurred there since the early 1970s. Topographic modifications and erosion hazards would be similar to those described for construction at the cogeneration facility site.

Transmission System

The access/maintenance roads leading to the transmission line corridor, as well as the construction access and maintenance road along the corridor and three of the four transmission tower pads, were previously graded under an existing Section 404 Permit. One additional 50-foot by 50-foot pad would be graded adjacent to the existing Custer/Intalco Transmission Line No. 2. Therefore, only very limited clearing and grading would be required to complete this project element.

Custer/Intalco Transmission Line No. 2

This specifics for this project element are still under development. One option being considered is replacing the existing single-circuit line with a double-circuit line. This would require placement of new towers. The location and number of these towers has not yet been determined. Also unknown is whether any new construction access roads would need to be established. These activities, if this option was chosen, may require clearing, grading, and topographic modification. There also could be exposed soil susceptible to erosion.

Other Project Components

Construction activities at Intalco would include excavation (presumably in a previously disturbed industrial area) to establish a 10-foot by 40-foot by 10-foot deep sump. Given that this would occur on land used for industrial purposes, there is a possibility of encountering contaminated soils. Topographic modifications would be minor and localized. There is an increased erosion risk while soils are exposed.

Construction of cogeneration facility access roads would require minor clearing and grading. Topographic modifications would be minimal because the existing topography is flat. There would be an increased erosion risk when soils are initially exposed until compaction and surfacing activities are completed.

Topographic modifications associated with the mitigation wetlands would involve filling some ditches on both compensatory wetland mitigation sites (CMA 1 and CMA 2) and construction of a level trench at about elevation 98 on CMA 2. Ditches in CMA 1 and CMA 2 would be filled primarily with material originally excavated to create them. For Laydown Area 4 and the northern approximately 273 feet of Laydown Area 2, fill would be removed at the end of project construction and wetland hydrologic conditions would be restored to the extent possible. Potential impacts to earth resources would be similar to those described for cogeneration facility construction.

Operation

Cogeneration Facility

Facility Operation and Maintenance

No significant impacts on soils or local topography are anticipated during the operation and maintenance of the cogeneration project. Additional fill or aggregate materials may be needed for repairs to roads and underground utilities, but the amounts would be minimal. The surface topography of the site is not expected to be altered after construction of the cogeneration facility.

Seismic Hazard

As discussed in Section 3.1.1, risk of a seismic event causing significant damage to the cogeneration facility and ancillary components is low because design criteria outlined for Seismic Zone 3 in the Uniform Building Code would be incorporated into the design. A large earthquake could affect operation of the cogeneration facility. However, it is unlikely that the impacts would be significant.

Volcanic Hazard

As discussed in Section 3.1.1, the greatest risk to the project from volcanic activity is from tephra (ash) fall. The probability of this impacting the cogeneration facility is low. Cogeneration facility operations would be suspended until tephra fall ceased and this material was cleaned up.

Refinery Interface

Impacts to earth resources and from natural hazards to components of the refinery interface are expected to be similar to those described for the cogeneration facility. It is possible that a large seismic event could damage pipelines. Damaged water pipelines could leak their contents until valves were closed. Ruptured gas lines could lead to fire and explosion. The probability of a large seismic event affecting pipe integrity is low due to design considerations.

Transmission System and Custer/Intalco Transmission Line No. 2

No impacts to earth resources are expected from operation of the transmission system or the Custer/Intalco Transmission Line No. 2. A large seismic event could damage transmission line towers and interrupt the flow of electricity.

Other Project Components

No impacts to earth resources are expected from operation of the water supply facilities at the Alcoa Intalco Works. A large seismic event could disrupt this facility.

3.1.3 Impacts of No Action

Under the No Action Alternative, most of the new facilities would not be constructed and no impacts on soils would occur. No construction impacts from the removal and handling of soil within the project site would occur. There would also be no change to the existing supply of fill materials from quarries in Whatcom County.

3.1.4 Secondary and Cumulative Impacts

No long-term secondary or cumulative impacts to earth resources from the proposed project or other reasonably foreseeable projects are expected. Some fill material would be supplied to the project from offsite sources and some material excavated from the site would need to be disposed of offsite. This would occur at approved or permitted locations.

Other construction projects in the area not associated with the cogeneration facility, such as the proposed Georgia Strait Crossing Project (GSX), also would likely have short-term impacts relating to clearing, excavation, and filling, and topographic modification. Under the proposed Georgia Strait Crossing project, installation of a pipeline along Grandview and Jackson roads would temporarily affect earth resources. Pipeline installation is scheduled to occur about the same time as construction of the proposed cogeneration project. Pipeline construction is expected to disturb surface soils within the 100-foot right-of-way (ROW) immediately north of Grandview Road and west of Jackson Road. The ROW would be cleared and the soil would be stockpiled within the ROW; a trench 6 to 10 feet deep and approximately 6 feet wide would be dug. These activities would affect the native soils within and adjacent to the pipeline ROW. It is anticipated that the topsoil would be restored and the area revegetated following pipeline installation. Thus, no long-term impacts on soils within the pipeline ROW or within the proposed cogeneration project boundaries are anticipated. BMPs used during installation of the pipeline would prevent/reduce impacts on other natural resources.

3.1.5 Mitigation Measures

Mitigation Proposed by the Applicant

Construction

Soil Contamination

In order to confirm the absence of contaminants, soils will be sampled and inspected before and during site clearing, grading, trenching, and other excavation activities. Despite these precautions, if suspect contaminated soil is encountered during trenching and other excavation activities, these activities will be stopped. Qualified personnel will respond to assess hazards and perform characterization. Treatment and/or disposal at an approved facility would depend on the type of contamination found.

A SWPP plan and SPCC plan would be developed and implemented for both construction and operation activities; these plans would outline strategies to prevent or minimize impacts on site soils from chemical spills and leaks of fuel and lubricants. The contents of the SWPP plan and SPCC plan are discussed in greater detail in Section 3.4 Water Quality.

Erosion Control Procedures

BMPs would be implemented during construction and operation for erosion control and prevention. BMPs would be described in a SWPP plan and Temporary Erosion and Sedimentation Control (TESC) plan developed prior to construction and operation. BMPs may include the installation of control structures such as silt fences/straw bales, sediment traps, and diversion ditches. Construction activities would be controlled to limit erosion. Graded areas would be smooth, compacted, free from irregular surface changes, and sloped to drain. Because the existing slopes range from 0.5% to 1%, extensive grading of the site would not be required. Disturbed areas would be surrounded with stabilized soil berms or sand bags to prevent erosion from affecting adjacent areas. Piles of excavated materials would be stabilized and protected using BMPs in accordance with a SWPP plan and TESC plan. Dust control and wind erosion would be controlled by spraying exposed soil with water.

Excavated materials of acceptable quality would be reused as much as possible. Excess materials would be disposed of at permitted fill sites or would be placed where they would not easily erode (i.e., not on slopes steeper than 3:1 unless compacted to the requirements of structural fill). Upon completion of construction, disturbed areas would be revegetated by seeding or hydroseeding. Seed mixes that are known to effectively stabilize erodible soils in northwestern Washington would be selected. Sprinkler systems may be used to sustain vegetation on bermed areas with high exposure to the erosive forces of wind.

Soil stockpiles would be seeded or covered with an emulsion and surrounded by silt fences and straw bales or sand bags, where necessary, to prevent excessive erosion by wind or rain.

Erosion control measures for construction, such as silt fencing, straw bales, and tarps, would be inspected and maintained periodically and after major storms as needed to ensure their continued effectiveness.

Stormwater runoff from the construction site would be collected and routed to a sediment control system. Sediment control measures, such as an oil-water separation system and detention ponds, would be sized for storm events ranging from 6-month, 24-hour up to the 100-year, 24-hour event. Details on the proposed stormwater and sediment control systems are provided in Section 3.4, Water Quality.

Operation

Seismic Hazards

The proposed cogeneration facility and associated infrastructure would be designed and built in accordance with applicable federal, state, and local building standards and codes specifically for power-generating facilities. The characteristics of soils at the proposed project site would be determined during the geotechnical analysis completed during detailed project design. If soils prove to be susceptible to induced amplification, the project design would incorporate protection measures against such seismic events.

Additional Recommended Mitigation Measures

Volcanic Hazards

In the event of tephra fall at the cogeneration facility, it is recommended that all activities at the facility be suspended until the tephra fall has ceased. All mechanical and electrical components and water supply containment structures should then be cleared of the volcanic ash before resuming operations.

3.1.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on earth resources are identified. Project design as well as operation and maintenance planning would minimize potential risks from natural hazards such as seismic and volcanic events.

3.2 AIR QUALITY

This section discusses the impact on air resources from the BP Cherry Point Cogeneration Project. It addresses potential impacts associated with the proposed project and identifies mitigation measures designed to limit those impacts. The analysis in this section is based on information from the Application for Site Certification prepared for this project (BP 2002, Appendix E).

In addition to evaluating the emissions resulting from the cogeneration facility alone, this section describes the Applicant's estimates of emission reductions that would occur with the cogeneration aspect of the proposal. As indicated in Section 1.2.1, BP Cherry Point Refinery Need, one of the purposes of the cogeneration project is to supply both steam and electricity to the existing refinery. The refinery's purchase of cogeneration facility steam would allow the removal of existing less efficient refinery utility boilers, leading to a reduction in regional emissions of particulate matter less than 10 microns in size (PM₁₀) and nitrogen oxides (NO_x). The short and long-range air quality impacts of both the cogeneration facility emissions and the refinery reductions are discussed in more detail below.

3.2.1 Regulatory Framework

Under Chapter 80.50 Revised Code of Washington (RCW), the authority for permit review and issuance of air permits is granted to the EFSEC for thermal generating power plants capable of generating 350 MW or more of electricity. The U.S. Environmental Protection Agency (EPA) has delegated to EFSEC the issuance of federal Prevention of Significant Deterioration (PSD) permits for facilities regulated under Chapter 80.50 RCW. EFSEC reviews applications for air emissions resulting from the operation of such facilities pursuant to the requirements of Chapter 463-39 WAC. EFSEC has adopted the substantive requirements of the Washington Department of Ecology regulations for air pollution sources as codified in Chapters 173-400 WAC (General Regulations for Air Pollution Sources), Chapter 173-401 WAC (Air Operating Permit Program), Chapter 173-406 WAC (Acid Rain Regulation), and Chapter 173-460 (Controls for New Sources of Toxic Air Pollutants).

Air Quality Standards

United States

The proposed cogeneration facility would be regulated according to applicable U.S. federal and Washington State laws and regulations. Pursuant to the Clean Air Act of 1970, the EPA established air quality standards for the following air pollutants: ozone (O₃), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), particulate matter (PM₁₀, PM_{2.5}), and sulfur dioxide (SO₂). These include primary standards that have been established to protect human health and secondary standards to protect the public welfare. Ecology has also adopted Washington Ambient Air Quality Standards (WAAQS) similar to the National Ambient Air Quality Standards (NAAQS), and has included standards for total suspended particulate (TSP).

Particulate matter includes both naturally occurring and man-made particles with a diameter of less than 10 microns or 2.5 microns, respectively. Local and regional contributions of particulate matter include sea salt, pollen, smoke from forest fires and wood stoves, road dust, industrial emissions, and agricultural dust. Particles of this size are small enough to be drawn deep into the respiratory system where they can contribute to infection and reduced resistance to disease (Canadian Federal Government 2002).

Table 3.2-1 summarizes the federal and state primary and secondary standards for the criteria pollutants, and the averaging time for determining compliance with the standards. It also presents the increments under the EPA's PSD program and the EPA PSD Class II significance levels for air quality that are applicable to the proposed project.

Canada

For purposes of review of the impacts to air quality on a regional basis, Canadian regulatory standards and objectives were considered. The Canadian Environmental Protection Act provides for three levels of air quality objectives: desirable, acceptable, and tolerable, which correspond to degrees of environmental damage or potential health effects. The Province of British Columbia also has established air quality objectives that are similar to the Canadian national objectives, and, where no comparable federal objectives exist, the Greater Vancouver Regional District (GVRD) has proposed objectives for pollutants of concern within its jurisdiction. Level A is a descriptor used by GVRD that is equivalent to the desirable objective, and Level B is a descriptor that is equivalent to the acceptable objective in the Canadian Environmental Protection Act. The Canadian Ministers of Environment have established nationwide standards for PM_{2.5} and O₃. These standards establish goals for the year 2010 rather than regulatory limits. Table 3.2-2 summarizes the Canadian National Ambient Air Quality Objectives and Standards.

Regulatory Requirements

The EPA and Ecology have developed air quality regulations and guidelines that require all new or modified "major sources" of air emissions to undergo a rigorous permitting process before commencing construction. The federal program is called New Source Review (NSR). The PSD program is within the overall federal NSR program. The provisions of the federal PSD program are contained in 40 CFR 52.21.

New Source Review

The NSR program applies to new or modified sources that could cause a significant increase in emissions of air pollutants. The objectives of the NSR process are to demonstrate that air emissions from the new source will not significantly impact ambient air quality near the facility and that state-of-the-art emission controls will be applied. NSR incorporates both state and federal requirements.

To satisfy the general NSR requirements, the following information must be submitted:

- Notice of Construction Application form and associated information. This application form is included at the front of the PSD application.
- PSD Applicability Analysis
- "Top-down" BACT Analysis
- Toxic Air Pollutant Review (WAC 173-460)
- Air Quality Modeling Analysis

The requirements for these separate review elements are described in further detail below.

Prevention of Significant Deterioration

PSD review regulations apply to new or modified sources located in an attainment area that have the potential to emit criteria pollutants in excess of predetermined "*de minimus*" values (40 CFR Part 51). For new generation facilities, these values are 100 tons per year (tpy) of criteria pollutants for 28 specific source categories, including power generating facilities, and 250 tpy for all others. The proposed project would be a PSD source because it would emit more than 100 tpy of NO_x, CO, PM₁₀, and PM_{2.5}. Also, the projected potential to emit annual emissions of volatile organic compounds (VOC), SO₂, and sulfuric acid mist (H₂SO₄) exceeds the individual significant emission rate thresholds listed in WAC 173-400-030. VOC is defined as any organic compound that participates in atmospheric photochemical reactions. Therefore, the proposed project is also subject to PSD review for those pollutants.

The PSD review process evaluates existing ambient air quality, the potential impacts of the proposed source on ambient air quality, whether the source would contribute to a violation of the NAAQS, and a review of the Best Available Control Technology (BACT). It should be noted that although NAAQS have been established for PM 2.5, the designation of attainment, non-attainment, and unclassified areas has not yet been performed for this pollutant. PM 2.5 is therefore not a regulated pollutant under the PSD program at this time.

PSD restricts the degree of ambient air quality deterioration that would be allowed by assigning increments for criteria pollutants based on the classification (attainment, non-attainment, or unclassified) of the area. PSD increments have been established for certain criteria pollutants and are interpreted as the maximum allowable ground-level increase of a pollutant concentration. Class I areas are assigned to federally protected wilderness areas, such as national parks, and allow the lowest increment of permissible deterioration. This essentially precludes development near these areas. Class II areas are designed to allow for moderate, controlled growth, and Class III areas allow for heavy industrial use, but in all cases the pollution concentrations cannot violate any of the NAAQSs.

The Class I areas closest to the proposed project include North Cascades National Park, Olympic National Park, Glacier Peak Wilderness Area, Alpine Lakes Wilderness Area, and Pasayten Wilderness Area (Figure 3.2-1). The area around the proposed project is designated Class II where less stringent PSD increments apply. Class I and II increments are shown with the ambient air quality standards in Table 3.2-1.

Significant Impact Levels (SILs) are used in the air quality impact analysis. The SILs are a screening tool to determine the extent of the air quality analysis required to demonstrate compliance with the NAAQSs and PSD increments. The SILs are typically 1 to 5% of the ambient air quality standards and are well below any levels that could lead to adverse health or welfare impacts. These SILs are more restrictive than the NAAQSs and the Canadian National Ambient Air Quality Objectives and Standards.

According to analysis methodologies established by Ecology and the EPA, the impact from a source is not required to be below the SILs. However, these levels set a worst-case scenario, so if the impacts of a source are below the SILs, state and federal agencies consider the impacts to be inconsequential and no further evaluation is required.

Finally, the PSD program also requires an analysis of the impairment to soils and vegetation, and an analysis of visibility, regional haze, and deposition impacts on Class I areas.

State/Local Emission Limits and Best Available Control Technology

As part of the PSD process, EFSEC is reviewing the Applicant's evaluation of alternative emission control technologies. The determination of which control technology best protects ambient air quality is made by the regulatory agency on a case-by-case basis taking into account the associated economic, energy, and environmental impacts. The analysis for BACT identifies pollutant-specific alternatives for emission control, and the costs and benefits of each alternative technology. BACT would reduce emissions of toxic air pollutants, along with those of criteria pollutants. For example, low-sulfur fuel, such as natural gas, is a BACT because of its lower emissions of criteria and toxic air pollutants over other fuels, such as fuel oil or coal. Combustion controls also reduce criteria pollutants by optimizing combustion and reducing pollutants emitted in the exhaust stream.

The determination of BACT at the time of the final air emissions permit review would define the emission limits for the proposed project. BACT for NO_x typically consists of dry, low NO_x technology, or SCR, which is a post-combustion control that uses ammonia and a catalyst to reduce NO_x emissions. Any unreacted ammonia is emitted as a toxic air pollutant, however, and is regulated by Washington State.

Other Air Permit Requirements

New Source Performance Standards

The EPA has adopted federal emission standards applicable to various combustion sources. These emission standards are referred to as the New Source Performance Standards (NSPS). EPA set forth the NSPS for stationary combustion turbines in 40 CFR 60, Subpart GG, dated September 1979. These require that NO_x emissions do not exceed 103 parts per million dry volume (ppmdv) at full load operation and that SO₂ emissions not exceed 150 ppmv. They also prohibit the use of fuel containing more than 0.8% sulfur by weight.

Figure 3.2-1

The duct burners are subject to the NSPS for steam generating units in 40 CFR 60, Subpart Db, which limit the NO_x emission for the duct burners to 0.20 lb/mmBtu. No other NSPS emissions standards are applicable to this proposed power generating facility.

Acid Rain

Title IV of the Clean Air Act (also known as the “acid rain” rules) applies to utility projects that started commercial operation on or after November 15, 1990, produce electricity for sale and do not fall into one of the regulatory exemptions. These rules are contained in 40 CFR Parts 72, 75, and 76 and have been adopted into WAC 173-406. The “acid rain” rules will apply to the proposed project’s combustion turbines and duct burners because these units will be utility units serving one or more generators with a nameplate capacity of greater than 25 MW.

The Title IV program consists of three primary requirements. To meet these requirements the Applicant would have to:

1. Submit an “acid rain” permit application at least 24 months before the anticipated date for start of operations,
2. Be subject to requirements for continuous emissions monitoring for NO_x and dilutents gas (O₂ or CO₂) and,
3. Be subject to the “acid rain” recordkeeping and reporting requirements, including the requirement to obtain and document SO₂ allowances.

Hazardous Air Pollutant Regulations

According to EPA Interpretive Rule (Federal Register 65 FR 21363), the proposed cogeneration facility is not categorically exempt from “case-by-case” Maximum Available Control Technology (MACT) determinations (Clean Air Act [CAA] Section 112). However, because no individual hazardous air pollutants (HAP) will have an emission rate greater than 10 tpy and no combination of HAPs will have a total cumulative annual emission rate of greater than 25 tpy, the facility is not subject to the MACT requirements.

No current National Emission Standards for Hazardous Air Pollutants (NESHAPS), as regulated under 40 CFR 61, are applicable to the cogeneration facility, and no current or proposed NESHAPS for sources regulated under 40 CFR 63 apply to the facility. In the future, stationary combustion turbines will be subject to NESHAPS, but since it has not yet been adopted, an applicability determination can not be made at this time.

Title V – Air Operating Permit

The cogeneration facility would be subject to the federal Clean Air Act Part 70 – Title V air operating permit program. The Applicant would have to file a permit application 12 months after facility operations commence.

Table 3-2.1: Ambient Air Quality Standards and Significant Impact Levels

Criteria Pollutants	Averaging Period	National						State of Washington ¹		PSD		EPA Significant Impact Level	
		Primary Standards ¹		Secondary Standards ¹									
		ppm	µg/m ³	ppm	µg/m ³	Class I µg/m ³	Class II µg/m ³						
Total Suspended Particulate	annual	--	--	--	--	--	60	--	--	--	--		
	24-hour	--	--	--	--	--	150	--	--	--	--		
Sulfur Dioxide	annual	0.03	80	--	--	0.02	52 ²	2	20	0.1	1		
	24-hour	0.14	365	--	--	0.10	262 ²	5	91	0.2	5		
	three-hour	0.14	--	0.5	1300	--	--	25	512	1.0	25		
	one-hour	--	--	--	--	0.40 ³	1050 ²	--	--	--	--		
PM ₁₀	annual	--	50	--	50	--	50	4	17	0.2	1		
	24-hour	--	150	--	150	--	150	8	30	0.3	5		
PM _{2.5}	annual	--	15	--	15	--	--	--	--	--	--		
	24-hour	--	65	--	65	--	--	--	--	--	--		
Carbon Monoxide	eight-hour	9	10,000	--	--	9	10,000 ²	--	--	--	500		
	one-hour	35	40,000	--	--	35	40,000 ²	--	--	--	2,000		
Ozone	one-hour	0.12	235	0.12	235	0.12	235 ²	--	--	--	--		
	eight-hour	0.08	176	0.08	176	--	--	--	--	--	--		
Nitrogen Dioxide	annual	0.053	100	0.053	100	0.05	100	2.5	25	0.1	1		
Lead	quarterly	--	1.5	--	1.5	--	--	--	--	--	--		

Source: WAC 173-400 and 40 CFR 52.21

Notes: µg/m³ = micrograms per cubic meter

ppm = parts per million by volume, dry basis

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

2 Values are calculated equivalent to regulated value.

3 The 0.40 ppm standard is not to be exceeded more than once per year

Table 3.2-2: Canadian National Ambient Air Quality Objectives and Standards ¹

Pollutant	Averaging Period	Canada Objectives ² (µg/m ³)		BC and GVRD Objectives ³ (µg/m ³)		Canada-Wide Standard (µg/m ³)
		Desirable	Acceptable	Level A	Level B	
Sulfur dioxide	annual	30	60	25	50	---
	24-hour	150	300	160	260	---
	three-hour	---	---	375	665	---
	one-hour	450	900	450	900	---
Total suspended particulate	annual	60	70	60	70	---
	24-hour	---	120	150	200	---
Inhalable particulate (PM ₁₀) ⁴	annual	---	---	---	30	---
	24-hour	---	---	---	50	---
Fine particulate (PM _{2.5}) ^{5,6}	24-hour	---	---	---	---	30
Carbon monoxide	eight-hour	6,000	15,000	5,500	11,000	---
	one-hour	15,000	35,000	14,300	28,000	---
Ozone	24-hour	30	50	---	---	---
	eight-hour ⁵	---	---	---	---	127
	one-hour	100	160	---	---	---
Nitrogen dioxide	annual	60	100	---	---	---
	24-hour	---	200	---	---	---
	one-hour	---	400	---	---	---
Total reduced sulfur	24-hour	---	---	3	6	---
	one-hour	---	---	7	28	---
Lead	annual	---	---	2	2	---
	24-hour	---	---	4	4	---
Zinc	annual	---	---	3	3	---
	24-hour	---	---	5	5	---

Source: GVRD 2002

1 The tolerable objective is the least strict of the Canadian objectives, so no column is presented in the table showing these values.

2 Federal objective unless otherwise noted.

3 British Columbia Provincial objective unless otherwise noted.

4 GVRD objective.

5 Canada-wide standard to be achieved by year 2010.

6 Based on the 98th percentile, average over a three-year period, and established by the Canadian regulatory agencies.

Title III – Prevention of Accidental Releases

Because the cogeneration facility proposes the use of anhydrous ammonia in the SCR emissions control system, the facility could become subject to the Prevention of Accidental Release provisions of the 1990 Clean Air Act Amendment, Section 112. If the proposed cogeneration facility is subject to these provisions, a Risk Management Plan would be required covering storage, handling, and use of ammonia.

3.2.2 Existing Conditions

Climate

The proposed project is in the Puget Sound lowlands, a north-south topographical depression bordered on the east by the Cascade Mountains and the west by the Olympic Mountains and

Vancouver Island. The project site is located in an area known as the Mountain View upland. The climate at the site is influenced by marine air that flows east from the Pacific Ocean and through the Straits of Georgia and Juan de Fuca. Occasionally, cold, dry continental air flows from the east-northeast through the Fraser River canyon.

According to data from the BP Cherry Point Refinery's meteorological seven-year monitoring program (1995-2001), the maximum high temperature recorded was 86°F (1998) and the record low temperature was 10°F (1996). Over the seven years of monitoring, January and December had the lowest temperature average of 40°F while July and August had the highest average of 60°F. Relative humidity is not measured as part of the BP meteorological measurements program. However, other published data demonstrate the influence of the marine climate at the project site. Afternoon humidity readings are typically in the 60% range during summer months and in the mid- to upper 80% range during winter months (Pacific Northwest River Basin Commission 1968). Higher relative humidity can be expected with the passage of migratory storm systems from the west. Lower humidity can be expected with high pressure over eastern British Columbia and eastern Washington.

Predominant winds at the project site are from the south to south-southwest and from the east-northeast. On an annual basis, winds from the south and south-southwest occur with a frequency of about 24%. Winds from the east or east-northeast occur about 21% of the time, and winds from the west to northwest occur about 20% of the time

Dust

The air in the vicinity of the project site is generally free of dust. The area around the site is predominantly rural, agricultural land with some populated areas within a few miles of the site. The agricultural land is predominantly covered with grass and is used for cattle grazing. Typical farming activities, such as soil tilling that create dust clouds, occur infrequently.

Dust-control measures regulated by the Northwest Air Pollution Authority (NWAPA) are aimed at preventing particulate matter from becoming airborne from untreated open areas (NWAPA 2003).

Odor

Over the past three years the NWAPA has received several odor-related complaints due to the existing refinery. A sulfur smell has been the most prevalent complaint, however, local officials who responded to the complaints have not detected or found any of these odors. Compared to other facilities of this type, the existing refinery has received minimal complaints (Billington, pers. comm., 2003).

Existing Air Quality

United States

Based on air quality monitoring information, Ecology and the EPA designate geographic regions as being in “attainment” or “nonattainment” if the region is in compliance or noncompliance with air pollutants listed under the NAAQSs (Table 3.2-1). Whatcom County and the surrounding area are in attainment for all air pollutants regulated by the NAAQS and the WAAQS.

The NWAPA operates monitoring sites for a variety of air pollutants within Whatcom County. Pollutants monitored by or reported to the NWAPA include SO₂, PM₁₀, PM_{2.5} and O₃. Data are reported as an air quality index (AQI) where levels are characterized as good, moderate, or unhealthy.

Data from the Lynden-Custer site indicate that no moderate or unhealthy days occurred in calendar year 2001 (all 365 days were in the “good” range). At the more urban Bellingham site, there were no moderate or unhealthy days for PM₁₀ (all 365 days were in the “good” range) and there were 6 days where the PM_{2.5} air quality index was in the moderate range. The Lynden-Custer site is representative of a rural “background” area while the Bellingham site is representative of a more mixed urban and rural area, where higher pollution levels are typically expected.

In Bellingham (Yew Street), PM₁₀ is collected continuously by a Rupprecht and Patashnick TEOM 1400 sampler. These data are summarized and reported by the NWAPA. For the years summarized, the maximum 24-hour PM₁₀ concentration was 53 micrograms per cubic meter (µg/m³). According to the three-year data presented, the maximum annual average PM₁₀ concentration in Bellingham was 13.7 µg/m³. In March 1999, this PM₁₀ sampler was moved to its current Yew Street location from its previous location on Iowa Street.

NWAPA has operated a PM_{2.5} sampler in Bellingham since February 1999 (Yew Street). This site is currently co-located with the Bellingham PM₁₀ measurements. The NWAPA also reports ozone data for a Lynden-Custer site. For calendar year 2001, no moderate or unhealthy days were experienced (all 365 days were in the “good” range). BP also operates an SO₂ monitor at the refinery. According to the NWAPA data summary for SO₂ at Blaine, all 365 days in calendar year 2001 were in the “good” range.

Air quality monitoring indicates that since 1999 (for PM₁₀, PM_{2.5}) and 2001 (for SO₂ and O₃), no moderate or unhealthy days have been recorded in Whatcom County.

Canada

Ambient air quality data have also been summarized by pollutant for the closest ambient monitoring stations in Canada. The Surrey and Langley sites are the closest sites in Canada to the project that monitor PM₁₀, CO, NO_x, and O₃. They are located approximately 16.2-mile to the north and northeast, respectively, from the cogeneration project site. The Richmond and

Abbotsford sites are the closest sites in Canada that monitor SO₂, and they are located 23 miles to the northwest and 22 miles to the northeast, respectively, from the cogeneration project site. Pitt Meadows and Vancouver Airport are the closest sites in Canada to the cogeneration project site that measure PM_{2.5}, and they are located 24 miles to the north and 27 miles to the northwest, respectively, from the project site. A summary of the ambient monitoring sites is shown in Table 3.2-3.

Table 3.2-3: Ambient Monitoring Stations in Canada

Station	Station ID	Distance from Project Site (miles)	Direction from Project Site	Pollutants Measured
Surrey	T15	16.5	N	PM ₁₀ , CO, NO ₂ , O ₃
Richmond	T17	23.1	NW	SO ₂
Pitt Meadows	T20	24.5	N	PM _{2.5}
Langley	T27	16.3	NE	PM ₁₀ , CO, NO ₂ , O ₃
Vancouver Airport	T31	27.0	NW	PM _{2.5}
Abbotsford	T33	22.3	NE	SO ₂

For the Canadian air quality data, the maximum and 98th percentile concentrations for each pollutant and averaging time are summarized in Table 3.2-4. Concentrations are listed for 1999 through 2001 for the closest two ambient monitoring stations for each pollutant. The maximum values of the three years and the two stations are also listed.

Table 3.2-4: Background Concentrations in Canada ¹

Pollutant		Ambient Monitoring Station 1			Ambient Monitoring Station 2			Maximum
		1999	2000	2001	1999	2000	2001	
Maximum Concentration (µg/m ³)								
SO ₂	Annual	3	3	3	3	1	3	3
	24-hour	11	13	8	5	5	8	13
	3-hour	19	27	16	19	21	13	27
	1-hour	29	35	29	27	27	29	35
PM ₁₀	Annual	12	13	12	12	13	12	13
	24-hour	34	31	35	32	34	33	35
PM _{2.5}	Annual	8	9	5	9	9	5	9
	24-hour	24	22	19	23	29	17	29
CO	8-hour	2,436	1,740	1,624	2,668	1,740	1,508	2,668
	1-hour	2,900	2,900	2,900	2,900	2,784	4,060	2,900
NO _x	Annual	23	27	21	17	17	17	27
	24-hour	69	67	55	52	48	42	69
	1-hour	107	99	90	84	88	73	107
Ozone	24-hour	88	84	76	94	86	82	94
	1-hour	140	138	166	142	134	160	168

¹ Ambient Monitoring Station 1 is Surrey for PM₁₀, CO, O₃, and NO₂, Richmond for SO₂, and Pitt Meadows for PM_{2.5}. Ambient Monitoring Station 2 is Langley for PM₁₀, CO, O₃, and NO₂, Abbotsford for SO₂, and Vancouver Airport for PM_{2.5}.

Table 3.2-4: Continued

Pollutant		Ambient Monitoring Station 1			Ambient Monitoring Station 2			Maximum
		1999	2000	2001	1999	2000	2001	
98th Percentile Concentrations for short-term averaging times (µg/m³)								
SO ₂	24-hour	5	8	5	5	5	5	8
	3-hour	8	11	8	5	8	5	11
	1-hour	21	24	16	19	19	11	24
PM ₁₀	24-hour	24	25	25	26	27	24	27
PM _{2.5}	24-hour	17	19	15	17	21	15	21
CO	8-hour	1,276	1,044	1,044	1,160	1,044	928	1,276
	1-hour	1,276	1,160	1,740	1,276	1,160	1,624	1,740
NO _x	24-hour	50	52	46	34	32	36	52
	1-hour	61	69	78	48	46	63	78
Ozone	24-hour	72	68	70	76	72	68	76
	1-hour	90	88	112	94	88	114	112

1 Ambient Monitoring Station 1 is Surrey for PM₁₀, CO, O₃, and NO₂, Richmond for SO₂, and Pitt Meadows for PM_{2.5}. Ambient Monitoring Station 2 is Langley for PM₁₀, CO, O₃, and NO₂, Abbotsford for SO₂, and Vancouver Airport for PM_{2.5}.

Monitoring Stations

The GVRD operates air quality monitoring stations in the Lower Fraser Valley of British Columbia. Similar to the United States, Canada's AQI is a measure derived by the GVRD and Lower Fraser Valley Ambient Air Quality Reports. Based on the index criteria, an AQI of less than 25 indicates good air quality. An AQI of 26 to 50 represents fair air quality levels. From 51 to 100, the AQI level is considered to be poor, and above 101 the air quality is considered to be very poor.

Air quality classified as good would show that air contaminants are near the background (ambient) levels, in which air quality poses little health risk within the region. Presently, 98% of the time air quality is at or below this level. Fair air quality within the region reflects that air contaminants are relatively low, however, sensitive individuals and ecosystems may have adverse effects. Currently, air quality is at this level less than 2% of the time. Poor air quality may adversely affect humans, animals, water, and vegetation. On average, air quality is at this level only for a few hours each year. Finally, very poor air quality can pose significant health and environmental risks within the region, leading to immediate government action (GVRD 2003).

Air quality in areas of British Columbia immediately north of the proposed project site is characterized in the good range with some hours characterized as fair. To characterize the existing air quality for areas closest to the U.S./Canada border, the most recent data available from a selection of monitoring stations were evaluated (Surrey, Richmond, Langley, and Abbotsford) and are summarized in Table 3.2-5. Poor and very poor air quality conditions were not recorded at any of these locations in 2000.

Table 3.2-5: GVRD Air Quality Index Data for 2000 ¹

Station	PM ₁₀ (24-hour)	SO ₂ (one-hour)	CO (one-hour)	O ₃ (one-hour)	NO ₂ (one-hour)
Total hours per year with an AQI level of good					
Surrey	8657	NM	8760	8728	8760
Richmond	8476	8760	8760	8748	8760
Langley	8557	NM	8760	8720	8760
Abbotsford	8525	8760	8760	8741	8760
Total hours per year with an AQI level of fair					
Surrey	103	NM	0	32	0
Richmond	284	0	0	12	0
Langley	203	NM	0	40	0
Abbotsford	235	0	0	19	0
Total hours with an AQI level of poor or very poor					
Surrey	0	NM	0	0	0
Richmond	0	0	0	0	0
Langley	0	NM	0	0	0
Abbotsford	0	0	0	0	0

Source: GVRD 2002

NM-The criteria pollutant was not monitored at this location.

Note: SO₂ is not measured at the Surrey and Langley monitoring stations.

¹ Data for calendar year 2000 are the latest available from GVRD.

Sources of Air Pollution in the Project Area

Existing emission sources in the project vicinity include the adjacent refinery, the Alcoa Intalco Works aluminum smelter (approximately 3 miles south-southeast of the project site), the Conoco-Phillips Refinery (approximately 5 miles south-southeast), and the Tenaska Washington Cogeneration power plant (approximately 5 miles to the south-southeast). The NWAPA and Ecology regulate all of these sources.

The Applicant issues annual reports to NWAPA and Ecology for review. These documents contain yearly emission data from the existing facility and are available to the public.

3.2.3 Impacts of the Proposed Action

Construction

Cogeneration Facility

Dust

The use of heavy equipment on the project site during the construction phase would generate dust. Late in the construction process onsite roads and parking areas would be constructed with asphalt over a compacted subbase.

Odors

This would be a localized air emission and is not anticipated to produce an impact.

Natural gas will be supplied to the site primarily through the existing refinery connections to the proprietary Ferndale pipeline, which connects to the West Coast Energy Pipeline at the U.S./Canada border near Sumas. If a leak occurs before preventative instrumentation/measures are conducted, a short-term odor may occur.

Combustion emissions would result from diesel construction equipment, various diesel-fueled trucks, and the private vehicles of workers commuting to the construction site. All site preparation would be completed using conventional methods of construction. General construction equipment would include, but is not limited to: heavy, medium, and light equipment such as excavators, roller compactors, front end loaders, bulldozers, graders, backhoes, dump trucks, water trucks, concrete trucks, pump trucks, utility trucks, cranes, and pile drivers.

Refinery Interface, Transmission System, Custer/Intalco Transmission Line No. 2, and Other Project Components

Construction of the pipelines, transmission lines, and other project components would generate short-term emissions, including fugitive dust and construction equipment exhaust emissions. Fugitive dust would be controlled by conventional construction practices (e.g., road watering, covering of dirt piles) to comply with state regulations.

Operation and Maintenance

The following section relates to information dealing with the operation and maintenance of the proposed cogeneration facility. All other aspects of the proposed project such as the refinery interface, transmission system, Custer/Intalco Transmission Line No. 2, and other project components are not addressed because of the lack of air emissions.

Emission Sources and Emission Controls

The principal sources of emissions from the proposed project during startup and operation would occur from up to three combustion turbines fired by natural gas, and three HRSGs.

Each HRSG would be equipped with low- NO_x duct burners and with selective catalytic reduction and oxidation catalyst systems for the removal of NO_x and CO, respectively. Steam will be produced at high pressure in the HRSG and sent to a single STG. For additional information, see Chapter 2.

The three combustion turbines would be equipped with dry low NO_x combustors that minimize the formation of NO_x and CO. GE would guarantee exhaust concentrations from the combustion gas turbine of 9 parts per million (ppm) for both NO_x and CO. A SCR catalyst bed and ammonia injection grids for the control of NO_x emissions will be installed in the HRSG, as well as a catalytic oxidation bed for the control of CO emissions. Because natural gas is a clean-burning

fuel, there would be inherently low amounts of sulfur formed as a result of the combustion process. Annual emissions rates for NO_x (2.5 ppm) and CO (2.0 ppm) were proposed. Anhydrous ammonia would be used in the SCR control system and some unreacted ammonia would exit the facility stack as ammonia “slip.” However, this ammonia slip would be limited to 5 ppm.

A cooling water system would condense the steam coming from the steam turbine. Cooling water would itself be cooled within the multi-cell cooling tower. The cooling towers would be designed with a very efficient drift elimination system to minimize the formation of PM₁₀. In a mechanical-drift cooling tower there is always a certain amount of water in the form of mist (drift) containing dissolved solids that would exit through the cooling tower stacks. As the drift evaporates, the dissolved solids would form particulate, thereby adding to the PM₁₀ emissions. Typically, cooling towers are designed to maintain a drift at 0.008 % of the amount of circulating water flow. The proposed project would incorporate ultra-low drift elimination devices in the cooling towers, which would maintain drift at a level of 0.001% of the amount of circulating water flow. Only a portion of the drift is particulate matter; the remainder is water, which evaporates.

The features listed below, which are incorporated into the proposed cogeneration facility, represent BACT:

- Dry low NO_x combustion technology on the combustion gas turbines which limits NO_x and CO emissions from the combustion gas turbines to 9.0 ppm,
- SCR technology incorporated in the HRSGs that further reduces total NO_x emissions to a 2.5 ppmvd basis, and
- Oxidation catalyst controls incorporated into the HRSGs that reduce CO emissions to 2.0 ppmvd and VOCs reduced by approximately 30% with the application of the CO oxidation catalyst.

Emissions of Criteria Pollutants

The combustion turbine is an internal combustion turbine with emissions varying with ambient temperature and load condition. Since turbine operating parameters are directly affected by the ambient temperature, the ambient temperatures of 5°F, 50°F, and 85°F are considered in the emission calculations. These temperatures are chosen to represent one winter condition (5°F), an annual average condition (50°F), and one hot summer condition (85°F). Turbine emissions are higher at lower ambient temperatures. For each of these temperatures, three load conditions are considered: 100 (base load), 75, and 50% load. For purposes of establishing the PSD permit emission limits, it is conservatively assumed that the gas turbines will operate 24 hours per day, 7 days per week.

The proposed emission units for the cogeneration facility are as follows:

- Three General Electric Frame 7FA combustion turbines (approximately 1,614 mmBtu/hour lower heating value for each turbine at 50°F and base load conditions),
- One diesel-driven emergency generator, about 1,500 kW in size,

- One diesel-driven firewater pump, about 265 horse power in size, and
- One multi-cell cooling tower.

The following operating scenario was considered as resulting in maximum emissions, and was used as the basis for the proposed permit limits:

- Base load on natural gas with duct burners operating on natural gas at a maximum rate for up to 7,960 hours per year, 50% load for up to 300 hours per year, and 100 hot starts per turbine and shutdowns with the remaining hours offline.
- A mixture of partial load and base load turbine operations (between 50% and base load) could occur for up to 8,760 hours per year. Emissions for partial loads are less than those at base load.
- An emergency diesel generator operating for testing and maintenance purposes for approximately two hours a week on any given day and up to a maximum of 250 hours per year.
- A firewater pump operating for testing and maintenance purposes for approximately two hours a week on any given day and up to a maximum of 250 hours per year.
- A cooling tower (PM₁₀ only) operating at peak capacity 24 hours per day, 7 days per week, 52 weeks per year.

Hourly criteria pollutant emission rates from auxiliary equipment such as the cooling tower, emergency diesel generator, and the emergency firewater pump are shown in Table 3.2-6.

Table 3.2-6: Hourly Criteria Pollutant Emission Rates – Auxiliary Equipment

Operating Unit	Hourly Emissions (lbs/hr)				
	NO _x	CO	VOC	PM ₁₀	SO ₂
Emergency generator	27.5	6.9	1.3	0.7	0.80
Firewater pump	3.33	0.17	0.14	0.05	0.105
Cooling tower	NE	NE	NE	1.63	NE

Source: BP 2002

NE = no emissions

Annual maximum potential emissions from the cogeneration facility and the auxiliary equipment are shown in Table 3.2-7.

Table 3.2-7: Annual Maximum Potential Criteria Pollutant Emissions

Operating Unit	Annual Emissions (tons/year)				
	NO _x	CO	VOC	PM ₁₀	SO ₂
Cogeneration Facility Turbines	229.4	156.8	42.2	254.4	50.9
Emergency generator	3.4	0.9	0.16	0.09	0.0995
Firewater pump	0.42	0.021	0.018	0.006	0.0131
Cooling tower	NE	NE	NE	7.1	NE
Total	233.3	157.7	42.3	261.6	51.0

Source: BP 2002

NE = no emissions

Note: Totals may not equal sum of individual components due to rounding. Refinery emissions reductions are excluded.

PSD Air Quality Impact Assessment

For purposes of the PSD assessments described below, emissions for the cogeneration facility were considered without taking into account any emission reductions that would occur at the refinery following removal of existing steam boilers.

PSD regulations require an assessment of the project's impact on air quality related values (AQRV) in Class I areas. AQRVs include regional visibility or haze; the effects of primary and secondary pollutants on sensitive plants; the effects of pollutant deposition on soils and water bodies; and effects associated with secondary aerosol formation. These requirements provide special protection for Class I areas.

Class I areas within a 124-mile radius of the project site include: North Cascades National Park, Olympic National Park, Glacier Peak Wilderness Area, Alpine Lakes Wilderness Area, and Pasayten Wilderness Area. The Mt. Baker Wilderness area was also included for informational purposes, even though it is not afforded special protection under the Clean Air Act.

PSD Class II Increment Consumption Analysis

Table 3.2-8 summarizes the maximum concentrations resulting from the cogeneration facility, and locations where these maxima were reached. Except for the Annual SO₂ concentration, all locations are in Whatcom County within 1-mile (or closer) of the site.

Table 3.2-8: Maximum Concentrations ¹

Pollutant	Averaging Time	Conc. (ug/m3)	Location
SO ₂	ANNUAL	0.03	7.5-miles north of project on the US/Canada border
SO ₂	24-HR	1.0	328-feet north of the project site
SO ₂	3-HR	5.0	Eastern boundary of the project site
SO ₂	1-HR	8.7	Eastern boundary of the project site
PM ₁₀	ANNUAL	0.25	1 mile north of the project site
PM ₁₀	24-HR	4.3	328 feet north of the project site
PM _{2.5}	ANNUAL	0.25	1 mile north of the project site
PM _{2.5}	24-HR	4.3	328 feet north of the project site
CO	8-HR	12.6	Eastern boundary of the project site
CO	1-HR	67.3	Eastern boundary of the project site
NOX	ANNUAL	0.60	Northern boundary of the project site

1 Not including background concentrations

The maximum modeled concentrations of SO₂, NO₂, CO, and PM₁₀ including background are below the respective SILs (Table 3.2-9). Proposed project generation of these pollutants has an insignificant impact on Class II increments, so further analysis is not required. In fact, Table 3.2-11 demonstrates that emissions combined with background concentrations are anticipated to be below the most stringent regulation for each criteria pollutant analyzed. The project would comply with the PSD Class II increment limits.

Local Air Quality Impact Assessment

The assessment of impacts on local and regional ambient air quality from the proposed facility was conducted using EPA-approved air quality dispersion models. These models are based on fundamental mathematical descriptions of atmospheric processes in which a pollutant source can be related to a receptor area. These models evaluated compliance with state and federal ambient air quality standards; SILs; and Class II area increments for NO₂ and SO₂. The regional impact assessment evaluated potential impacts on Class I areas within about 124 miles of the project site, including impacts on visibility, Class I increments for NO₂, SO₂, and PM₁₀, and impacts on soil and vegetation from deposition of nitrogen and sulfur compounds.

The Industrial Source Complex (ISC) dispersion model (EPA SCRAM) was used. The modeling analysis revealed that the project would not significantly affect the ambient air quality of the area, nor have a significant effect on Class II areas. Table 3.2-9 compares maximum concentrations to the PSD SIL.

Table 3.2-9: Significant Impact Level Modeling Analysis Results – U.S. Class II Areas¹

Pollutant	Averaging Period	Maximum Concentration ^{2,3} (µg/m ³)	SIL ⁴ (µg/m ³)
Sulfur dioxide	annual ^{5,7}	0.03	1
	24-hour ^{6,8}	4.3	5
	three-hour ^{6,8}	8.4	25
Inhalable particulate (PM ₁₀) ³	annual ⁷	0.25	1
	24-hour	4.3	5
Carbon monoxide	eight-hour ⁸	50.4	500
	one-hour ⁸	81.4	2,000
Nitrogen dioxide	annual ⁷	0.60	1

1 All other areas that are not designated as Class I within the State of Washington.

2 Highest of all cases for 1995, 1996, 1998, 1999, 2000.

3 Excludes the effect of refinery emission reductions.

4 Significant impact level for criteria pollutants.

5 Value represents a maximum sulfur content in natural gas of 0.8 gr/100 standard cubic feet annual average.

6 Value represents a maximum sulfur content in natural gas of 1.6 gr/100 standard cubic feet.

7 Based on annual average ambient temperature of 50°F.

8 From emergency use of the diesel generator.

Table 3.2-10 shows the results of the long-term criteria pollutant modeling. The maximum long-term (annual average) ground-level concentrations for criteria pollutants (NO₂, SO₂, and PM₁₀) were modeled using the ISC model.

Background concentrations are the maximum value for each pollutant and averaging time of the two nearest representative ambient measuring stations. The predicted concentrations are added to the maximum background concentrations and compared to the most stringent NAAQS or the WAAQS shown in Table 3.2-1. Table 3.2-11 shows that the total concentration (modeled concentration plus background concentration) is significantly less than the most stringent standard for all pollutants analyzed.

Table 3.2-10: Significant Impact Level and Modeling Analysis Results - Class I Areas¹

Pollutant	Averaging Period	Maximum Concentration ^{2,3} (µg/m ³)	SIL ⁴ (µg/m ³)
Sulfur Dioxide	annual	0.001	0.1
	24-hour	0.021	0.2
	three-hour	0.048	1
PM ₁₀	annual	0.0054	0.2
	24-hour	0.087	0.3
Nitrogen dioxide	annual	0.0053	0.1

1 Class I areas include North Cascades National Park, Olympic National Park, Glacier Peak Wilderness, Alpine Lakes Wilderness, and Pasayten Wilderness Area.

2 Highest of 1995, 1996, 1998, 1999, 2000.

3 Excludes the effect of refinery emissions reductions.

4 Significant impact level for criteria pollutants.

Table 3.2-11: Comparison with Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Concentration (µg/m ³)			Most Stringent of the State of Washington Standards or NAAQS (µg/m ³)
		Modeled	Background	Total	
SO ₂	annual	0.03	3	3	80
	24-hour	1.0	13	14	365
	three-hour	5.1	27	32	1,300
	one-hour	8.7	35	44	1,065
PM ₁₀	annual	0.25	13	13	50
	24-hour	4.3	35	39	150
PM _{2.5}	annual	0.25	9	9	15
	24-hour	4.3	29	33	65
CO	eight-hour	12.6	2,668	2,681	10,000
	one-hour	67.3	2,900	2,967	40,000
NO ₂	annual	0.60	27	28	100

Source: BP 2002

Excludes the effect of refinery emissions reductions.

All PM₁₀ was conservatively assumed to be PM_{2.5}.

Pollutant Concentration Effects on Soils and Vegetation

Federal land managers (National Park Service, U.S. Fish and Wildlife, and U.S. Forest Service) have the responsibility of ensuring AQRVs in Class I areas are not adversely affected, regardless of whether the Class I increments are maintained. In order to protect plant species, the U.S. Forest Service recommends that maximum SO₂ concentrations not exceed 40 to 50 parts per billion (ppb) (105 to 130 µg/m³), and annual SO₂ concentrations should not exceed 8 to 12 ppb (21 to 31 µg/m³). For emissions of NO₂ (assuming a full conversion from NO_x), potential plant damage would not begin to occur with 24-hour concentrations less than 15 ppb (28 µg/m³). Based on the results of the dispersion modeling analyses, facility emissions are expected to have a negligible effect on soils and vegetation. The proposed project would only combust low-sulfur natural gas fuel, thus minimizing the emission of sulfur compounds. Also, modeling results show that the annual maximum annual concentration of NO₂ is below 1.0 µg/m³ (about 1.1 ppb).

Nitrogen and Sulfur Deposition at Class I Areas

The CALPUFF modeling system was used to estimate the cogeneration facility's potential contribution to total nitrogen and sulfur deposition in Class I areas. Soil, vegetation, and aquatic resources in Class I areas are potentially influenced by nitrogen and sulfur deposition.

A change in visibility of greater than 5% is the threshold (level of concern) used by federal land managers to signify that additional analysis may be needed to more fully understand the overall impacts on visibility. The results of the dispersion modeling for visibility impacts are summarized in Table 3.2-12. Without the reduced emissions associated with decommissioning the boilers, the CALPUFF modeling results show that the maximum change in visibility in a Class I area is 6.0%. The maximum visibility change modeled is in Olympic National Park. Only one day per year was above 5% in all of the modeled Class I areas.

Regional Haze Assessment

Regional haze is usually quantified using two related indicators. First, the “visual range” is the distance at which a dark mountain is just perceptible against the sky. The visual range decreases if the air is polluted. Secondly, the “light extinction coefficient” is used to quantify how pollutants in the atmosphere reduce visual range. Increased light extinction reduces the visual range. According to federal land managers responsible for protecting air quality in Class I areas, a 5% change in extinction can be used to indicate a “just perceptible” change to landscape and a 10% change in extinction coefficient from the “natural” background is considered a significant incremental impact. Section 3.2.6, Cumulative Impacts, contains a more in-depth discussion.

Toxic Air Pollutant Emission Rates

For purposes of the regulatory Toxic Air Pollutant assessments described below, emissions for the cogeneration facility were considered excluding any emission reductions that would occur at the refinery following removal of existing steam generation boilers.

This section presents the emission factors and emission rates used in the analysis of toxic air pollutants. The proposed project has the potential to emit small quantities of toxic air pollutants regulated by Ecology. Formaldehyde, benzene, and other organic compounds associated with the combustion of fossil fuels would be released. In addition, post-combustion control with SCR results in ammonia emissions or “slip” that passes through the process unreacted. Ammonia is not a federal hazardous air pollutant, but it is identified as a Washington State Toxic Air Pollutant and along with sulfuric acid would be the highest noncriteria pollutant concentration emitted from the project.

Emissions of toxic air pollutants would result from the combustion of natural gas in the gas turbines, HRSG duct burners, and auxiliary boiler, as well as from the use of the emergency diesel generator and diesel fire pump. Emissions were computed for short-term emission rates, and the hourly fuel use of heat input was used to estimate emissions on a pounds per hour basis. For the annual average emission rates (tons per year), total annual fuel use or heat inputs were computed and used with the emission factors in estimating the emissions.

Table 3.2-12: Air Quality Modeling Results

Operating Scenario	Class I area	Maximum Nitrogen Deposition (g/ha/yr)	Maximum Sulfur Deposition (g/ha/yr)	Maximum Visibility Change (%)	Number of Days over 5%	Visibility Change when Subtracting Boiler Emission Reductions
Normal operation without duct burners operating	Olympic National Park	0.09	0.11	5.5	1	1.6
	North Cascades National Park	0.44	0.31	2.5	0	1.4
	Alpine Lakes Wilderness Area	0.56	0.68	3.8	0	1.9
	Glacier Peak Wilderness Area	0.42	0.32	4.1	0	1.8
	Pasayten Wilderness Area	0.23	0.13	1.7	0	1.0
	Mt. Baker Wilderness Area	0.63	0.56	4.0	0	2.2
Normal operation with duct burners	Olympic National Park	0.09	0.11	5.6	1	1.7
	North Cascades National Park	0.45	0.31	2.5	0	1.4
	Alpine Lakes Wilderness Area	0.57	0.70	3.9	0	2.0
	Glacier Peak Wilderness Area	0.42	0.32	4.2	0	1.9
	Pasayten Wilderness Area	0.23	0.13	1.7	0	1.1
	Mt. Baker Wilderness Area	0.64	0.57	4.0	0	2.3
Operation with duct burners firing at a maximum rate	Olympic National Park	0.09	0.12	6.0	1	1.9
	North Cascades National Park	0.47	0.32	2.6	0	1.5
	Alpine Lakes Wilderness Area	0.60	0.73	4.1	0	2.3
	Glacier Peak Wilderness Area	0.44	0.34	4.4	0	2.1
	Pasayten Wilderness Area	0.24	0.14	1.8	0	1.2
	Mt. Baker Wilderness Area	0.67	0.60	4.1	0	2.3
Maximum		0.67	0.73	6.0	1	2.3

Notes: Significance level for visibility change is 5%.

Significance level for deposition is 5 g/ha/yr.

Ammonia emissions are based on a 5 ppmvd slip associated with the use of SCR for NO_x control. Sulfuric acid mist emissions depend on the amount of sulfur in the fuel and amount of sulfur dioxide converted to sulfur trioxide.

The toxic air pollutants and their pollutant class, emission factors, and emission rates for the gas turbines, the emergency diesel generator, and the diesel fire pump are listed in Table 3.2-13. The toxic air pollutant classes refer to Class A, for annual-averaged risk-based carcinogens, and Class B for non-carcinogens.

The proposed project would adopt BACT for toxics for controlling toxic emissions pursuant to Chapter 173-460-040 WAC, including the following:

- Use of clean natural gas as the only fuel for the combustion gas turbines and HRSG duct burners which help minimize formation of toxics, and
- Use of an oxidation catalyst unit on each HRSG duct burner that would reduce the emissions of certain volatile organic toxic compounds.

Modeling Criteria

Air quality dispersion modeling was used to assess compliance with the State of Washington's toxic air pollutant regulations (Chapter 173-460 WAC). Those toxic air pollutants that are emitted in quantities above the Small Quantity Emissions Rate (SQER) require calculation of potential impacts that are then compared with the Acceptable Source Impact Levels (ASILs) to assess compliance. Seventeen compounds were identified as being emitted in amounts greater than the small quantity emission rate and required modeling. Depending on the compound, either the 24-hour or annual average concentrations were used for comparison with the ASILs.

Toxic Air Pollutant Analysis

The maximum modeled 24-hour and annual average toxic air pollutant concentrations resulting from the proposed facility emissions are compared to the appropriate ASILs in Table 3.2-14. For all toxic air pollutants evaluated, the maximum modeled concentrations are less than the ASILs. Maximum short-term ammonia and sulfuric acid mist concentrations are also below the 24-hour ASIL. Based on these modeling results, the proposed cogeneration facility is not expected to create any significant impacts due to its toxic air pollutant emissions.

Table 3.2-13: Toxic Compounds that Require Modeling

Toxic Compound	Emission Rate for three Combustion Turbines (lbs/hr)	Emission Rate for Emergency Generator (lbs/hr)	Emission Rate for Firewater Pump (lbs/hr)	Total Annual Emissions (lbs/yr)	Total Hourly Emissions (lbs/hr)	SQER (lbs/yr)	SQER (lbs/hr)	ASIL (µg/m ³)	Class A or B Toxic Compound
Acetaldehyde	0.0210	0.00039	0.001553	184.8	0.023	50	NA	0.45	A Annual
Acrolein	0.0373	0.000121	0.0001872	327.1	0.038	175	0.02	0.02	B 24-hr
Ammonia ¹	39.5	0	0	346,247	39.5	17,500	2.0	100	B 24-hr
Benzene	0.0705	0.01192	0.001889	621.4	0.084	20	NA	0.12	A Annual
1,3-Butadiene	0.0025	0	0.0000791	22.0	0.0026	0.5	NA	0.0036	A Annual
Formaldehyde	0.5876	0.00121	0.00239	5,148	0.59	20	NA	0.077	A Annual
PAH	0.0129	0.00326	0.000034	113.5	0.016	NA	NA	0.00048	A Annual
Arsenic	0.000052	0.00371	0.000265	1.5	0.00403	NA	NA	0.00023	A Annual
Beryllium	0.000003	0	0	0.03	0.000003	NA	NA	0.00042	A Annual
Cadmium	0.000287	0.00035	0.000025	2.6	0.00066	NA	NA	0.00056	A Annual
Chromium	0.0259	0.00371	0.000265	227.6	0.030	175	0.02	1.7	B 24-hr
Cobalt	0.0255	0	0	223.6	0.026	175	0.02	0.33	B 24-hr
Copper ¹	0.0257	0	0	225.3	0.026	175	0.02	0.3	B 24-hr
Manganese	0.0256	0	0	224.2	0.026	175	0.02	0.4	B 24-hr
Nickel	0.0260	0.00035	0.000025	228.3	0.026	0.5	NA	0.0021	A Annual
Zinc ¹	0.0331	0.00385	0.000275	290.7	0.037	175	0.02	7	B 24-hr
Sulfuric Acid ¹	8.1	0.2437	0.0321	71,040	8.38	175	0.02	3.3	B 24-hr

Notes: SQER = Small Quantity Emission Rate

ASIL = Acceptable Source Impact Level

NA = Not Applicable

The results represent maximum emissions

1 Not an EPA classified hazardous air pollutant.

Table 3.2-14: Significant Impact Level Modeling Analysis Results - Toxic Compounds

Pollutant	Maximum Predicted Concentration ($\mu\text{g}/\text{m}^3$) ⁴		ASIL ($\mu\text{g}/\text{m}^3$) ³	ASIL Exceeded
	Annual ¹	24-hr ²		
Acetaldehyde	0.00014	NA	0.45	No
Acrolein	NA	0.0027	0.02	No
Ammonia	NA	2.8	100	No
Benzene	0.00032	NA	0.12	No
1,3-Butadiene	0.00001	NA	0.0036	No
Formaldehyde	0.00237	NA	0.077	No
PAH	0.00007	NA	0.00048	No
Arsenic	0.00007	NA	0.00023	No
Beryllium	<0.00001 ⁵	NA	0.00042	No
Cadmium	0.00001	NA	0.00056	No
Chromium	NA	0.0024	1.7	No
Cobalt	NA	0.0018	0.33	No
Copper	NA	0.0018	0.3	No
Manganese	NA	0.0018	0.4	No
Nickel	0.00011	NA	0.0021	No
Zinc	NA	0.0025	7	No
Sulfuric Acid	NA	0.57	3.3	No

1 Highest of cases (modeled operating scenarios) 1AB, 1BB, 1CB, 2B, 6B (50°F).

2 Highest of all cases (modeled operating scenarios) for 1995, 1996, 1998, 1999, and 2000.

3 Acceptable source impact levels.

4 Excludes the effect of refinery emissions reductions.

5 Impacts are less than the sensitivity of the ISC model of 0.00001 $\mu\text{g}/\text{m}^3$

Regional Air Quality Impact Assessment

Short Range Air Quality Impacts in Canada

Concentration analyses for areas in Canada were conducted using methods similar to those used for Class II areas in the U.S., as previously described. These analyses excluded any emission reductions from the refinery resulting from the removal of refinery boilers.

The analyses covered an area into Canada extending 31-miles from the project site (the limit of the approved use of the ISC dispersion model), as shown in Figure 3.2-1. The predicted concentrations are added to the maximum background concentrations provided by Canadian regulatory agencies and compared to the Canadian objectives and standards presented in Table 3.2-15. The $\text{PM}_{2.5}$ emissions are not specifically modeled and are conservatively assumed to be equal to the PM_{10} emissions. In reality, the $\text{PM}_{2.5}$ emissions are a subset of the PM_{10} emissions and should, therefore, be lower than reported. The modeled maximum concentration is significantly less than the background concentration for all pollutants. The total concentration (modeled concentration plus background concentration) is significantly less than the objectives and standards (Table 3.2-2) for all pollutants.

Table 3.2-16 summarizes the concentrations resulting from the project alone (not including background) reached in Canada. The highest concentrations in Canada were reached 7.5 to 7.8 miles north of the project site at the US/Canada border. As discussed above, the maximum

modeled concentration (including background) occurs in the US, and is less than both the US standards and Canadian Objectives. Table 3.2-17 summarizes the concentrations estimated (including background) at the closest monitoring stations in Canada.

Table 3.2-15: Maximum Concentration Modeling Analysis in Canada

Pollutant	Averaging Time	Maximum Concentration in Canada ($\mu\text{g}/\text{m}^3$)			Most Stringent Canadian Objective or Standard ($\mu\text{g}/\text{m}^3$)
		Modeled	Background	Total	
SO ₂	annual	0.03	3	3	25
	24-hour	0.7	16	17	150
	three-hour	3.3	27	30	374
	one-hour	5.3	59	64	450
PM ₁₀	annual	0.2	13	13	30
	24-hour	2.5	35	38	50
PM _{2.5} ^{1, 2}	24-hour	0.9	18	19	30
CO	eight-hour	4.8	2,668	2,673	5,500
	one-hour	13.6	2,900	2,914	14,300
NO ₂ ³	annual	0.2	27	27	60
	24-hour	1.6	69	71	200
	one-hour	16.7	107	124	400

Notes: Excludes the effect of refinery emissions reductions.

1 PM_{2.5} emissions are conservatively assumed to be equal to PM₁₀ emissions.

2 The PM_{2.5} Canada-wide standard is based on the 98th percentile averaged over three years; therefore, the modeled and background values indicated above are also based on these assumptions.

3 NO_x is considered to be fully converted to NO₂.

Table 3.2-16: Highest Concentrations in Canada

Pollutant	Averaging Time	Concentration ($\mu\text{g}/\text{m}^3$)	Location
SO ₂	ANNUAL	0.03	7.5-miles north of project on the US/Canada border
SO ₂	24-HR	0.7	7.5-miles north of project on the US/Canada border
SO ₂	3-HR	3.3	7.5-miles north of project on the US/Canada border
SO ₂	1-HR	5.3	7.5-miles north of project on the US/Canada border
PM ₁₀	ANNUAL	0.2	7.5-miles north of project on the US/Canada border
PM ₁₀	24-HR	2.5	7.5-miles north of project on the US/Canada border
PM _{2.5}	24-HR	0.9	7.5-miles north of project on the US/Canada border
CO	8-HR	4.8	7.8-miles north of project on the US/Canada border
CO	1-HR	13.6	7.5-miles north of project on the US/Canada border
NO _x	ANNUAL	0.2	7.5-miles north of project on the US/Canada border
NO _x	24-HR	1.6	7.5-miles north of project on the US/Canada border
NO _x	1-HR	16.7	7.5-miles north of project on the US/Canada border

Table 3.2-17: Ambient Air Monitors Closest to Project Site

Pollutant	Averaging Time	Concentration (µg/m3)	Background Concentration (µg/m3)	Total Concentration (µg/m3)	Objective ¹ (µg/m3)
Concentrations at Surrey					
PM10	ANNUAL	0.05	13	13.0	30
PM10	24-HR	0.50	39	39.5	50
NOX	ANNUAL	0.04	27	27.0	60
NOX	24-HR	0.42	69	69.4	200
NOX	1-HR	8.2	107	115	400
CO	8-HR	1.1	2436	2437	5500
CO	1-HR	3.6	2900	2904	14300
Concentrations at Langley ²					
PM10	ANNUAL	0.04	13	13.0	30
PM10	24-HR	0.36	37	37.4	50
PM2.5	24-HR	0.36	16	16.4	30
NOX	ANNUAL	0.03	20	20.0	60
NOX	24-HR	0.33	52	52.3	200
NOX	1-HR	7.8	92	100	400
CO	8-HR	0.7	2668	2669	5500
CO	1-HR	3.6	4060	4064	14300
Closest SO2 monitors in Canada – Concentrations at Richmond					
SO2	ANNUAL	0.003	3	3.0	25
SO2	24-HR	0.08	13	13.1	150
SO2	3-HR	0.34	27	27.3	374
SO2	1-HR	0.90	35	35.9	450
Concentrations at Abbotsford					
SO2	ANNUAL	0.0014	3	3.0	25
SO2	24-HR	0.058	8	8.1	150
SO2	3-HR	0.35	21	21.3	374
SO2	1-HR	1.04	29	30.0	450
PM2.5 Ambient Air Monitors Closest to Project Site – Concentrations at Pitt Meadows ³					
PM2.5	ANNUAL	0.029	9	9.0	NA
PM2.5	24-HR	0.30	19	19.3	30
Concentrations at Vancouver Airport					
PM2.5	ANNUAL	0.016	9	9.0	NA
PM2.5	24-HR	0.17	18	18.2	30

- Notes: 1 Most Stringent Canadian Objective or Standard
2 A PM2.5 monitor was added at Langley in 2002.
3 PM2.5 background and total concentration are based on the 98th percentile

Air Quality Visibility Analysis in Canada

The visibility analyses for Canadian areas were conducted using methods similar to those used for Class I areas in the U.S., and excluded any effects of refinery emission reductions. The analyses were conducted along seven lines of sight recommended by the GVRD (listed in Table 3.2-18). The visibility extinction was averaged along each line of sight to achieve a day-by-day account of whether visibility is impaired with and without the impacts from the proposed project. The maximum visibility change because of emissions from the proposed project was also calculated.

The results of the Canada visibility analyses are summarized in Table 3.2-19. A visual range of less than 37 miles was used to determine impaired visibility. As shown in this table, impacts from the proposed project would not increase the number of days with impaired visibility at any of the seven specified lines of sight. A visibility analysis threshold has not been established by Canadian agencies. For purposes of this analysis, the threshold established by the U.S. federal land managers was used. According to the federal land managers, a greater than 5% change in visibility will evoke a noticeable change in most landscapes. The results of the visibility analysis in Canada show that the maximum visibility change is only 2.7%, which is significantly below the 5% threshold.

Table 3.2-18: Lines of Sight Evaluated for Visibility Analysis in Canada

Line of Sight	Observer Location	Direction and Target
1	Victoria	East-northeast to Mount Baker
2	White Rock	East-southeast to Mount Baker
3	Tsawassen	East-southeast to Mount Baker
4	Vancouver	North to North Shore Mountains (The Lions)
5	Langley	North to North Shore Mountains (Golden Ears)
6	Chilliwack	East to Mount Cheam
7	Abbotsford	Southeast to Mount Baker

Table 3.2-19: Results of Visibility Analysis in Canada

Line of Sight	Number of Days with Impaired Visibility, Background Conditions ¹	Additional Days with Impaired Visibility from Cogeneration Facility	Maximum Visibility Change
1	171	0	1.2%
2	166	0	2.4%
3	166	0	2.1%
4	166	0	2.2%
5	166	0	2.7%
6	166	0	1.5%
7	166	0	1.4%

1 Impaired visibility is defined as those days with a visibility range of less than 37-miles. Excludes the effect of refinery emissions reductions.

Regional Impacts of Concurrent Emissions Reductions at the Refinery

State regulatory air permitting requirements require that the maximum potential emissions expected from the cogeneration facility be used for permitting purposes. The analyses presented above are based on the maximum potential emissions. However, in order to characterize a scenario of more probable long range impacts to the region, the Applicant has estimated what the actual emissions from the cogeneration facility are likely to be. This estimate is based on the following assumptions, described in more detail below:

- Refinery emissions would decrease because of the removal of existing utility boilers that would no longer be needed once steam was purchased from the cogeneration facility;

- A more realistic actual operating scenario would lead to actual emissions lower than the maximum potential emissions required by regulatory analyses;
- Actual particulate emissions would be lower than those measured at the stacks by the required EPA reference methods; and
- Recent information indicates that long range secondary particulate formation would be reduced due to NO_x emission reductions at the refinery.

The overall emissions reductions estimated by the Applicant are summarized in Table 3.2-20.

Table 3.2-20: Overall Emission Reductions Estimated by the Applicant

Expected Annual Reductions (tpy)	NO _x	CO	VOC	PM ₁₀	SO ₂
Estimated Actual Emissions from the Cogeneration Facility	181	81	28	94	50
Refinery Emission Reductions Through Utility Boiler Removal	-499	-54	-3	-10	-7
Net Regional Change in Emissions	-318	27	25	-84	43
Changes in Secondary Emissions from Cogeneration Facility and Refinery Boiler Removal	105	0	0	-96	-9
Net Regional Emission Changes	-213	27	25	-12	34

Source: BP 2002

Refinery Emission Reductions due to removal of Refinery Steam Boilers

Emissions of criteria pollutants from the proposed cogeneration facility would be offset by reductions in emissions from the refinery. These reductions would occur because the cogeneration facility would provide steam to the refinery, which would allow the refinery to discontinue the utility boilers currently in use. This would also allow the refinery to reduce its use of gas-fired heaters. Table 3.2-21 summarizes the possible refinery emission reductions if steam produced by the cogeneration project replaces steam currently produced by refinery boilers. A consequence of cogeneration is the reduction in steam production inside the refinery and an associated reduction in the criteria pollutant emissions. All emission reductions are based on the reduction in steam production in the refinery. After the cogeneration project begins supplying steam to the refinery, the refinery utility boilers would be shut down and would no longer produce emissions.

It should be noted that new boilers are being planned for the Clean Fuels project but they will be shut down when the cogeneration facility is operating. Some backup boiler capability would still be required at the refinery when the cogeneration facility is not operating.

Table 3.2-21: Refinery Emission Reductions

Expected Annual Reductions (tpy)	NO _x	CO	VOC	PM ₁₀	SO ₂
Refinery emission reductions	-499	-54	-3	-10	-7

Source: BP 2002

Estimate of Actual Emissions from the Cogeneration Facility

The data in Table 3.2-7 reflects the maximum potential emissions expected from the cogeneration facility, based on the regulatory requirements of PSD and NSR review. The Applicant has also prepared an estimate of the cogeneration facility emissions based on what expected actual operation of the cogeneration are likely to be, shown in Table 3.2-22. This estimate was based upon several assumptions. First, the Applicant used an average operating scenario that was developed based on six years of expected operation (a typical operational/maintenance cycle for turbines) while taking into account market conditions and required maintenance. Under this average operating scenario, the cogeneration facility is expected to operate as follows:

- 55% of the time at 100% turbine load and no duct firing.
- 39% of the time at 100% turbine load and variable duct burner firing sufficient to maintain the refinery steam header pressure.
- 2% of the time in a forced outage where one turbine is down for maintenance for eight hours while the other two are operating at 100% turbine load.
- 1% of the time in an economic dispatch mode where all three turbines are down for eight hours.
- 3% of the time in a planned outage where turbines would be shut down for more than 72 hours for planned maintenance.

Table 3.2-22: Expected Annual Emissions (Criteria Pollutants)

Expected Annual Emissions (tons/year)	NO _x	CO	VOC	PM ₁₀	SO ₂
100% load with no duct firing	104.9	45.8	14.4	133.0	27.7
100% load with minimal duct firing	65.7	28.2	11.6	95.2	20.4
Forced outage	3.9	2.8	0.7	4.6	0.9
Economic dispatch	2.3	2.9	0.5	2.3	0.4
Planned outage	0.4	0.6	0.1	0.1	0.02
Emergency generator	3.44	0.86	0.16	0.09	0.10
Firewater pump	0.42	0.021	0.018	0.006	0.013
Cooling tower	NE	NE	NE	7.1	NE
Total (tons/year)	181.1	81.2	27.5	242.4	49.6
PM ₁₀ adjustments ¹				-148.5	
Total (tons/year)				93.9	

NE - no emissions

1 Approximately 60% of the PM₁₀ emissions are subtracted due to source tests exaggerations of sulfates and the inclusion of compounds associated with background, ambient air.

Second, the Applicant assumed that average actual NO_x emissions would be no more than 90% of the proposed permit limit. In order to ensure constant compliance with the short-term permit limits, these types of facilities would expect to maintain average emissions somewhat below their permit limits. Based on its operating experience, the Applicant indicated that it would be reasonable to expect actual NO_x emissions to average 10% below the permit limit.

Third, the Applicant assumed that average actual CO emissions would be no more than 80% of the proposed permit limit in order to ensure constant compliance with the short-term permit limits. Since oxidation catalyst performance is more efficient when new and degrades over time, it is reasonable to expect that the CO concentration will be very low initially and then increase over time. The long-term average CO concentration will always be below the permit limit.

Finally, the Applicant assumed that the project's actual PM₁₀ emissions would be approximately 60% below the proposed permit limit due to source test exaggeration of sulfates and the inclusion of compounds associated with background air. The Applicant based these assumptions on research that has been conducted in an effort to determine the source and type of the particulate matter in the exhaust gas and to determine whether the EPA test method is accurate (England and Wien 2002).

This research shows that up to 90% of the particulate reported by this test method (EPA Method PRE-4/202) in exhaust from natural gas-fueled combustion turbines is condensable particulate. Of this condensable particulate, about 90% is inorganic and comprised of sulfates, chlorides, ammonia, sodium, and calcium.

This research also shows that the EPA test method significantly exaggerates PM₁₀ emissions. By far, the largest source of error in the EPA test method is generated by condensable particulate measured by the test. SO₂ gas, a constituent of the stack gas, is drawn into the test apparatus. As expected of a gas, SO₂ passes through the filterable portion of the test apparatus and into an ice water bath, where it is “bubbled” through the cold water. The SO₂ dissolves in the cold water. Since gas turbines operate with a large excess of oxygen, oxygen is also dissolved in the cold water. During the testing, virtually all of the SO₂ is slowly oxidized to form sulfate (SO₄), which is measured as a particulate. This results in the test method significantly overestimating the particulate emissions because, during normal operation, only a relatively small portion of the SO₂ in the exhaust would form SO₄ in the stack.

The test method also overstates the particulate emissions by including particulate already present in the ambient air. This particulate matter was identified in the research as sodium, chloride, and calcium.

The study concludes that the EPA test method suffers from measurement error due to the small amount of particulate sample collected from the gas turbine exhaust. The EPA method was intended to collect samples over a one-hour period, however, the research shows that gas turbine tests must be run for up to six hours to collect enough material.

Based on the information contained in the GE and Sierra Research studies, the actual particulate emissions from the facility are expected to be at least 60% less than the particulate emissions measured by the EPA reference method test.

Secondary Particulate

The Applicant also considered secondary particulate in the overall particulate emissions balance. The projected annual emissions shown in Table 3.2-22 are based only on in-stack emission or primary emissions.

One to two days after leaving the stack, a portion of the NO₂ and SO₂ emitted from the stack as gas eventually combines with ammonia in the atmosphere to form particles of ammonium nitrate and ammonium sulfate. These newly formed compounds are called secondary particulate because they are formed in the atmosphere outside of the stack.

The amount of NO₂ and SO₂ converted to particulate is dependent on a number of atmospheric factors, including time, temperature, and moisture. In the following analysis, the 33% of NO₂ is converted to ammonium nitrate and 20% of SO₂ is converted to ammonium sulfate. The conversion factors used for this analysis are consistent with the CALPUFF model conversion factors and published articles (Stockwell 2000).

As shown in Table 3.2-23, changes in secondary particulate emissions would occur from two sources: first, NO_x and SO₂ emitted by the Cogeneration Facility would produce secondary particulate emissions; second, reductions of NO_x emissions from the Refinery through removal of the utility boilers would lead to a reduction of refinery secondary particulate emissions. When both of these secondary particulate emission changes are taken into account, the proposed project would result in an overall regional reduction of NO_x and particulate, as shown in Table 3.2-20.

Impacts on Class I Visibility Analyses from Refinery Emission Reductions

The Applicant performed additional modeling for the Class I visibility analysis to account for some of the reduction in emissions resulting from removal of the utility boilers at the refinery. The results of this revised dispersion modeling for visibility impacts are summarized in Table 3.2-24. The maximum visibility change, when subtracting the emissions for the three utility boilers, is 2.3%, and the number of days of impact to the Olympic Regional Park is reduced to zero.

Table 3.2-23: Secondary Particulate Emission Balance

Expected Annual Emissions (tons/yr)	NO _x	CO	VOC	PM ₁₀	SO ₂
Total from Cogeneration	181	81	28	94	50
Secondary PM formed by Cogen NO _x and SO ₂	-60	0	0	70	-10
Cogen Emissions After Secondary PM Formation	121	81	28	164	40
Refinery Emission Reductions through utility boiler removal	-499	-54	-3	-10	-7
Secondary PM Avoided by Refinery Reductions	165	0	0	-166	1
Refinery Emission Reductions After Secondary PM Formation	-334	-54	-3	-176	-6
Changes in Secondary emissions from Cogen and removal of Refinery boilers	105	0	0	-96	-9

Source: BP 2002

Note: These balances assume that no molecular weight change occurs upon formation of secondary particulate matter. This is a conservative approach for calculating reduction in PM.

Table 3.2-24: Air Quality Related Values Modeling Analysis Results Including Refinery Emissions Reductions

Operating Scenario	Class I area	Visibility Change when Subtracting Boiler Emission Reductions	Number of Days over 5%
Normal operation without duct burners operating	Olympic National Park	1.6	0
	North Cascades National Park	1.4	0
	Alpine Lakes Wilderness Area	1.9	0
	Glacier Peak Wilderness Area	1.8	0
	Pasayten Wilderness Area	1.0	0
	Mt. Baker Wilderness Area	2.2	0
Normal operation with duct burners	Olympic National Park	1.7	0
	North Cascades National Park	1.4	0
	Alpine Lakes Wilderness Area	2.0	0
	Glacier Peak Wilderness Area	1.9	0
	Pasayten Wilderness Area	1.1	0
	Mt. Baker Wilderness Area	2.3	0
Operation with duct burners firing at a maximum rate	Olympic National Park	1.9	0
	North Cascades National Park	1.5	0
	Alpine Lakes Wilderness Area	2.3	0
	Glacier Peak Wilderness Area	2.1	0
	Pasayten Wilderness Area	1.2	0
	Mt. Baker Wilderness Area	2.3	0
Maximum		2.3	0

Notes: Significance level for visibility change is 5%.
Significance level for deposition is 5 g/ha/yr.

Dust

Onsite roads and parking areas would be constructed with asphalt over a compacted subbase. These roads would be paved to minimize the potential for fugitive dust emissions from vehicle traffic. Significant quantities of dust would not be generated during operation of the proposed facility.

Odors

Operation of the proposed facility is not anticipated to create any nuisance odors. Natural gas may be odorized, but it would be contained within the natural gas pipeline and cogeneration facility piping system up to the point of use in the combustion gas turbines and HRSGs where it would be combusted.

Anhydrous ammonia would be used in the SCR system as a reaction agent for the control of NO_x emissions. Unreacted ammonia would be present in the HRSG exhaust gas flow. Ammonia is commonly perceived as having an odor (e.g., household cleaners). However, based on the quantity to be released through the HRSG stack, ammonia odor is not expected to be detectable. In fact, the dispersion modeling conducted for ammonia at a rate of 5 ppm (a maximum of 13.2 lbs/hour per turbine and about 173 tons/year total) from the HRSG stacks indicates that the public exposure to ammonia (approximately 2.8 g/m³ or 0.004 ppm) would be well below the

range of detection (5 to 53 ppm) (Clayton 1993). Ammonia emissions would be limited to a 24-hour average of no more than 5 ppm at 15% O₂. Relative to the public health exposure of ammonia, the maximum projected ground-level impact of the ammonia emissions, based on the 5 ppm level, is about 3% of the 100 µg/m³ 24-hour health-based standard identified in WAC 173-460.

Cooling Tower Steam Plume Fogging and Icing

In cold weather, a cooling tower plume would typically persist until the air exiting the cooling tower sufficiently mixes with the surrounding cooler, drier air. If the plume returns to ground level prior to dissipating, it can cause localized fogging or icing of downwind structures and roadways.

Downwind impacts caused by water vapor and water droplets from the cooling towers were modeled by the Applicant using the Seasonal/Annual Cooling Tower Impact Program (SACTIP) computer model. SACTIP calculates the occurrence of elevated visible water plumes and salt deposition, and ground-level fogging and icing. The model simulates downwind dispersion of the steam plumes based on wind data from the local meteorological station and relative humidity data.

The objective of this study was to determine if the cooling tower would contribute to fogging and/or icing on Grandview Road on the north side of the project boundary. The analysis shows that fogging may occur for a total of 2.5 hours a year in the northeast or northwest directions. The area affected by fogging extends from 655 to 1640 feet from the center of the cooling tower. Grandview Road is approximately 1,312-feet in these directions and, therefore, may be affected by the edge of the plume for these few hours of the year.

In order for roadway icing to occur, the cooling tower plume needs to touch down on the road surface, the plume must become condensed, and the temperature of the road surface must be below freezing. However, due to the infrequent occurrence of these conditions, if icing were to occur it would be of short duration.

3.2.4 Impacts of No Action

Under this alternative, existing natural-gas-fired power plants would be more likely to continue operations. No new hydroelectric generating capacity is being added, and the development of nuclear power plants has been halted. Wind and solar power do not have the generating availability needed to meet continuous electricity demand. Fuel cell technologies are being developed, but remain relatively small and expensive. Natural-gas-fired combined-cycle combustion turbine plants would meet the increasing demand for electricity generation. If the proposed cogeneration facility were not built and operated, the refinery and others in the region would use electricity produced by existing sources of generation and new gas-fired combined-cycle power plants.

3.2.5 Greenhouse Gas

Overview

The issue of how emissions from human activities might affect global climate has been the subject of extensive international research over the past several decades. There is now a broad consensus among atmospheric scientists that emissions caused by humans are resulting in a rise in global temperatures, although there is still uncertainty about the magnitude of future impacts and the best approach to mitigate the impacts. Two sets of key research documents have recently been published.

The United Nations Intergovernmental Panel on Climate Change (IPCC) published its most recent set of five-year progress reports summarizing worldwide research on global warming (IPCC 2001). These reports indicated that some level of global warming related to human activity is likely to occur and that there is a significant possibility of severe environmental impacts. Several alternative measures were evaluated to achieve the emission reductions specified by the Kyoto Protocol.

President Bush requested the National Academy of Sciences to provide a brief comprehensive review of the IPCC reports (National Academy of Sciences 2001). The review panel included atmospheric scientists with a range of opinions on future global warming. The National Academy of Sciences review was written in lay terms and focused on addressing several fundamental issues. The panel concurred with most of the findings by the IPCC.

Regulatory Framework

Currently, there are no international, national, Washington State, or local regulations that set numerical limits on greenhouse gas emissions, however the Kyoto Protocol has been established and is discussed below. Within the State of Washington, rules relating to siting energy facilities (WAC 463-42-225, Proposal-emission control) requires an Applicant to demonstrate that highest and best practicable treatment for control of emissions is used for a number of air pollutants, including CO₂. The Washington regulation does not specify how “highest and best practicable treatment” for CO₂ is to be quantified.

Several jurisdictions in the Pacific Northwest have committed to, or require, the mitigation of greenhouse gas emissions, for example:

- The State of Oregon’s target is a 17% reduction compared to the most efficient power plant operating in the United States.
- Seattle City Light’s greenhouse gas program cites a target of 100% elimination of net future increases of greenhouse gas emissions from all new fossil fuel generating stations added to the city’s generating mix (Seattle City Light 2001).
- BC Hydro plans to contract with third-party organizations to procure offsite greenhouse gas projects to offset 50% of the increase in greenhouse gas emissions from two new natural-gas fired electrical generating stations on Vancouver Island, up through the year 2010 (BC Hydro 2001). The year 2010 was specified in the Kyoto Protocol as the date upon which signatory

nations must reduce their greenhouse gas emissions. Presumably, new emission reduction programs enacted in response to the Kyoto Protocol (or similar rules) would take effect after BC Hydro's voluntary offset program expired in 2010.

In Washington State, four approved thermal power projects under EFSEC jurisdiction are required to mitigate greenhouse gas emissions, as follows:

- The Chehalis Power Project is must acquire greenhouse gas offsets for up to 8% of the overall emissions; Chehalis Power would acquire offsets on a ton-for-ton basis from a recognized supplier, such as the Climate Trust, or by participating directly in greenhouse gas mitigation projects;
- The Sumas Energy 2 Generation Facility is required to mitigate CO₂ emissions according to the monetary path of the Oregon Energy Facility Siting Council, at \$0.57 per ton of carbon dioxide, based on a 30-year operating life, with no surcharge for administrative expenses; the approximate \$8.04 million payment would be made in five annual installments starting at the time the facility begins to operate.
- The Satsop Combustion Turbine Project is required to mitigate CO₂ emissions from the facility that exceed 0.675 lb/kWh, at a rate of \$0.57 per ton of CO₂ to be mitigated based upon the facility's maximum potential emissions, and adjusted annually according to the Producer Price Index; 7.5% administrative costs would be paid in addition to the per ton mitigation fee; payments would be made annually for the first 30 years in which the facility operates.
- The Wallula Power Project is required to implement a "Greenhouse Gas, Environmental Mitigation Enhancement Package" which includes payment of approximately \$6.0 million to non profit and tribal organizations committed to the development of renewable energy resources and projects, and/or preservation and restoration of fish and wildlife habitat and other environmental programs benefiting the Walla Walla region.

Project Greenhouse Gas Emissions

The significant portion of greenhouse gas emissions generated by the project would result from the combustion of natural gas, a fossil fuel in the Cogeneration facility. For purposes of evaluating greenhouse gas emissions, the combustion efficiency of the proposal is quantified by the CO₂ emission factor, with units of pounds of CO₂ emitted per kilowatt-hour of electricity produced. Table 3.2-25 lists the CO₂ emission factors for typical fossil-fueled generating stations operating today. As shown in the table, combined cycle combustion turbines emit much less CO₂ than other types of fossil-fuel power plants. The estimated overall CO₂ emission factor for the proposed cogeneration facility is 0.83 pound per kilowatt-hour (lbs per kWhr).

Assuming an 85% capacity factor for the plant, the estimated annual CO₂ emissions from the cogeneration facility would be 2.2 million tons per year. Fugitive leaks of natural gas from the systems serving the proposed cogeneration facility are estimated to emit methane equivalent to 12% of the project's stack emissions of greenhouse gas (U.S. Department of Energy 2000b). The estimated greenhouse gas emissions generated by leaks from the supply pipelines serving the BP Cogeneration project would be 13,000 tons of methane per year.

Table 3.2-25: Typical CO₂ Emission Factors for Electrical Generating Stations

Generating Station Fuel Type	CO ₂ Emission Factor (lbs CO ₂ per kWhr)
BP Cogeneration Facility, natural gas-fired combined-cycle combustion turbine	0.83
Natural gas fuel combined-cycle combustion turbine	0.87
Natural gas fuel, conventional gas-fired boiler	1.32
Fuel oil, conventional oil-fired boiler	1.97
Coal, conventional coal-fired boiler	2.10
Other solid fuel generating stations	1.38
Nationwide average for electric utility generating stations (1998)	1.34

Sources: BP 2002; U.S. Department of Energy 2000; EFSEC 2002.

Mitigation Measures

The Applicant is proposing a greenhouse gas mitigation plan that would be flexible with respect to future changes in facility ownership.

As long as the proposed cogeneration facility is owned by the Applicant, the project's greenhouse gas emissions mitigation would be a part of BP's corporate greenhouse gas objective and the proposed project emissions would be offset by greenhouse gas emission reductions within BP worldwide operations. BP's worldwide objective is to hold net GHG emissions at the 2002 level of 90.8 tons (181.66 billion pounds) through the year 2012, while absorbing all new growth in BP company operations.

If, at some point in the future, the Applicant sells the proposed cogeneration facility, mitigation for proposed cogeneration facility greenhouse gas emissions would be provided as described below:

1. The proposed CO₂ emission limit would be 0.675 pound CO₂/kWh calculated on the basis of proposed cogeneration facility fuel charged to power in British thermal units per kilowatt hour (Btu/kWh).
 - a. Fuel charged to power equals (total fuel consumed by the cogeneration unit less fuel charged to steam) divided by net kWh generated.
 - b. Fuel charged to steam is equal to the steam energy used by the refinery divided by a conversion factor of 0.901 lower heating value/higher heating value.
2. Emissions in excess of the CO₂ emission limit would be mitigated either by:
 - a. an annual payment to a qualifying organization such as the Climate Trust of \$0.85/ton CO₂, or
 - b. Greenhouse gas reductions obtained by the proposed cogeneration facility owner, or
 - c. a combination of the two.

3. Mitigation would be satisfied annually for 30 years, which is the assumed economic life of the project. Mitigation would be reported to EFSEC annually.

3.2.6 Secondary and Cumulative Impacts

Cumulative Impact of Refinery and Cogeneration Facility Reductions

In combination with the removal of refinery utility boilers, the proposed cogeneration facility would result in an overall reduction in ambient concentrations of PM₁₀. These values represent the modeled impact of primary PM₁₀ emissions. Removal of the refinery boilers resulting from steam purchase from the cogeneration facility would significantly reduce NO_x emissions from the refinery, and would consequently also reduce secondary particulate in the airshed. The reduction in secondary particulate is expected to be greater than the increase in primary particulate emissions.

Bonneville Regional Air Quality Modeling Studies

In response to the regional boom in energy facility proposals which occurred in 2001-2002, and in order to address the cumulative impacts of the large number of proposals requesting interconnection with the federal transmission system, Bonneville initiated a Regional Air Impact Analysis to evaluate the impact of these facilities on airsheds in the pacific northwest. (Bonneville 2001a, 2001b, 2001c).

This study examines the potential contribution of the BP Cherry Point Project to regional haze in Class I areas within the Bonneville Service Area, the Columbia River Gorge National Scenic Area (CRGNSA), and the Mt. Baker Wilderness. Regional haze impacts are assessed following the techniques used in the Phase I study conducted by Bonneville. Bonneville's Phase I study examined potential air quality impacts associated with over 40 recently proposed power projects in the area. Based on the results of the Regional Air Quality Modeling Study, Bonneville is now examining potential cumulative regional haze impacts on a case-by-case basis for each new project before issuing a Record of Decision (ROD). Since it is unlikely all the proposed power plants will be built, the analysis investigates the cumulative impacts from a Baseline Source Group consisting of projects that have already been issued a ROD, other recently permitted power projects not requesting access to Bonneville's transmission grid but within the area, facilities well along in their permitting process, and the facility being considered for a ROD. The remainder of this section describes the Baseline Source Group, provides an overview of the dispersion modeling approach, presents the results of a cumulative analysis for the Baseline Source Group, and discusses the potential contribution of the BP Cherry Point Project to regional haze.

Phase I examined three scenarios regarding the number of future power plants to be operated in the region:

- A worst-case scenario in which a total of 45 new power plants were built and operated simultaneously at their rated capacity using their primary fuel for a total of more than 24,000 MW;

- A second scenario with 28 new power plants, totaling a little over 11,000 MW operated simultaneously by 2004; and
- A third scenario with 15 new power plants totaling 7,000 MW by 2004, which is the most likely scenario in the next 10 years based on projection of need for new energy.

Phase II attempted to model the individual contribution of each new plant to the overall cumulative impact. The Phase II analysis for the proposed cogeneration facility is essentially the same as the 7,000 MW scenario from Phase I.

Modeling Overview of Phase I

The dispersion modeling techniques used in the study are as follows:

- The study looked at two scenarios: (1) air impacts that would accrue if 28 of the projects were built and energized by 2004, and (2) air impacts that would occur if all 45 projects were built as planned and operated simultaneously.
- NO_x, PM₁₀, and SO₂ emissions from 45 proposed power projects with a combined capacity of more than 24,000 MW were considered in the analysis.
- The study evaluated impacts on 16 Class I/Scenic/Wilderness Areas (three National Parks, the Spokane Indian Reservation, and 12 wilderness areas), CRGNSA, and the Mt. Baker Wilderness Area.
- PM₁₀ concentrations include both primary and secondary aerosols, and the nitrogen deposition estimates include the ammonium ion.

Areas Showing Greatest Impact

Results showed that the greatest air quality impacts would occur in the Puget Sound lowlands from Centralia to Bellingham, in the Hermiston area, and in the eastern portions of the Lower Columbia River Basin.

Class II Significant Impact Levels Not Exceeded

With the exception of two receptors, predicted concentrations from the proposed power plants are less than the SILs for all pollutants and averaging periods. The peak PM₁₀ concentration occurred near the Wallula Gap. The predicted PM₁₀ concentration at this location was 4.54 µg/m³ because all of the plants are scheduled to be energized prior to 2004. The peak PM₁₀ concentration of all the proposed plants at this location was 12.4 µg/m³. The SILs were also exceeded in one other location; the 24-hour PM₁₀ SIL was exceeded at a receptor near the Tacoma tide flats, where the model predicts a 24-hour PM₁₀ concentration of 6.2 µg/m³. The SILs are thresholds used in the evaluation of individual, not multiple, facility impacts on the NAAQS.

National Ambient Air Quality Standards

This study has not examined local impacts from the power projects, but model results suggest that even if all the proposed power plants were energized, they are unlikely to exceed the NAAQS.

Proposed Class I Significant Impact Levels Exceeded at Several Locations

If all the plants scheduled to be energized before 2004 are built, their emissions are predicted to exceed the proposed 24-hour PM₁₀ Class I SIL (0.3 µg/m³) in the CRGNSA and in the Spokane Indian Reservation. When all 45 proposed sources were included in the model, the proposed 24-hour PM₁₀ Class I SIL was exceeded in 100 out of 18 Class I/Scenic/Wilderness Areas. However, Bonneville anticipates only a small portion of these plants will likely be built.

Increment Consumed

Predicted concentrations of PM₁₀, NO_x, and SO₂ from the proposed power projects are small fractions of the applicable Class I increments. For example, the peak PM₁₀ concentration was only 1.54 µg/ m³ in the CRGNSA, which is well below the 24-hour PM₁₀ Class I increment of 8 µg/ m³.

Nitrogen and Sulfur Deposition

Annual nitrogen and sulfur deposition predicted for the Class I/Scenic/Wilderness Areas, the CRGNSA, and the Mr. Baker Wilderness are less than 1% of the background deposition rates provided by the federal land managers for these areas.

Affected Visibility

The study results suggest the proposed power projects could degrade visibility in Class I areas, as characterized by guidance criteria established by the federal land managers. The model predictions indicate emissions from the plants scheduled to be energized prior to 2004 would degrade visibility on very clear days by more than 5% at 14 out of 18 Class I/Scenic/Wilderness Areas and by more than 10% at 8 areas. If all 45 of the proposed plants are built, visibility on very clear days has the potential to be frequently degraded by more than 10% at 12 out of 18 Class I/Scenic/Wilderness Areas and in the surrounding Class II areas. The sensitive areas most affected by the first group of plants (energized before 2004) are Mt. Rainier, the Alpine Lakes Wilderness, and the Mt. Baker Wilderness Areas. The inclusion of all proposed plants (pre- and post-January 2004) results in more than 10% change in visibility in 12 out of 18 of the Northwest's Class I/Scenic/Wilderness Areas.

Overview of Phase II

Peak emissions from the 15 projects within the Phase II Baseline Source Group, including the BP Cherry Point Project, are listed in Table 3.2-26. Emissions are shown both for primary and secondary fuels.

Table 3.2-26: Baseline Source Group Plus the BP Cherry Point Project Peak Emissions with Primary Fuel

No.	Project Name	Owner	MW	Peak Emissions (lb/hr)		
				SO ₂	NO _x	PM ₁₀
1	Fredonia Facility	PSE	108	3.5	23.2	6.8
2	Rathdrum Power, LLC	Cogentrix	270	2.7	29.8	21.4
3	Frederickson Power	West Coast	249	10.2	19.7	16.9
4	Coyote Springs 2	Avista	280	1.1	30.0	4.5
5	Goldendale Energy Project	Calpine	248	12.7	14.9	11.8
6	Hermiston Power Project	Calpine	546	2.5	71.7	38.1
7	Chehalis Generating Facility	Tractebel	520	20.8	40.9	31.6
8	Goldendale (The Cliffs)	GNA Energy	300	3.7	20.3	16.3
9	Big Hanaford Project	TransAlta	267	6.5	23.1	14.3
10	Mint Farm Generation	Mirant	319	4.0	25.1	23.1
11	Satsop CT Project - Phase I	Duke	650	6.7	43.4	47.0
12	Wanapa Energy Center	Confed.Tribes	1200	13.9	98.8	124.8
13	Plymouth Generation	NESCO	307	17.3	18.4	24.0
14	BP Cherry Point	BP NW Products	720	15.9	66.9	70.5
15	Summit/Westward (Clatskanie)	Summit	520	8.2	54.0	50.7
Total			6504	130	580	502
Peak Emissions with Secondary Fuel						
1	Fredonia Facility (Oil-Fired)	PSE	104	51.2	23.2	12.2
7	Chehalis (Oil-Fired)	Tractebel	520	238.0	211.5	40.0

The Fredonia Facility has requested fuel oil firing for all hours of the year as a secondary fuel. The Chehalis Generating Facility has requested fuel oil firing for 720 hours per year.

Operating Scenarios

The analysis assumes all plants in Table 3.2-26 are operating at peak load with their primary fuel for the entire simulation period. An oil-firing scenario was also considered, where sources permitted to fire with fuel oil were assumed to operate in this manner over the winter season. It is important to note that peak load operating assumptions likely overestimate impacts, and with the exception of the Fredonia Facility, the projects are not allowed to fire with fuel oil for an entire winter season. In practice, virtually all proponents state that they intend to burn gas except in times of significant shortage.

The oil-burning scenario is a compromise solution to a potentially complex assessment. The present analysis likely overstates potential impacts attributable to the Chehalis Generating Facility because it cannot burn oil every day of the winter. The meteorology on winter days producing the highest impacts may also not occur concurrently with the economic conditions likely to cause these power plants to burn oil. On the other hand, the impacts attributable to the Fredonia Facility (if they are allowed to burn oil every day) may be under-predicted because the analysis limits its oil-fired emissions to winter months.

Modeling Methods

- The CALPUFF dispersion model was applied to both of the simulations. CALPUFF is the EPA's preferred model for long-range transport assessments. CALPUFF treats plumes as a series of puffs that move and disperse according to local conditions that vary in time and space. CALPUFF estimates processes for wet and dry deposition, aerosol chemistry, and regional haze. The contribution of the BP Cherry Point Project to background extinction was assessed using the post-processing utilities included with the CALPUFF model system.
- Wind fields are based on the University of Washington's simulations of Pacific Northwest weather.
- The aerosol concentrations used to characterize background extinction coefficients in the study represent excellent visual conditions. Background visibility parameters are presented in Table 4 of the *Modeling Protocol*.
- The 432-mile by 418-mile study area includes Washington and portions of Oregon, Idaho, and British Columbia. Meteorological, terrain, and land use data were provided to the model using a horizontal grid mesh size of 7.5-mile. The terrain data are based on an average for each grid cell, thus the simulations do not fully resolve potential local impacts in complex terrain. A six-kilometer mesh size sampling grid was used with receptor locations within 16 Class I areas (3 National Parks, the Spokane Indian Reservation, and 12 wilderness areas), the CRGNSA, and the Mt. Baker Wilderness.
- Building downwash effects are not considered in the analysis, and emissions were characterized using a single stack for each facility.

Phase II Results

The CALPUFF modeling system was applied to simulate emissions from the Baseline Source Group using a year of Pacific Northwest weather. The 24-hour average extinction coefficient was used as a measure of regional haze. The analysis predicted the number of days for each season with greater than 5% and 10% change to background extinction (measure of light), respectively. For both the annual natural gas and the winter oil-fired scenarios, the Baseline Source Group could result in a "just perceptible" change to the extinction coefficient on a few days for several of the areas examined in the study. The areas most affected are the Class I areas near the CRGNSA, Olympic National Park, Mt. Rainier National Park, and the Alpine Lakes Wilderness. In Mt. Rainier National Park, the predicted change to background extinction for the winter oil-fired case exceeds the 10% significance criterion on six days. The Baseline Source Group does not exceed the 10% significance criterion on any days when these sources are fired by natural gas.

Potential changes to background extinction due to emissions from the BP Cherry Point Project to Class I areas, the CRGNSA, and the Mt. Baker Wilderness were evaluated. The modeling suggests the proposed facility could increase daily background extinction by up to 8.05%, 2.23%, and 3.21% in the Mt. Baker Wilderness, the North Cascades National Park, and Olympic National Park, respectively. The project would contribute greater than 0.4% on only one day in any one area when the combined group's contribution is greater than 5% and on no days when the group's contribution is greater than 10%. The project would not significantly contribute to

regional haze at any of the Class I areas within the Bonneville Service Area, the CRGNSA, or the Mt. Baker Wilderness when the facilities considered in this analysis are fired by natural gas.

The project's contribution to predicted changes in extinction for the winter oil-fired scenario was also evaluated. This figure was constructed from the highest 24-hour extinction coefficient at each receptor predicted for the project during a winter simulation. The project's contributions are not significant on any of the six days when the Baseline Source Group's combined change in extinction is greater than 10% in Mt. Rainier National Park.

Cumulative Impact of Greenhouse Gas Emissions

Global warming is a worldwide problem caused by the combined greenhouse gas emissions throughout the planet. CO₂ emitted from an industrial facility persists in the atmosphere for over 100 years before it is eventually metabolized by plants or absorbed into the oceans (ICPP 2001a). During that 100-year lifetime, a parcel of emissions generated anywhere on the planet will disperse throughout the world and affect climate change everywhere. Thus, climate change in Washington would be affected as much by emissions from power plants in China, for example, as by emissions from the proposed project. To provide perspective on the potential direct impacts of emissions from the proposed project, it is necessary to consider worldwide emissions. Table 3.2-27 lists greenhouse gas emissions worldwide, from the U.S., and from the State of Washington. The table also lists the total estimated future greenhouse gas emissions from the new gas-fired power plants forecast to be built in the Pacific Northwest (Bonneville 2001a).

Many air pollutants compose "greenhouse gases," each of which exhibits a different chemical tendency to affect global warming. The two most common greenhouse gases associated with gas-fired power plants are CO₂ emitted from the exhaust stacks and methane emitted as fugitive leaks of natural gas along pipeline systems. Emissions of various greenhouse gas chemicals are commonly standardized as "carbon equivalents." The emission rates listed in Table 3.2-27 are standardized as million metric tons of carbon equivalents (MMTCE) per year, to account for the different global warming potential of each greenhouse gas. For comparison, 1 million tons of CO₂ equals 0.25 MMTCE, and 1 million tons of methane equals 5.2 MMTCE.

As listed in the table, most of the worldwide greenhouse gas emissions are in the form of CO₂, while a smaller fraction of the emissions are in the form of other gases such as methane or nitrous oxide. The total annual CO₂ emissions associated with the cogeneration facility would be 0.56 MMTCE if the facility operates at 85% capacity. Based on the data listed in Table 3.2-27, this is 2.5% of the greenhouse gas presently emitted from all sources in Washington State and 5.1% of the amount anticipated to be issued from all proposed future power plants in the Northwest, assuming all of these plants were constructed. The greenhouse gas emissions from the cogeneration facility would be approximately 0.03% of the U.S. emissions. The actual effect on global warming caused solely by emissions from the cogeneration facility is unknown. However, a cogeneration facility produces less greenhouse gas emissions per kilowatt hour of electricity produced than a combined-cycle facility with no cogeneration capability. In a regional perspective, the production of greenhouse gases could be reduced if operation of the BP cogeneration facility displaces the operation of other non-cogeneration facilities.

Table 3.2-27: Comparison of Worldwide vs. Local Greenhouse Gas Emissions

Item	Annual Greenhouse Gas Emissions (MMTCE per year)		
	CO ₂	Compounds other than CO ₂	Total
Worldwide emissions (including U.S. in 1998)	5,660	2,430	8,090
United States Emissions (1998)	1,494	340	1,834
Washington State Emissions (1995)	21	4	25
Anticipated future gas-fired power plants in Washington and Oregon (28 plants, 11,000 MW)	11	1.3	12.3
Proposed BP Cherry Point Cogen emissions at 85% capacity	0.55	0.07	0.63

Sources: IPCC 2001; EPA 2000; CTED 1999

MMTCE – million metric tons of carbon equivalent

The refinery would also realize a net reduction of CO₂ emissions from the purchase of steam from the cogeneration facility rather than production onsite in refinery boilers. The Applicant has estimated that approximately 440,000 tons per year of CO₂ emission reduction would occur in this manner.

Cumulative Impacts of the BP Cogeneration Facility and the Sumas Energy 2 Generation Facility

In response to a scoping comment, the cumulative impacts of the BP cogeneration facility and Sumas Energy 2 Generation Facility were estimated for the Sumas/Abbotsford area, and compared with the respective standards and objectives in Tables 3.2-28 and 3.2-29. These tables provide a conservative estimate of the cumulative impact of both facilities, considering that the estimates provided for the BP facility might not correspond to identical meteorological conditions under which the SE2 emissions were evaluated. Therefore, conservatively, the cumulative emissions from both of these facilities would be below the applicable standards or objectives.

Georgia Strait Crossing Project

The proposed GSX project would be located within the proposed cogeneration project site, and both projects could have the same construction time frame. The GSX project involves construction and operation of a pipeline that would transport natural gas from existing systems at the U.S./Canada border near Sumas, Washington, to an interconnect pipeline proposed by Canada in Boundary Pass in the Strait of Georgia. The system would consist of an onshore and offshore pipeline, interconnect facilities, one new natural gas compressor station, and related facilities. Within a stretch of less than a mile, the cogeneration project and the GSX project would share a common project area. This pipeline would involve many construction activities, some of which include clearing, grading, trenching, and backfilling. Since the proposed GSX and cogeneration project might coincide, cumulative dust generation (i.e., particulate matter) would be a possible side effect.

Emissions during the construction of both projects would consist of fugitive dust and combustion exhaust from construction equipment and vehicles. However, with proper mitigation measures (see Section 3.2.7) dust and emission production would be minimal.

Table 3.2-28: Cumulative Total Concentrations Compared to Canadian Air Quality Objective

Criteria Pollutant	Averaging Time	Highest and Cumulative Concentrations ($\mu\text{g}/\text{m}^3$)				Most Stringent of Canadian Objective ($\mu\text{g}/\text{m}^3$)
		Maximum Existing Background Concentration ^{2,3} ($\mu\text{g}/\text{m}^3$)	Modeled Maximum Impacts of Sumas Energy 2 ($\mu\text{g}/\text{m}^3$) ¹	Modeled Maximum Impacts of BP Cogeneration Facility in Abbotsford ($\mu\text{g}/\text{m}^3$)	Cumulative Impact ($\mu\text{g}/\text{m}^3$)	
SO ₂	annual	3	0.13	0.0014	3.13	25
	24-hour	8	1.22	0.58	9.80	150
	three-hour	21	4	0.353	25.35	375
	one-hour	29	5.13	1.04	35.17	450
PM ₁₀	annual	14	0.38	0.0079	14.39	30
	24-hour	36	3.67	0.16	39.83	50
CO	eight-hour	3,480	3.32	0.45	3,484	5,500
	one-hour	6,960	6.5	2.7	6,969	14,300
NO ₂	annual	29	0.26	0.006	29.27	60
	24-hour	73	2.54	0.12	75.66	200
	one-hour	109	10.73	3.2	122.93	400

Source: BP 2002, GVRD 1999, 2000, 2001

1 Modeled maximum impacts of Sumas Energy 2 are taken from the SE2 Second Revised Application dated June 29, 2001, Table 6.1-16.

2 Maximum concentration from a three year monitoring period (1999, 2000, 2001).

Table 3.2-29: Cumulative Total Concentrations Compared to NAAQS or WAAQS

Criteria Pollutant	Averaging Time	Highest and Cumulative Concentrations ($\mu\text{g}/\text{m}^3$)				Most Stringent of either the NAAQS or WAAQS ($\mu\text{g}/\text{m}^3$)
		Maximum Existing Background Concentration ^{2,3} ($\mu\text{g}/\text{m}^3$)	Modeled Maximum Impacts of Sumas Energy 2 ($\mu\text{g}/\text{m}^3$) ¹	Modeled Maximum Impacts of BP Cogeneration Facility in Sumas ($\mu\text{g}/\text{m}^3$)	Cumulative Impact ($\mu\text{g}/\text{m}^3$)	
SO ₂	annual	3	0.13	0.0046	3.13	80
	24-hour	8	1.4	0.13	9.53	365
	three-hour	21	3	0.57	24.6	1,300
	one-hour	29	6.97	1.7	37.7	1,065
PM ₁₀	annual	14	0.39	0.027	14.4	50
	24-hour	36	4.23	0.43	40.7	150
CO	eight-hour	3,480	4.57	0.81	3,485	10,000
	one-hour	6,960	8.82	4.4	6,973	40,000
NO ₂	annual	29	0.27	0.021	29.3	100

Source: BP 2002, GVRD 1999, 2000, 2001

1 Modeled maximum impacts of Sumas Energy 2 are taken from the SE2 Second Revised Application dated June 29, 2001, Table 6.1-16.

2 Maximum concentration from a three year monitoring period (1999, 2000, 2001).

3.2.7 Mitigation Measures

Construction

Mitigation Proposed by the Applicant

Any emission of fugitive dust requires implementation of Best Management and Good Construction Practices. Incorporating mitigation measures into the construction specifications for the project would reduce construction impacts. Possible mitigation measures to control PM₁₀, particulate matter deposition, and emissions of CO and NO_x during construction are listed below.

- Spraying exposed soil with water would reduce PM₁₀ emissions and particulate matter deposition. Water would be applied at a rate to maintain a moist surface, but not create surface water runoff or erosion conditions.
- Providing wheel washers to remove particulate matter that would otherwise be carried offsite by vehicles would decrease deposition of particulate matter on area roads and subsequent entrainment from those roads.
- Removing mud deposited on paved, public roads would reduce particulate matter in the area.
- Routing and scheduling construction trucks to reduce delays to traffic during peak travel times would reduce secondary air quality impacts caused by a reduction in traffic speeds while waiting for construction trucks.
- Requiring appropriate emission-control devices on all construction equipment powered by gasoline or diesel fuel would reduce CO and NO_x emissions in vehicular exhaust. Using relatively new, well-maintained equipment would reduce CO and NO_x emissions.
- Planting vegetative cover as soon as possible after grading would reduce windblown particulate matter in the area.

Additional Recommended Mitigation Measures

- Covering all trucks transporting materials, wetting materials in trucks, or providing adequate freeboard (space from the top of the material to the top of the truck) would further reduce PM₁₀ and deposition of particulate matter during transportation.

Operation and Maintenance

Regulated Air Emissions

The Applicant would mitigate air emissions from the proposed cogeneration facility by burning only natural gas in the combustion turbines and duct burners and only low-sulfur diesel fuel in the emergency generator and firewater pump. Over and above the CGT vendor's 9.0 ppm dry, low NO_x technology, NO_x emissions from the CGTs and duct burners would be controlled to the BACT level (2.5 ppm annual average at 15% O₂) through the use of SCR. A catalytic oxidation system would be installed for the control of CO emissions from the CGTs and duct burners to an annual level of 2 ppm (at 15% O₂). This catalytic oxidation system would also provide the added benefit of controlling about 30% of the VOC emissions, including toxic air pollutants. Other

pollutants would be controlled using good combustion technology and good operating practices and the combustion of low-sulfur natural gas as a fuel (BP 2002, Appendix E).

The Applicant would control dust on all the proposed cogeneration facility roads and would provide necessary maintenance and housekeeping to minimize the amount of dust that could be generated from vehicle traffic.

Additional Mitigation Measures

The Applicant has proposed reductions in refinery emissions through removal of the steam boilers. Because the air emissions from the refinery and the cogeneration facility would be regulated by different state jurisdictions (Ecology for the refinery, and EFSEC for the cogeneration facility), it's unclear which jurisdiction will enforce these reductions in refinery emissions. Enforceable conditions requiring removal of the refinery's three utility boilers within six months of the beginning of cogeneration facility operation could allow regulatory agencies to more fully take into account refinery emission reductions in the permitting and environmental review processes.

Greenhouse Gas

As long as the proposed cogeneration facility is owned by the Applicant, the project's greenhouse gas emissions mitigation would be a part of BP's corporate greenhouse gas objective and the proposed project emissions would be offset by greenhouse gas emission reductions within BP worldwide operations. BP's worldwide objective is to hold net GHG emissions at the 2002 level of 90.8 tons (181.66 billion pounds) through the year 2012, while absorbing all new growth in BP company operations.

If, at some point in the future, the Applicant sells the proposed cogeneration facility, mitigation would be provided for greenhouse gas emissions in excess of 0.675 pound CO₂/kWh in the form of an annual payment to a qualifying organization such as the Climate Trust of \$0.85/ton CO₂, or greenhouse gas reductions would be obtained by the proposed cogeneration facility owner, or a combination of the two. Mitigation would be satisfied annually for 30 years, which is the assumed economic life of the project. Mitigation would be reported to EFSEC annually.

3.2.8 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on air quality are identified. The proposed cogeneration facility would emit criteria air pollutants and toxic air pollutants into the atmosphere. It could also enable the refinery to implement significant emission reductions. If such emission reductions were implemented, it is likely there would be no observable changes in ambient air quality levels, either in the U.S. or in Canada. The various analyses conducted for the PSD application and for other sensitive areas of interest indicate that air emissions associated with the proposed cogeneration facility would occur and would have an impact on the overall air quality of the region. Those emissions are not likely to cause any adverse impacts to the protection of human health and welfare, to any soils, vegetation, flora, or fauna, or to any other

sensitive areas identified by the National Parks Service, U.S. Fish and Wildlife Service, U.S. Forest Service, or by Canadian air quality regulatory agencies.

3.3 WATER RESOURCES

The following section discusses existing water resources in the region of the proposed project, and assesses the project's potential for affecting those resources. Mitigation measures to reduce or eliminate impacts that would result from the project are also discussed. The analysis in this section is primarily based on information provided by the Applicant in the ASC (BP 2002, Section 3.3 and Appendix F). Where additional sources of information have been used to evaluate the potential impacts associated with the proposed project, those sources have been cited. Information regarding water quality is presented in Section 3.4.

3.3.1 Existing Conditions

Surface Water Resources

Regional Area

The proposed project, including all its ancillary facilities, is located within what is commonly called the Mountain View upland of Whatcom County (Newcomb et al. 1949). The area consists of gently rolling hills interspersed with broad areas of relatively level ground. Although not technically within the Nooksack River Basin, for purposes of water resource management, the project is within Water Resource Inventory Area (WRIA) 1. Small seasonal meandering streams drain the area to Birch Bay and/or the Strait of Georgia. Review of the Soil Conservation Service (Goldin 1992) soils inventory indicates the area is a mosaic of wetland and upland soils. Many of the wetland soils have been logged, ditched, and drained since Euro-American settlement, and converted to agricultural uses. Despite these activities, the National Wetland Inventory (USFWS 1987a, 1987b) shows there is still a mosaic of wetlands within the project vicinity, although not as extensive as previously existed.

Grassland and cultivated farmland predominate in northwestern Whatcom County, mixed with wetland areas and small stands of planted or second-growth forest. A small amount of paved and roofed areas exist within the upland, associated with roads, homes, and a few industrial operations, including the refinery. The wetlands are attributed largely to depressions within the undulating topography and low permeability soils, which result in poor drainage (see Section 3.1 for more information about soils, and Section 3.5 for more information about wetlands).

Nooksack River

The Nooksack River is the largest river discharging in Whatcom County, and its 786-square-mile watershed (above Ferndale) encompasses most of the County. Mean annual flow in the river is approximately 3,800 cubic feet per second (cfs) at Ferndale. At its closest point, the river is more than 20 miles from the refinery and its watershed is about 18 miles from the refinery. Use of Nooksack River water is discussed below in the Water Uses and Water Rights subsection.

Project Area

The cogeneration facility, mitigation wetlands, transmission line interconnection, and the associated refinery interface areas are near the western end of the Terrell Creek drainage basin, as depicted in Figure 3.3-1. The Terrell Creek basin is approximately 17 square miles in area and comprises an irregularly shaped section of the Mountain View upland between the settlements of Mountain View and Birch Bay. Terrell Creek's source is Terrell Lake. The creek generally passes through the basin from east to west. The stream meanders in a northwesterly direction from the lake and, after 2 miles, is joined by Fingalson Creek from the east. Shortly thereafter, the mainstem turns west and continues to flow for another 3 miles to its discharge point into Birch Bay at the Strait of Georgia. The stream is deeply incised in some areas and is contained within a broader valley in others.

Most streamflow within Terrell Creek is obtained from surface water runoff rather than from Terrell Lake or through groundwater recharge (baseflow). As such, streamflow is highly seasonal, and the creek dries up completely most summers (Washington Department of Water Resources 1960). No quantified hydrologic data were found for Terrell Creek.

The subbasin of the Terrell Creek basin in which the cogeneration facility and the refinery are located is approximately 800 acres in size. Surface water generally flows as sheet flow or shallow groundwater (interflow) in a northwesterly direction toward Terrell Creek. Confined flow is limited mostly to ditches and some short lengths of natural channel close to Terrell Creek.

The cogeneration facility, refinery laydown areas, and transmission line interconnection are located in a drainage subbasin measuring approximately 800 acres. Altogether, they occupy approximately 25% of the subbasin. The subbasin generally slopes downward toward the northwest. Surface water runoff drains through a series of ditches and ponds into Terrell Creek near Jackson Road or through a roadside ditch along the east side of Blaine Road directly into Terrell Creek where the road crosses the creek. Although most of the ditches (except those along the roadsides) have not been maintained for many years and are overgrown with grasses and shrubs, they still convey surface flows during periods of rainfall. Ditches along Grandview Road and Jackson Road also collect runoff and eventually discharge to the creek at the point where the creek crosses beneath Jackson Road.

Cogeneration Facility

The proposed cogeneration facility site contains all or part of six wetlands, as shown in Figure 3.5-1 and described in Section 3.5. Four of these—A, B2, B3, and C—are partially drained by a ditch that directs surface flow in a northwesterly direction toward a ditch that runs northerly along the eastern boundary of the refinery. Two westward-flowing ditches drain water from Wetland E in the southern portion of the facility site, and from the south and east of the facility site, to the same northerly flowing ditch along the refinery boundary. That ditch, in turn, flows to a ditch on the south side of Grandview Road, which flows westerly to Blain Road. At Blain Road the flow is directed through a culvert under Grandview Road and then north in a ditch to Terrell Creek.

Figure 3.3-1: Surface Water Drainage Basin

Refinery Interface

Surface flows east of Blaine Road on the refinery site are intercepted by a ditch on the east side of Blaine Road and carried north to the culvert under Grandview Road and on to Terrell Creek (see Figure 3.3-2). The proposed laydown areas on the refinery site contain four wetlands as shown in Figure 3.5-1 and described in Section 3.5. Three of these, F, G, and J, are surrounded by ditches. Surface flows in the proposed laydown areas on the refinery site are intercepted by north and west flowing ditches and carried to a northwest-flowing ditch to a second culvert under Grandview Road approximately 1,500 feet west of Blaine Road. From the culvert, flows enter a natural channel in a northwestward direction to the refinery duck ponds and eventually to a culvert under Jackson Road joining with Terrell Creek.

Transmission System

The transmission line interconnect corridor contains several wetlands, as described in the transmission line environmental report (Radian International and Dames and Moore 1999) and summarized in Section 3.5. Discharge from these wetlands and other surface flow is generally intercepted by north and west flowing ditches and eventually carried to the ditch along the south side of Grandview Road, or the ditch on the east side of the refinery and then to Grandview Road. Although construction of the western maintenance road from Brown Road has begun, it has not altered surface flow across the site since it is oriented primarily north-south.

Custer/Intalco Transmission Line No. 2

The Bonneville transmission line corridor between the Custer substation and the cogeneration facility interconnection traverses both the Terrell Creek Basin and the California Creek Basin to the north. The California Creek Basin is also located in the Mountain View upland and has very similar geology, geography, topography, historical development, and surface water characteristics as the Terrell Creek Basin. It does not, however, have a lake at its headwaters. A wetland and aquatic resources survey was conducted to determine potential adverse impacts (Appendix D). Five streams and 34 wetlands were identified within the corridor.

The five streams include California, Fingalson, and Terrell creeks and two unnamed creeks tributary to California Creek. The 34 wetlands are somewhat equally distributed along the 5-mile corridor, varying from four to eight wetlands per mile and occupying from 30 to 1,200 feet of right-of-way. Most of the wetlands are associated with one of the five creeks and most are emergent marsh wetlands heavily disturbed by current or past agricultural practices. Only a few are scrub-shrub wetlands; these are maintained by Bonneville to a height no greater than 25 feet.

Other Project Facilities

Alcoa Intalco Works. All of the facilities necessary to permit recycling of cooling water from Alcoa Intalco Works to the cogeneration facility would be within the existing industrial plant. All surface water is directed to an existing stormwater facility and ultimately discharged to the Strait of Georgia through a permitted outfall. Impervious surfaces prevent any interaction between surface runoff and groundwater.

Wetland Mitigation Areas. Two wetland mitigation areas, designated CMA 1 and CMA 2 and totaling approximately 110 acres, are proposed north of Grandview Road on each side of Blaine Road. On the east side of Blaine Road, CMA 1 drains in a northerly direction toward Terrell Creek. A total of 40.3 acres of wetland were identified on the 53.3-acre CMA 1 site (Appendix D). A northerly trending ditch bisects the site and carries flow to a natural channel that leads northerly to Terrell Creek. Shallow east-west trending ditches on each side of the northerly trending ditch intercept surface flow and direct it toward the central ditch. About 44.3 acres of wetland were identified on the 63.5-acre CMA 2 site. Surface water flow patterns on the CMA 2 site are much more complicated than on CMA 1 and are depicted in Figure 3.3-3.

Stormwater

Runoff

An average annual 40.7 inches of precipitation has been reported in the project vicinity (Goldin 1992), most as rainfall. Stormwater runoff does not infiltrate easily into the ground due to the low permeability of surface soils (see Section 3.1), and generally moves across the project site as dispersed overland flow. Generally, runoff is not substantial due to the gentle slope of the land, established vegetation, and the lack of well-defined drainage channels. In most of the area, excess runoff is eventually collected in ditches and carried to creeks via roadside ditches.

Flooding Potential

All of the proposed project components are located outside the 5-year, 100-year, and 500-year floodplains. Figure 3.3-4 shows the proximity of floodplain boundaries in the project vicinity.

The floodplain boundaries are based on the following FEMA floodplain maps:

- City of Bellingham, Washington, Whatcom County, Panels 1-10 (effective date: September 2, 1982),
- City of Blaine, Washington, Whatcom County, 1 panel only (effective date: July 16, 1979),
- City of Everson, Washington, Whatcom County, 1 panel only (effective date: August 2, 1982),
- Town of Ferndale, Washington, Whatcom County, 1 panel only (effective date: June 1, 1983),
- City of Lynden, Washington, Whatcom County, 1 panel only (effective date: November 3, 1982),
- City of Nooksack, Washington, Whatcom County, 1 panel only (effective date: September 2, 1982),
- City of Sumas, Washington, Whatcom County, 1 panel only (effective date: May 15, 1985).

Figure 3.3-2: Project Site Drainage

Figure 3.3-3: Estimated Existing Surface and Subsurface Flow Near CMA 2

Figure 3.3-4

Groundwater

Geology

Geologic conditions beneath the Mountain View upland are described in Section 3.1, Earth, and borehole/well logs from explorations near the cogeneration facility site are provided in BP 2002, Appendix G. Figures 3.3-5 and 3.3-6 provide geologic cross sections developed from the soil borings.

The area is underlain by several hundred feet of Pleistocene glacial and non-glacial sediments deposited in the past 20,000 years during glacial advances and retreats associated primarily with the Fraser glaciation. These deposits, are in turn, underlain by much older sedimentary bedrock. The principal geologic deposits identified beneath the project site are as follows, from youngest to oldest:

- Sand and gravel overlying the Bellingham drift (recent alluvium),
- Bellingham drift,
- Deming sand,
- Kulshan drift, and
- Undifferentiated sedimentary deposits.

Drift deposits are composed of a poorly sorted, heterogeneous mixture of boulders, till, gravel, sand, and clay transported by glaciers and deposited under marine conditions while the study area lay below sea level.

Regional Hydrostratigraphy

Major water-bearing units (aquifers) in the region are the coarser-grained sand and gravel deposits associated with the Deming sand and other glacial outwash deposits. Major aquitards are the finer-grained marine drifts and tills, including the Bellingham and Kulshan drifts and Vashon Till. The marine drifts can locally contain elevated sand and gravel content, but have sufficient silt and clay content to have very low permeability. The older undifferentiated deposits and the sedimentary bedrock also contain both aquifer and aquitards.

Project Vicinity Hydrostratigraphy

Although specific investigation data do not exist for any portions of the project site, geologic and hydrostratigraphic conditions illustrated in Figures 3.3-5 through 3.3-7 are anticipated to be representative of conditions beneath the project vicinity (for further detail on geologic conditions, refer to Section 3.1, Earth). These sections show the following hydrostratigraphic units as listed from the surface downward:

- Upper water-bearing zone,
- Bellingham drift aquitard,
- Deming sand aquifer, and
- Kulshan drift aquitard.

Detailed hydrogeologic studies at the refinery have revealed that the upper portion of the Bellingham drift is weathered to depths of 20 feet and is more permeable than the lower unweathered portions of this deposit. Therefore, the sand and gravel overlying the Bellingham drift and the weathered Bellingham drift together comprise the upper water-bearing zone in the project vicinity. This zone likely occurs under unconfined conditions and is perched on the underlying Bellingham drift aquitard. The Deming sand is the first major aquifer beneath the site and is likely confined between the Bellingham drift and Kulshan drift aquitards.

Groundwater Movement

Groundwater movement within the Whatcom Basin has been reported in Newcomb et al. (1949) and Easterbrook (1973). The reports do not provide groundwater movement in specific aquifers, but do indicate recharge from the area of the Mountain View upland and gradients leading away from the upland. Generalized contours of the surface of the water table are shown in Figure 3.3-7, and indicate groundwater flow generally toward the west across the project vicinity. Site-specific hydrogeologic investigations at the refinery also indicate that groundwater within both the upper water-bearing zone and the Deming sand aquifer flows toward the northwest.

Recharge and Discharge

The upper water-bearing zone is recharged through the direct infiltration of rainfall. Discharge from this aquifer is to local ditches, wetlands, and streams, as described in the following subsection.

The Deming sand aquifer is likely recharged via the direct infiltration of precipitation over elevated areas such as Holman Hill located about 3 miles east of the refinery, the Mountain View uplands, and broadly over the entire area. Although the overlying Bellingham drift is an aquitard, leakage through this deposit over large areas probably does provide some minimal recharge. The Deming sand aquifer likely discharges to the lower reaches of area drainages near sea level or to the Strait of Georgia, depending on the location and configuration of the aquifer.

The older and deeper pre-Pleistocene aquifers are likely part of a regional groundwater flow system within the overall Whatcom Basin. Recharge likely occurs inland, possibly on the higher elevation fringes of the basin. Groundwater in the deeper aquifer systems likely discharges offshore to the Strait of Georgia.

Interaction with Surface Water

Groundwater in the near surface upper water-bearing zone is in hydraulic continuity with local streams, namely Terrell Creek. The Deming sand is found beneath 50 to over 70 feet of low-permeability Bellingham drift. Water levels in wells in the Deming sand aquifer are often in excess of 50 feet below ground surface. Terrell Creek is effectively isolated (perched) from the Deming sand, Vashon, and pre-Vashon aquifers in the project vicinity. Water in the Vashon and pre-Vashon deposits would not impact surface water because that groundwater discharges offshore to the Strait of Georgia.

Figure 3.3-5

Figure 3.3-6

Aquifer Characteristics

Groundwater average linear horizontal velocities in the weathered (near surface) Bellingham drift unit were estimated to be between 0.1 and 0.8 ft/yr (Remediation Technologies, Inc. 1993). By contrast, groundwater average linear horizontal velocity in the Deming sand aquifer has been estimated to be 25 to 260 ft/yr (CH2M Hill 1985).

Water Rights and Water Supply

Water use in the area is predominantly for agriculture, municipal supplies, commercial and industrial processes, and domestic supplies. The refinery currently uses an average of 4,170 gpm for industrial process water, which is supplied under agreement with the Whatcom County PUD. This represents about 55% of the refinery's 11 mgd water contract. Alcoa Intalco Works also has a contract for industrial water, which includes 2,780 gpm for once-through cooling of an air compressor. This is surface water diverted from the Nooksack River, upstream of Ferndale.

Industrial process water is currently supplied through an existing pipeline to Alcoa Intalco Works that extends on to the refinery. This pipeline enters the refinery at its southeast corner from Aldergrove Road.

Potable water is supplied to the refinery by the Birch Bay Water and Sewer District. The District would provide potable (treated) water for use by cogeneration facility employees under an existing agreement with the Applicant. The amount of potable water required for operation of the cogeneration facility is anticipated to average between 1 and 5 gpm. The District currently purchases water from the City of Blaine, according to Department of Health data.

A review of Ecology's Water Right Application Tracking (WRAT) database (August 2001) by the Applicant was conducted to evaluate the potential impacts to water rights as a result of construction and operation of the cogeneration facility. Water rights surrounding the site are designated to have a purpose of use for irrigation, domestic single, domestic multiple, municipal, wildlife, and commercial and industrial manufacturing. Water rights certificates, permits, and applications within a mile of the site are summarized below:

- Three certificated surface water rights, and
- nine groundwater rights (four applications and five certificated).

Many small "exempt" wells (less than 5,000 gallons per day do not require a water right) may be in use within the 1-mile radius for domestic water supply, but exempt wells are not documented in Ecology's WRAT database.

Surface and groundwater certificates, permits, claims, and applications recorded by Ecology for the PUD, the District, and the City of Blaine are presented in Tables 3.3-1 and 3.3-2. A summary of water rights is included in the ASC (BP 2002, Appendix F).

Water Discharge

Wastewater

The refinery's wastewater is directed to the onsite wastewater treatment facility. Once treated, the water is discharged via the refinery's existing wastewater discharge point, Outfall 001, at the Cherry Point terminal into the Strait of Georgia under an existing NPDES permit. Discharge from the outfall averages 2,338 gpm. The refinery's sanitary wastewater is directed to the Birch Bay Water and Sewer District's sewage treatment facility under an existing agreement.

Stormwater

Stormwater runoff from the refinery interface area presently drains uncontrolled as described above.

3.3.2 Impacts of the Proposed Action

Construction

Cogeneration Facility

Surface Water

Following clearing, initial site preparation would include temporary stormwater facilities to detain and treat precipitation, and perimeter ditches to intercept and divert any flows from upslope areas around the site. Clearing and grading would most likely occur during the dry season, due to the physical limitations of construction in seasonally wet areas. Construction of the stormwater facilities and perimeter ditches would result in the immediate alteration in surface water flow across the site that would not be exhibited until the beginning of the following wet season. Run-on flow from upslope would be eliminated and flow onsite from precipitation events would be quickly directed to the stormwater detention system. At the same time, elimination of vegetation would eliminate transpiration, resulting in some increase in flow offsite.

An unlined stormwater detention pond (1) has been proposed during construction, therefore some leakage to the local shallow groundwater table can be expected. The effect of any leakage is not expected to have a significant effect on local surface or groundwater flows for several reasons. First, local soils have a relatively low permeability and therefore any leakage would be expected to be slow. Second, construction is not expected to last long enough (two years) for any leakage to be significant (Wigfield, pers. comm., 2003). Finally, Grandview Road and its adjacent roadside ditch are approximately 400 feet north of the detention pond and would likely intercept any leakage and direct it to the existing culvert under Grandview Road to the east of Blaine Road.

Figure 3.3-7

Table 3.3-1: Water Rights, Permits, Certifications, and Claims in the Nooksack Basin (Upstream of Ferndale)

Document Number	Document Type	Purpose Code	Priority Date	Location	Qi (gpm)	Qa (acre-feet)	Purpose Starting Date	Purpose Ending Date	Last Name	First Name	Business Name	Source Name
G1-*01249CWRIS	Certificate	IR	October 7, 1949	T39N/R02E-22	350	54					Greenacres Meml Pk	Infiltration Trench
G1-*02509CWRIS	Certificate	MU	May 9, 1952	T39N/R02E-19	1,000	1,615					Ferndale Town Of	Well
G1-*03899CWRIS	Certificate	MU	February 28, 1955	T39N/R02E-19	870	440					Ferndale Town Of	Well
G1-*05728CWRIS	Certificate	DS, FS, IR	September 7, 1960	T40N/R02E-07	810	1,93.6					Le Cocq R B	Well
G1-*06660CWRIS	Certificate	IR	March 28, 1963	T40N/R02E-22	380	120					Shady Nook Farms	Well
G1-*10062CWRIS	Certificate	IR	March 7, 1969	T40N/R02E-10	500	84	01-May-96	01-Oct-96			Schoessler G Jr	Infiltration Trench
G1-00300CWRIS	Certificate	IR	July 10, 1970	T39N/R02E-02	400	108	01-Jun-96	30-Sep-96			Vaughn Leona	Infiltration Trench
G1-00010CWRIS	Certificate	IR	November 16, 1970	T40N/R02E-11	1,209	67	01-May-96	30-Sep-96			Steensma Fred	Well
G1-00444CWRIS	Certificate	IR	December 28, 1970	T40N/R01E-14	500	92	01-May-96	31-Oct-96			Olason Harold	Infiltration Trench
G1-00345CWRIS	Certificate	IR, DS	February 15, 1972	T40N/R02E-15	450	66	5/15/1996 (IR)	9/15/1996 (IR)			Yoder Richard L	Well
G1-26325	Certificate	FR	September 11, 1991	T39N/R02E-06	1,350				Jansen	Albert	Jjj Construction Co., Inc.	Infiltration Trench
S1-00708CWRIS	Certificate	CI, IR	September 27, 1968		12,566	18,544					Whatcom Cnty PUD 1	Nooksack River
S1-00707C	Certificate	CI	April 16, 1965		22,440	27,667					Whatcom Cnty PUD 1	Nooksack River
S1-*11970C	Certificate	CI	January 13, 1953		2,244	0					Whatcom Cnty PUD 1	Nooksack River
S1-00707C	Certificate	DM, IR	April 16, 1965		22,440	27,667					Whatcom Cnty PUD 1	Nooksack River
G1-*05086CWRIS	Certificate	MU	December 22, 1958		500	800					City of Blaine	Well
G1-*07623CWRIS	Certificate	MU	May 21, 1965		400	640					City of Blaine	Well
G1-22483CWRIS	Certificate	MU	April 14, 1975		450	726					City of Blaine	Well
G1-300037CL	Claim/	MU			800	1,290					City of Blaine	Well
G1-26822	Permit	MU	November 13, 1992		200	320					City of Blaine	Well

Source: Ecology 2001a

Table 3.3-2: Pending Groundwater Right Applications in the Terrell Creek/Cherry Point Watershed

Document Number	Document Type	Purpose Code	Priority Date	Location	Qi (gpm)	Business Name	Source Name
G1-27758	Application	CI, MU	August 23, 1996	T39N/R01E-09	700	Whatcom County PUD	Well
G1-27746	Application	CI, MU	June 21, 1996	T39N/R01W-13	1,500	Trillium Corporation	Well
S1-*06273AWRIS	Application	CI, DM	December 23, 1944		8,976	Whatcom County PUD	South Fork Nooksack River
G1-26820	Application	MU	November 13, 1992		200	City of Blaine	Well
G1-26821	Application	MU	November 13, 1992		450	City of Blaine	Well
G1-28046	Application	DM	August 3, 1999		500	Birch Bay Water and Sewer District	Well

Source: Ecology 2001a

Purpose Codes: DG (domestic general) MU (domestic municipal)
 FP (frost protection) ST (stock watering)
 IR (irrigation) DM (domestic multiple)
 CI (commercial and industrial manufacturing)

Stormwater/Flood Potential

Figure 3.3-4 shows the proximity of floodplain boundaries to the proposed cogeneration facility site. The proposed cogeneration facility and all associated components are not located within the 5-, 100-, or 500-year floodplains and therefore flooding would not be expected. This is the case during construction and operation of the cogeneration project and all its ancillary facilities.

Figure 3.3-8 shows the design basis for the operational stormwater control system.

Stormwater Quantity

Surface flow alterations in CMA 1 will result from filling existing ditches. This will increase sheetflow and hydraulic residence time for surface water moving across the site toward Terrell Creek.

Stormwater runoff rates from the cogeneration facility site have been calculated to determine the available flow to CMA 2. The final discharge from the project site would be to CMA 2 north of Grandview Road and west of Blaine Road. Runoff from the cogeneration site would be treated and then discharged through a level discharge trench to maximize sheetflow across the mitigation site. Ditches on the mitigation site would be filled to maximize residence time on the site and reduce early interception of sheetflow and redirection to Terrell Creek. Flows from the mitigation area will eventually move to Terrell Creek by way of the existing BP wetland mitigation area located at the west end of CMA 2. Figure 3.3-9 depicts the flow of surface water across CMA 2 after mitigation.

Stormwater collection, treatment, and discharge would be within the same hydrologic basin where the stormwater originates. As long as stormwater discharge from the facility during construction and operation meets Class AA standards, no significant changes to the quantity of water in the basin would result from construction and operation of the cogeneration facility. The stormwater that does not meet Class AA standards would be diverted to the refinery's wastewater treatment system. This would reduce the surface waterflow to wetlands in CMA 2 and the flow to Terrell Creek.

Groundwater

Recharge to the upper (near surface) water-bearing zone is primarily by direct rainfall precipitation and infiltration. Water levels in the upper water-bearing zone are shallow (< 5-foot depths at many locations) and are best described as perched groundwater in hydrologic continuity with the surrounding wetlands. Recharge to this zone would decrease essentially to zero at the project site, but would increase on the mitigation areas as runoff is transferred to them and ditches are eliminated to maximize hydraulic residence time.

Figure 3.3-8

Figure 3.3-9

Recharge to the Deming sand aquifer should not be measurably affected by stormwater control for the cogeneration facility or any other components of the project. The Deming sand aquifer is minimally recharged by leakage through the overlying Bellingham drift aquitard over a many square mile area, so the relatively small (approximately 70 acres) area of paved and roofed land for the proposed cogeneration facility and laydown areas should have no material affect. Furthermore, increased recharge of the upper (surface water) bearing zone in the mitigation areas should provide some additional source for leakage to the Deming sand aquifer.

Most of the stormwater collected on the cogeneration facility site would be routed to a surface water detention pond and allowed to discharge to wetlands within the same hydrologic subbasin. The net effect would be returning the collected stormwater to the same hydrologic system for recharge. Some containment systems, such as secondary containment of tanks for fuels, lubricants, and hazardous materials used during construction, would have a probability for receiving contaminated stormwater. These systems would be equipped with outlet valves to allow for inspection of the water before its release. The operation of these systems would be addressed in the SWPP plan procedures to avoid the contamination of the stormwater system. Stormwater that accumulates within storage tank containment structures would represent only a small portion of the entire stormwater from the construction site and, if contaminated, is the only stormwater that would not be returned to the same hydrologic basin. Any contaminated stormwater would be diverted and sent directly to the refinery wastewater treatment system for treatment and eventual discharge to the Strait of Georgia.

Water Rights and Water Supply

During construction, non-potable water would be supplied by truck to provide dust control (anticipated to be about 7 million gallons over the entire two-year construction period). Potable drinking water for construction workers would be provided by a water service to be contracted by the general site contractor.

Water for HRSG and export steam line steam-blow tests and hydrostatic tests would be required for the commissioning of the power plant facilities, natural gas connections, and water supply/discharge connections. The volume of water needed for HRSG steam-blow testing would be about 15.5 million gallons. Export steam line steam-blow testing would require about 1.2 million gallons, and hydrostatic testing would likely not exceed 4.8 million gallons. Testing would take place near completion of construction over a period of two to three months. The water source would either be industrial water directly from the PUD, or recycled cooling water from Alcoa Intalco Works if it is in operation.

Wastewater

No discharges to the refinery wastewater system are anticipated during construction, except for the additional load to the existing wastewater system from hydrostatic testing and other startup needs. Should there be contamination of stormwater within the secondary containment berms, that stormwater would also be directed to the refinery wastewater treatment facility. This additional load is not expected to cause any overload of volume to the existing system. According to the Applicant, water volumes used for hydrostatic testing are not unlike those used

for various refinery functions and would not be expected to exceed the capacity of the refinery's wastewater treatment system.

Refinery Interface

Laydown areas on the refinery site would most likely be the first facilities to be constructed, since these would be the initial base for construction operations. Following clearing, initial site preparation would include construction of stormwater facilities to detain and treat precipitation falling on the laydown site, and perimeter ditches to intercept and divert any flows from upslope areas around the site.

An unlined stormwater detention pond (2) has been proposed, therefore some leakage to the local shallow groundwater table could be expected. The leakage is not expected to have a significant effect on local surface or groundwater flows for several reasons. First, the local soils have a relatively low permeability and therefore any leakage would be expected to be slow. Second, construction is not expected to last long enough for any leakage to be significant (Wigfield, pers. comm., 2003). Finally, Grandview Road and its adjacent roadside ditch are located 400 feet north of the detention pond and would likely intercept leakage to shallow groundwater and direct it to the existing culvert under Grandview Road west of the laydown areas. Unlike the cogeneration facility site, stormwater facilities constructed for the laydown areas would be final. All laydown areas would be permanent for other refinery uses except the northern approximately 270 feet of Laydown Area 2, which would be restored after construction. Construction of the storm drainage facilities for the laydown areas would most likely occur during the dry season because of the physical limitations of construction in seasonally wet areas.

Construction of the three laydown areas and associated stormwater facilities would result in the immediate alteration to surface water flow across the site, but this alteration likely would not be exhibited until the beginning of the following wet season. Flow from upslope would be eliminated and flow onsite from precipitation events would be quickly directed to the stormwater detention system (detention pond 2). At the same time, elimination of vegetation would eliminate transpiration, resulting in a slight increase in flow offsite during and following precipitation events. Stormwater would be discharged to a ditch at the northwest end of the laydown areas. Flows go to a culvert under Grandview Road and discharge to a natural swale that supplies the BP duck ponds. The slight increase in total flow should not adversely affect the duck ponds.

Construction of Access Road 2 to the cogeneration site would also be an early construction activity in order to allow ready access to the site from the laydown areas. This road would intercept some northward-flowing surface and shallow groundwater in the area between Blaine Road and the refinery eastern boundary. Culverts would be necessary at both the east and west ends of the road to accommodate existing ditches. Nonetheless, some dewatering of the wetland immediately north of the roadway could be expected.

The various ancillary pipelines between the cogeneration facility and the refinery (steam, condensate return, sanitary sewer, potable water, wastewater, etc.) are expected to be laid either in the footprint of Access Road 2 or the elevated piperack. In either case they are not anticipated to have an adverse impact on surface or groundwater flows in the project vicinity.

It has not yet been determined precisely where the industrial water pipeline from the southeast corner of the refinery to the cogeneration facility would be laid. Construction of this pipeline could have a minor impact on surface water flows, depending on where it is located and if there are precipitation events during the construction activity. Regardless of its location, however, the impacts are not expected to be significant.

Transmission System

As with other facilities, construction of any access/maintenance roads for the transmission interconnection would result in an immediate alteration of surface water flows in the immediate vicinity of the roads. Such alteration would not be experienced until the following wet season. It is assumed that culverts would be placed wherever roads cross ditches or other surface water features. Nonetheless, where roads pass through wetlands, some dewatering of wetlands on the downslope (northwestern) side of the road would be expected.

Custer/Intalco Transmission Line No. 2

Similar to the transmission interconnection corridor, construction of any access/maintenance roads would result in an immediate alteration of surface water flows in the immediate vicinity of the roads. Such alteration would not be experienced until the following wet season. It is assumed that culverts would be placed wherever roads cross ditches or other surface water features. Nonetheless, where roads pass through wetlands, some dewatering of wetlands on the downslope (northwestern) side of the road would be expected.

Other Project Facilities

Alcoa Intalco Works

Construction of the collection sump, pump station, and approximately 1,600-foot pipeline may have a short-term effect on surface water flows as a result of earth disturbance. Since the exact location of these facilities has not been identified, it can only be assumed that they would be located within the confines of an already significantly altered industrial facility. It is also assumed that construction would only occur during the dry season, so that exposed soils would be covered and restored prior to any precipitation. If this assumption is not true, some alteration of local surface water flows during construction might be expected. Assuming construction does occur during the dry season, any impacts are expected to be minimal.

Wetland Mitigation Areas

Construction of the project and its ancillary facilities would not have an effect on flows through CMA 1, since that area does not presently receive any surface or groundwater flows from the cogeneration facility or refinery interface areas and that situation would not change. Filling of the ditches on CMA 1 is expected to increase stormwater detention time on the site. The result should be an improvement in wetland hydrologic characteristics in the area.

Increased flows to CMA 2, combined with more effective distribution and plugging of ditches, is also expected to increase hydraulic residence time on the site, thus enhancing existing wetlands and restoring wetlands that have been effectively drained.

Operation

Cogeneration Facility

Surface Water

Alterations to surface water flow through the cogeneration facility site would continue as initially implemented during project construction. Flows from upslope of the cogeneration facility site would be diverted around the perimeter of the site and discharged to CMA 1 where they are presently directed. As noted earlier under construction impacts, the ditch along the east side of the cogeneration facility could likely initiate drainage of wetland C that might not be apparent until several years into operation.

Stormwater

Once construction is complete, operation of stormwater facilities on the principal facility site would entail collection by a combination of storm drainage pipes and ditches that would route stormwater to detention pond 1 and subsequently discharge to CMA 2 following treatment, as described under construction impacts.

Groundwater

As discussed under construction impacts above, recharge to the shallow (near surface) groundwater table would essentially go to zero at both the cogeneration facility and the associated refinery laydown areas. Also as discussed under construction, some leakage from the unlined detention ponds could be expected, but this likely would be intercepted by Grandview Road and its associated roadside ditch.

Water Rights and Water Supply

Industrial process water would be supplied through a water re-use agreement between the PUD, the Applicant, and Alcoa Intalco Works for once-through cooling water from Alcoa, assuming Alcoa Intalco is in operation. Under this scenario, Alcoa would be able to provide approximately 2,770 gpm and the excess not used by the cogeneration facility could be used by the refinery, resulting in a net reduction of water withdrawal from the Nooksack River. If Alcoa is not in operation, the approximately 2,244-2,316 gpm of process water required by the cogeneration facility would be supplied directly by the PUD. In either case there would be no net increase in water withdrawal from the Nooksack River.

Potable water use of 1 to 5 gpm is anticipated from the cogeneration facility, as is an equivalent increase in sanitary waste discharge to the refinery and ultimately to the Blaine Wastewater Treatment Plant. This is considered minimal to overall refinery use, and the district has indicated

this increased usage would not impact available supplies or resources of potable water under current certified rights, as noted in the discussion of affected environment. The district currently purchases potable water from the City of Blaine, according to Department of Health data.

Normal fluctuations in the refinery's steam demand and seasonal ambient temperature changes would affect the cogeneration facility's water consumption. Warmer ambient temperatures in the summer increase water use, and cooler ambient temperatures in the winter decrease water use as a result of changes in evaporation rates in the cooling tower. Lower steam consumption by the refinery increases cogeneration facility water usage because of higher condensing duty.

Refinery Interface

Alterations to surface water flow through Laydown Areas 1 through 3 would continue as initially implemented during project construction. Most of the flows from upslope of the laydown areas would be diverted around the site and discharged to the culvert under Grandview Road northwest of the laydown areas where they are presently directed. After construction is completed, fill on Laydown Area 4 and the northern approximately 273 feet of Laydown Area 2 will be removed and the areas restored to a combination of wetland and upland habitats. These are identified as the east and west restoration areas, respectively. The east restoration area will be recontoured to approximate its pre-project topography and will receive surface flows from upslope to recreate a wetland at the western, downslope end. The west restoration area will be recontoured to include a shallow swale and flow-through ponds. A portion of the flows going down the east side of Blaine Road will be diverted to the west restoration area by way of a weir and culvert under Blaine Road. From the west, restoration area flows will enter detention pond 2 and then be discharged to the ditch flowing to Grandview Road, in the existing culvert under the road, and then northwestward to the BP duck ponds. No other impacts on water resources are expected.

Transmission System

After construction, the transmission line interconnection maintenance road would continue to have some minor adverse impacts on local surface water flow. No other impacts to water resources are expected.

Custer/Intalco Transmission Line No. 2

After construction, any new transmission line maintenance road would continue to have some minor adverse impacts on local surface water flow. No other impacts to water resources are expected.

Other Project Facilities

Alcoa Intalco Works

Operation of the recycled water connection with Alcoa Intalco Works should not have any impact on surface or groundwater resources. The effect of the interconnection on industrial water resources and withdrawals from the Nooksack River are discussed under construction impacts.

Wetland Mitigation Areas

As noted above, construction of the project and its ancillary facilities would not affect flows through CMA 1, since that area does not presently receive any surface or groundwater flows from the cogeneration facility or refinery interface area, a situation that would not change. During operation, surface water from the cogeneration facility would continue to be discharged to the CMA 2 site as described under construction. As noted above, increased flows to CMA 2, combined with more effective distribution and plugging of ditches, is also expected to increase hydraulic residence time on the site, thus enhancing existing wetlands and restoring wetlands that have been effectively drained.

3.3.3 Impacts of No Action

Under the No Action Alternative, there are no immediate plans to develop the proposed cogeneration or refinery interface areas. These areas are within the county's Heavy Impact Industrial area and could be developed for another project in the future. Any future development, however, would need to reflect constraints associated with wetlands both on the cogeneration site and in the laydown areas on the refinery site.

Under the No Action Alternative, a stand-alone merchant plant would likely be built somewhere in the region to supply needed electricity. This "replacement plant" would not be likely be able to take advantage of the cogeneration and possible water re-use opportunities that the proposed project has at the refinery location. While the potential cogeneration opportunities are clear, the recycling and reuse possibilities are less so, due to the uncertainty of the continued operation of the Alcoa Intalco Works. Identification of other potential impacts would be speculative.

Under the No Action Alternative, the wetland mitigation in areas CMA 1 and CMA 2 and the east and west restoration areas would not be constructed, and thus any improvement in habitat value or hydrologic function would not occur. Without these improvements, these areas would continue to provide limited wetland habitat or hydrologic functions.

3.3.4 Secondary and Cumulative Impacts

Some small cumulative impacts on surface and groundwater resources could result from construction of the cogeneration facility and the neighboring GSX pipeline, if these two projects occurred simultaneously. The use of recycled once-through cooling water would reduce the need for freshwater withdrawal from the Nooksack River by an average of 484 to 556 gpm. Even if Alcoa Intalco Works never operates again, there would still be a net decrease in withdrawal from the Nooksack River since the proposed project would not use as much industrial water as Alcoa did.

3.3.5 Mitigation Measures

Construction

Mitigation Proposed by the Applicant

The following discussion of the Applicant's proposed mitigation measures applies to construction impacts at all construction components of the project.

Surface Water

During construction, BMPs and the requirements of the Puget Sound Stormwater Treatment Manual for Western Washington would be applied at all construction sites where ground disturbance would occur. This could include all elements of the project. These procedures have been developed to contain and slow the flow of surface and stormwater on construction sites. While primarily associated with the need to reduce or eliminate water quality impacts associated with construction activities, they also help to regulate surface and stormwater flow. SWPP plans for both construction and operational activities would be prepared by the Applicant for the cogeneration facility site, and would include stormwater management procedures. The SWPP plan for construction would include a TESC plan for each phase of the cogeneration facility site. The SWPP plan and TESC plan would include the specification of all necessary BMPs for construction activities. The grading plan for the site would also specify the necessary BMPs for erosion. All erosion-control BMPs would be in place and functioning prior to the start of construction. BMPs would include such features as hay bale barricades, silt fences, and a detention pond to slow stormwater. Slowing of stormwater would increase infiltration and recharge of the shallow (near surface) aquifer.

Routing of surface water flowing onto the construction sites could slightly increase flow rates downstream of the project, but BMPs installed in newly constructed perimeter ditches should offset this slight increase in flows.

The restoration areas and compensatory mitigation areas would mitigate impacts on wetland hydrologic conditions on the project site. Other than BMPs to prevent excessive surface water flows as described above, no mitigation measures would be necessary.

Stormwater

BMPs discussed in the surface water subsection above should also control stormwater flows from the construction sites.

Flooding

Since none of the construction sites would have an impact on flooding or experience flooding events, no mitigation measures for flooding are proposed.

Groundwater

All BMPs that function to slow the flow of surface water would also increase discharge to groundwater in the shallow (near surface) aquifer.

Water Rights and Water Supply

During construction, non-potable water would be supplied by a temporary connection to the refinery. A piping system would distribute the water to taps, including a fill station for water trucks located in the work area. Water trucks would provide dust control during construction. Flow volumes would represent a slight increase over existing uses but are not expected to exceed the capacity of the refinery's existing contract.

Drinking water to construction workers would be provided by a water service to be contracted by the site contractor. It is anticipated that this water would infiltrate or evaporate. Mitigation measures would not be required.

Wastewater

With the exception of contaminated stormwater from inside the secondary containment areas to be discharged to the refinery wastewater treatment system, no wastewater would be expected during construction. Such flows would be minimal and would not require any mitigation. Sanitary waste would be handled with temporary facilities provided by an offsite contractor. No impacts would be expected and no mitigating measures are proposed.

Additional Recommended Mitigation Measures

If the industrial water supply pipeline from the southeast corner of the refinery to the cogeneration facility is constructed in the undeveloped area east of Blaine Road, pipeline collars and/or trench plugs should be installed to prevent the pipeline trench from draining any wetlands along the alignment.

Operation

The Applicant's proposed mitigation measures for operation of the cogeneration facility and the refinery interface portions of the project site would be the same. No operational mitigation measures are proposed for the transmission interconnection or transmission corridor.

Surface Water/Stormwater

The SWPP plan for operation would include structural and operational BMPs, an SPCC plan, a final stormwater management plan, and general operating procedures. This plan would be completed and onsite upon commencement of facility operation. The SPCC plan for operation would include structural, operational, and treatment BMPs. Structural BMPs would include impervious containment, covers, and spill control and cleanup equipment. Operational BMPs would include good housekeeping, employee training, spill prevention procedures, preventative

maintenance, and inspections. Treatment BMPs would include oil/water separation systems and treatment/detention ponds, as discussed below.

Groundwater

Leakage from the unlined detention facilities would increase discharge to shallow groundwater, offsetting any decreases as a result of loss of pervious surface. The mitigation wetlands have also been designed to increase discharge to the shallow aquifer as mitigation for the loss of wetland hydrologic functions.

Water Rights and Water Supply

The PUD would supply 1 to 5 gpm of water for potable and sanitation water needs. This quantity of water is small and would not impact water supply resources. Mitigation is not necessary.

If the Alcoa Intalco Works remains operational, the PUD would supply recycled industrial wastewater to the cogeneration facility. The recycled water would be once-through cooling water. The cogeneration facility would require an average of 2,244 to 2,316 gpm. The PUD would have an average of 2,780 gpm of water; any water not used by the cogeneration facility could be provided to the refinery. The need to withdraw freshwater from the Nooksack River would be reduced by an average of 484 to 556 gpm. The refinery's water use would also be reduced by about 20 gpm as a result of steam provided by the cogeneration facility.

Wastewater

Industrial wastewater from the cogeneration facility would be treated in the refinery's wastewater treatment system prior to discharge to the Strait of Georgia through the BP Cherry Point Refinery's NPDES permitted outfall. Sanitary wastewater would be routed to the PUD's wastewater treatment plant for treatment and discharge to the Strait of Georgia.

3.3.6 Significant Unavoidable Adverse Impacts

The proposed project, with all its associated mitigation measures, would have a limited impact on water resources in the area. Loss of wetlands and their hydrologic functions due to fill activities would be offset by enhancement of wetlands within the wetland mitigation areas. Increased stormwater runoff due to impervious surfaces would be offset by stormwater detention systems and wetland mitigation. Total water withdrawal from the Nooksack River would either be slightly less or the same, depending on whether Alcoa Intalco Works was operating. Construction and operation of the project could have a significant adverse impact on the otherwise undisturbed portion of Wetland C if the ditches on the east side of the cogeneration facility intercept surface and/or shallow groundwater flows.

3.4 WATER QUALITY

The following section describes existing water quality in the region of the proposed BP Cherry Point cogeneration facility, and assesses the project's potential for affecting water quality. Mitigation measures to reduce or eliminate impacts that would result from the project are also discussed. The analysis in this section is primarily based on information provided by the Applicant in the ASC (BP 2002, Appendix F).

3.4.1 Existing Conditions

Surface water resources are described detail in Section 3.3. The cogeneration project, including all its ancillary facilities, is located within what is commonly called the Mountain View Upland of Whatcom County (Newcomb et al. 1949).

The cogeneration facility, refinery site interface, and transmission line intertie are situated near the western end of the Terrell Creek drainage basin. Lake Terrell is the headwaters for Terrell Creek. The creek generally passes through the basin from east to west to its discharge point into Birch Bay at the Strait of Georgia. Stormwater from the project site would be discharged to the Terrell Creek drainage basin.

The Bonneville Transmission Line No. 2 corridor between Custer and the cogeneration facility site traverses both the Terrell Creek Basin and the California Creek Basin. The California Creek Basin, which lies north of the Terrell Creek basin, is also located in the Mountain View Upland and has very similar geology, geography, topography, historical development, and surface water characteristics to the Terrell Creek Basin. It does not, however, have a lake at its headwaters. California Creek flows generally northwest to Drayton Harbor.

Terrell Creek is classified as Class AA, extraordinary waters. Class AA waters must meet the water quality criteria as found in Chapter 173-201A-030. The Washington State Department of Ecology has established a water quality monitoring station on Terrell Creek near Jackson Road, northwest of the cogeneration facility. Sampling during 2001 and 2002 revealed exceedances from state water quality criteria for Class AA waters for fecal coliform bacteria (two exceedances) and dissolved oxygen (seven exceedances).

Neither Terrell Creek nor Lake Terrell are included in Ecology's section 303(d) list of impaired waters and there are no Total Maximum Daily Load (TMDL) plans or other existing water quality limitations in effect for either water body.

No water quality data were found for California Creek in Ecology's Internet databases. No specific classification for California Creek was found in WAC 173-201a. Therefore, California Creek falls under WAC 173-201A-120 general classification and is classified as Class AA. Given that the California Creek Basin is similar in physical makeup and land use to the Terrell Creek Basin, it is reasonable to assume that water quality conditions and concerns are also similar.

Industrial wastewater from the cogeneration facility would be discharged to the Strait of Georgia via the BP Cherry Point Refinery's wastewater treatment system. Cogeneration facility wastewater would be treated and combined with the refinery's wastewater and discharged through the NPDES-permitted (WA-002290-0) Outfall 001. This outfall was established during the original refinery construction and was put in place between 1969 and 1971. The Strait of Georgia is designated as a Class AA marine receiving water in the vicinity of the outfall. No surface water quality information for the Strait of Georgia in the vicinity of the outfall could be found.

The Nooksack River is the source of industrial process water for the project. Water from the Nooksack River would be piped to the site by the Whatcom County PUD, either from once through non-contact cooling water from a jacketed air compressor at the Alcoa Intalco Works if that facility is operational or directly from the river. Water quality parameters of once through non-contact cooling water are presented in Table 3.4-1. It is expected that the jacketed air compressor would alter only temperature (an increase of approximately 5°F) of the once through non-contact cooling water (Torpey, pers. comm., 2003).

The Nooksack River is a Class A surface water. Ecology maintains five water quality monitoring stations on the Nooksack River. The closest is located southeast of the cogeneration site at Brennan in western Whatcom County. Sampling between 1996 and 2002 revealed exceedances from state water quality criteria for Class A waters for fecal coliform bacteria (five exceedances) and total mercury (two exceedances).

Table 3.4-1: Source Water Quality

Constituent	Result	Units
Dissolved Oxygen	8.2	mg/l
Hydrogen Ion	7.2	pH
Temperature	21.4	C
Chemical Oxygen Demand	ND	mg/l
Total Organic Carbon	0.55	mg/l
Total Nitrate/Nitrite	0.15	mg/l
Fluoride	ND	mg/l
Bromide	ND	mg/l
Vanadium	0.009	mg/l
Aluminum	0.523	mg/l
Antimony	ND	mg/l
Arsenic	ND	mg/l
Barium	0.010	mg/l
Beryllium	ND	mg/l
Cadmium	ND	mg/l
Chromium	ND	mg/l
Cobalt	ND	mg/l
Copper	ND	mg/l
Iron	0.368	mg/l

Table 3.4-1: Continued

Constituent	Result	Units
Lead	ND	mg/l
Manganese	0.009	mg/l
Mercury	ND	mg/l
Nickel	0.001	mg/l
Selenium	ND	mg/l
Thallium	ND	mg/l
Tin	ND	mg/l
Zinc	0.005	mg/l

Source: Bechtel 2001

Groundwater Quality

The physical setting for regional and local groundwater is described in Section 3.3.

Groundwater within the Whatcom Basin in general, and specifically within the Mountain View Upland, typically has low dissolved solid content and is suitable for domestic and public water supply. The salinity of the aquifers in this area is low (generally below 20 ppm of chloride). Reports indicate that the deeper pre-Vashon sediments also contain water of good quality even from strata hundreds of feet below sea level (Newcomb et al. 1949). By contrast, groundwater in Tertiary bedrock, which primarily acts as an aquitard, commonly has elevated salinity levels when encountered.

The most objectionable constituent in basin groundwater in the western Whatcom Basin is elevated iron (Newcomb et al. 1949). Its occurrence is confined almost entirely to recessional outwash sands and gravels and recent alluvial deposits. A borehole log of well 40/1E-33 G reports a “sulfur smell odor,” possibly hydrogen sulfide. Such occurrence may be due to peat or swamp deposits in close proximity to the aquifer (Newcomb et al. 1949).

A potential exists for shallow groundwater beneath the project site to be contaminated because of its proximity to the BP industrial operation. The area appears hydraulically upgradient of facility operations, however, and therefore is not especially vulnerable to releases from the facility, if they have occurred in the past.

Refinery Wastewater

Process water from the BP Cherry Point refinery receives primary and secondary treatment in a wastewater treatment system consisting of parallel oil/water separators, an equalization tank, an activated sludge unit, a secondary clarifier, and two clarification ponds. The discharge from the wastewater treatment system is pumped into the Strait of Georgia. An NPDES permit was issued to BP by Ecology on October 1, 1999. Table 3.4-2 lists the limitations on the treated process wastewater discharged from the refinery, as outlined in the NPDES permit:

Table 3.4-2: Refinery Effluent Limitations (pounds per day, except where noted)

Parameters	Monthly Average	Daily Maximum
Biochemical Oxygen Demand (five-day)	1,240	2,260
Chemical Oxygen Demand	8,540	16,610
Total Suspended Solids	990	1,570
Oil and Grease	360	680
Oil and Grease	Concentration shall at no time exceed 15 mg/l and shall not exceed 10 mg/l more than three days per month.	
Phenolic Compounds	8.1	16.7
Ammonia as N	870	1,910
Sulfide	6.7	14.7
Total Chromium	12.5	27.5
Hexavalent Chromium	0.9	2.0
pH	Within the range of 6.0 to 9.0	

In a report dated May 28, 2002, BP documented the results of a study conducted in 2000-2001 to determine the treatment and removal efficiencies of its wastewater treatment system. This report also includes an engineering analysis of the wastewater treatment system's design capacity. The refinery currently uses approximately 50% of the organic and hydraulic capacity of the wastewater treatment system (EFSEC 2003). Once treated, the water is discharged via the refinery's existing wastewater discharge point at the Cherry Point terminal through Outfall 001 under an existing NPDES permit to the Strait of Georgia.

3.4.2 Impacts of the Proposed Action

Construction

This section describes potential impacts to water quality from construction activities and project design elements proposed by the Applicant to minimize or eliminate those potential impacts.

Cogeneration Facility

Potable Water and Construction Wastewater

During construction, nonpotable water would be necessary for dust control (anticipated to be about 7 million gallons over the entire construction period). Drinking water for construction workers would be provided by a water service to be contracted by the site contractor. There should be no impacts on the quality of the potable water source from these activities.

Water for HRSG and export steam line steam-blow tests and hydrostatic tests would be required for the commissioning of the cogeneration facility, natural gas connections, and water supply/discharge connections. The source of the test water would be the fresh industrial water supplied by the PUD. About 15.5 million gallons of water would be needed for HRSG steam-blow testing. Export steam line steam-blow testing would require about 1.2 million gallons, and hydrostatic testing would require no more than 4.8 million gallons. Testing would take place near the completion of construction over a period of two to three months.

The water generated from these activities is anticipated to be “clean,” but could contain small amounts of oil and grease. Consequently, the Applicant plans to collect and discharge the test water to the refinery wastewater treatment system. As described above, the refinery wastewater treatment system currently operates at approximately 50% of its organic and hydraulic capacity. Impacts on the refinery wastewater treatment system are not anticipated.

Water used for HRSG steam-blow tests would be discharged as steam to the atmosphere. If contaminants are present in the water, the contaminants may be discharged to the atmosphere with the steam.

Stormwater (Surface Runoff)

The potential exists for impacts on stormwater quality either from sediment loading or from accidental spills and leaks. Turbid sediment-laden surface water runoff could discharge relatively directly to Terrell Creek along the Blaine Road ditch, or more circuitously to Terrell Creek by way of the wetland/pond areas north of Grandview Road.

A Construction SWPP plan would be developed in accordance with BMPs and would detail the sediment and erosion control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality. These may include such things as silt fencing and hay bales, and placement of polyethylene tarps to cover exposed surfaces. Control of fuel storage and equipment fueling operations for spill prevention and control would be detailed in the SWPP plan. These BMPs would be inspected after every storm event greater than 0.5 inches of precipitation in 24-hours to assess damage and maintenance requirements, if any.

As described in Section 3.3, the construction stormwater collection and treatment system would include diversion ditches to prevent runoff from areas outside the cogeneration project site from entering the site. Stormwater runoff from within the cogeneration project site would be contained, collected, and routed to the stormwater treatment and detention system. Silt fences and temporary swales on the construction site would lead runoff to the treatment and detention system. Perimeter silt fences around the construction zone would be installed to remove sediment from runoff before it reaches the site boundary. Additional localized silt fencing would be used as required during construction to minimize erosion and transport of soil. Temporary swales would be constructed to accommodate areas being excavated or filled. Once the preliminary cut-and-fill work is complete, the swales would likely remain in place until final grading. Wherever possible, temporary swales would be incorporated into the permanent stormwater collection system. The perimeter silt fence would not be removed until the site has been stabilized. In general, the stormwater treatment and detention system would consist of oil/water separation system equipped with a shutoff valve in case of an accidental release for containment. Emergency cleanup equipment and supplies would be available onsite for rapid response. Stormwater would be discharged from the oil/water separation system into a final treatment and detention pond (1) located near the northwest corner of the site. The unlined pond would be properly sized in accordance with Whatcom County and Ecology requirements, and then eventually discharged to wetlands from the treatment/detention pond. Additional stormwater

quality treatment would be achieved when water discharged from the construction stormwater treatment system reaches the wetlands between the project area and Terrell Creek.

As elements of the permanent stormwater collection system are installed within the cogeneration project site (see discussion below), they would be used to contain, collect, and treat construction runoff. Silt fencing intended to prevent sediments from entering would protect inlets to the permanent system. Seeding and mulching would be used where practical for slope stabilization as rough grading is completed.

Containment pits or other means of confinement would be provided locally near each potential source of contaminating materials to provide for protection against spillage. A SWPP plan would be established prior to commencement of construction activities.

With implementation of the planned construction stormwater collection and treatment system, SWPP plan, and BMPs, there would be no adverse change to the returning quality of the collected stormwater to the Terrell Creek drainage basin.

Sanitary Waste

Portable sanitation units would be used during construction of the cogeneration facility. These units would be maintained on a regular basis, and a licensed Sanitary Waste Management Contractor would collect waste from the units for disposal in accordance with applicable regulations. Sanitary waste generation is anticipated to be 500 gallons per day in conjunction with the construction phase.

Groundwater

A potential exists for impacts on groundwater through accidental spills of construction chemicals or through fuel and lubricant leaks from construction equipment. A list of chemicals anticipated to be used during construction is provided in Table 3.4-3.

If an accidental release did occur and reached bare ground, the surface soils and underlying Bellingham drift are expected to be an effective medium for chemical absorption and retardation. Both the surface soils and Bellingham drift contain fine-grained silts and clays, which would slow infiltration but not prevent it.

There is limited potential for impacts to the Deming aquifer from construction-related spills or leaks due to the thickness of the overlying Bellingham drift and its low permeability. By contrast, there is a greater potential for impacts to the upper water-bearing zone due to its shallow depth and higher permeability soils. Impacts to this shallow groundwater zone would likely require a large-volume spill that was undetected for an extended period of time. A large-volume spill that was immediately detected and cleaned up would have a very low potential for impacting the upper water-bearing zone.

Table 3.4-3: Chemicals to Be Used and Stored During Construction

Chemical	Purpose	Estimated Quantity	Storage Location
STG and pre-boiler piping cleaners	STG and pre-boiler piping cleaning waste, chelant chemical cleaner, or demineralized water treated with oxygen scavenger and amine	400,000 gallons	Brought to site by equipment vendor/contractor
Solvents, used equipment lube oils, paints, adhesives	Used in construction	200 gallons monthly	Not known at this time
Used and waste oils	For CGT and STG lube oil flushes	200 55-gallon drums over life of construction	Not known at this time
Spent lead batteries	Various	3 batteries annually	Not known at this time
Spent alkaline batteries	Various	80 batteries monthly	Not known at this time
Waste oil from oily waste holding tank	Collected onsite	25 gallons monthly	Not known at this time
Oil rags, oil absorbent	Generated during normal construction activities, excluding lube oil flushes	55 gallons monthly	Not known at this time
Argon Gas	Welding and HRSG components	Not known at this time	Temporary warehouse
Acetylene	Cutting torches	Not known at this time	Temporary warehouse
Helium	Welding aluminum ducts	Not known at this time	Temporary warehouse
Nitrogen	Welding	Not known at this time	Temporary warehouse
Oxygen	Cutting torches	Not known at this time	Temporary warehouse

Source: BP 2002

Refinery Interface

Stormwater treatment measures for the refinery interface would be similar to those described for the cogeneration facility. Construction stormwater would be routed through oil/water separation facilities then to an unlined stormwater detention pond (2) located in the southwest corner of Laydown Area 2.

The refinery interface includes most of the piping systems that would require hydrostatic testing prior to operation. As discussed above, this test water would be routed through the refinery wastewater treatment system prior to discharge to the Strait of Georgia via Outfall 001. No impact on the refinery's wastewater treatment system nor the Strait of Georgia surface water and sediment is expected. The refinery wastewater treatment system currently operates at 50% of its capacity and should, therefore, accommodate the additional temporary inputs without reduction in outfall quality.

Transmission System

This new 0.8-mile transmission line would require the construction of five towers. As described above for the cogeneration facility, the potential for contamination of stormwater from sediment or accidental spills is possible during tower construction. Implementation of the construction SWPP plan and appropriate BMPs would protect against adverse impacts on surface water and groundwater quality.

The 150-foot-wide electrical transmission line corridor has not yet been cleared of trees, although the access/maintenance roads leading to the transmission line corridor have been developed. Three pads for the transmission towers have already been constructed. The gravel pads are approximately 50 feet by 50 feet. One additional pad will be constructed at a later date adjacent to the existing Bonneville Transmission Corridor. There are two gravel access roads, approximately 15 feet wide, which have been developed for construction and access of the transmission pads and footings. These pads and access roads were constructed under an existing Clean Water Act permit. BMPs such as silt fences, straw bales, and mulching would be used as necessary during clearing of the corridor and construction of the remaining tower pad to control erosion until the area can be stabilized with gravel or vegetation.

Custer/Intalco Transmission Line No. 2

Upgrading the existing approximately 5-mile corridor may require placement of several new towers (the number of new towers required has not been determined). Potential impacts on surface water and groundwater quality are similar to those described for the cogeneration facility. Implementation of the construction SWPP plan and appropriate BMPs would protect against adverse impacts on surface water and groundwater quality.

The upgrade option involving the Remedial Action Scheme, rather than the option requiring placement of new towers, would not impact water quality.

Other Project Components

Potential impacts on surface water and groundwater quality during construction of the other project components are similar to those described for the cogeneration facility. Implementation of the construction SWPP plan and appropriate BMPs would protect against adverse impacts on surface water and groundwater quality.

The new section of the industrial water supply pipeline would need to be hydrostatically tested prior to operation. As discussed above, this test water would be routed through the refinery wastewater treatment system prior to discharge to the Strait of Georgia via Outfall 001. No impact to the refinery's wastewater treatment system nor the Strait of Georgia surface water and sediment is expected.

Operation

Cogeneration Facility

Process Wastewater

Wastewater sources would include the following:

- Treatment of raw water to produce high-quality boiler feedwater (BFW) and refinery return condensate treatment;

- Equipment drains - collection of water and/or other minor drainage from various types of equipment (“oily wastewater”); and
- Cooling tower blowdown.

The estimated flows and chemical compositions of waste streams from the cogeneration project, except for sanitary wastewater, are provided in Table 3.4-4.

Table 3.4-4: Wastewater Flows and Chemical Composition

	Demineralization Plant Regeneration Water (Includes Filter Backwash)	Equipment Drain and Washdown Oily Wastewater	Cogeneration Cooling Tower Blowdown
Average Flow (gpm)	54	5	131 ¹⁰
Peak Flow	300 gpm	50 gpm	400 gpm
Duration	1 hr/day	30 min/day	8 hrs/day
General Parameters			
pH (pH units)	6.5 – 8.5	7.0 – 7.5	8.0 – 9.5 ¹³
Dissolved oxygen (mg/L)	8	8	8
COD	8 ¹	65 ¹	200 ¹²
BOD	4 ¹	33 ¹	81 ¹²
Oil and grease (mg/L)	2	20	0.3
TDS (mg/L)	5,000	62	2,200
TSS (mg/L)	28	20	50
Temperature (°F)	< 80	< 80	< 100
Major Cation Concentration (mg/L)			
Ca	54	14	207
Mg	20	5	77
Na	1,688	11	165
K	3.6	1	14
Major Anions Concentration (mg/L)			
HCO ₃	62	67	200
CO ₃	0	0	0
Cl	12	3.2	287 ⁹
SO ₄	2,950	14	1,024 ⁹
Trace Metals Concentration (mg/L)			
Ag ^{2a}	0.004	0.001	0.015
Al ²	3.0	0.75	11.25
As ^{2a}	0.004	0.001	0.24 (0.512) ⁷
Ba ²	0.072	0.018	0.27
Trace Metals Concentration (mg/L)			
Be ^{2a}	0.004	0.001	0.015
Cd ^{2a}	0.004	0.001	0.015
Cr ²	0.008	0.002	0.20 (0.918) ⁷
Co ^{2a}	0.02	0.005	0.075
Cu ^{2a}	0.02	0.005	0.23 (0.291) ⁷
Fe ²	0.308	0.077	1.16
Hg ^{2a}	0.002	0.0005	0.0075
Mn ²	0.588	0.147	2.205
Ni ^{2a}	0.004	0.001	0.015
Pb ^{2a}	0.004	0.001	0.015
Sb ^{2a}	0.004	0.001	0.015
Se ^{2a}	0.004	0.001	0.015

Table 3.4-4: Continued

	Demineralization Plant Regeneration Water (Includes Filter Backwash)	Equipment Drain and Washdown Oily Wastewater	Cogeneration Cooling Tower Blowdown
Sn ^{2a}	0.16	0.04	0.6
Tl ^{2a}	0.004	0.001	0.015
V ²	0.036	0.009	0.135
Zn ²	0.04	0.01	2.0 ⁹
Other Anions Concentration (mg/L)			
SiO ₃	40	10	150
PO ₄	2.0	0.5	10 ⁹
F ^{2a}	2.0	0.5	7.5
NO ₃ /NO ₂	4.0	1.0	15
NH ₃ /NH ₄	₃	₃	₃
Br ^{2a}	0.02	0.005	0.075
Organics Concentration (mg/L)			
Dissolved organic carbon	4	4	4
Polymers (polyquarternaryamine)	19 ⁵	0	0
Polymers (polyacrylamide)	0	0	10 ⁸
Total organic carbon	48 ⁶	12	50 ¹¹

Source: Bechtel 2001

- Notes:
- Based on typical ratio between oil and grease, COD and BOD in industrial wastewater.
 - Trace metal data reported, except aluminum (Al), are based on a single test report by Edge Analytical (Ref 01-4184, 08/29/2001). Actual quantities would be related to background concentrations as follows:
 - For Denim Plant Regeneration Water (Includes Filter Backwash), the actual concentration would be approximately four times the background concentration in the Whatcom PUD water.
 - For Equipment Drain and Washdown Oily Wastewater, the actual concentration would be the background concentration in the Whatcom PUD water.
 - For Cogeneration Cooling Tower Blowdown, the actual concentration would be approximately 15 times the background concentration in the Whatcom PUD water.
- Values for Aluminum are based on historical average values as supplied by Whatcom County PUD and concentrated on the same basis as the rest of the trace metals.
- The Edge Analytical test showed no detectable quantity of this component. The quantities shown are based on the detection limit for the analytical test and are concentrated by 1, 4, or 15 times as described in Note 2.
 - Not detected in site samples; not normally present in surface waters at detectable levels.
 - Included with total organic carbon concentration value.
 - This type of polymer may be used to treat makeup water, which is filtered prior to demineralization.
 - This is an assumed value and is based on four times the value typical for surface waters subject to elevated TOC due to seasonal runoff.
 - This is an estimated value, and is 15 times the value obtained in a test performed by Edge Analytical (Reference # 01-4184) plus the highest anticipated leachate rate from CCA-C wood used in cooling tower construction. This highest concentration occurs initially upon cooling tower startup. Over a period of about one year, this initial concentration would decrease about 40–80%. The number in parentheses is the highest initial concentration; the other number in the cell is the longer-term concentration.
 - This type of polymer may be used as a dispersant in the cooling tower recirculating water.
 - This value reflects addition of this substance to the cooling tower recirculating water to control pH and limit biofouling and corrosion.
 - This value could increase to 203 gpm if the cooling tower is operated at 10 cycles of concentration as opposed to 15. Concentrations of chemical species relating to the cooling tower would then be reduced in inverse proportion. Total mass flow of species listed would remain constant. Because 10-cycle operation requires 72 gpm more makeup water on an average basis than 15-cycle operation, freshwater requirements for the cogeneration facility are given for 10-cycle operation.
 - This value is based on a typical average surface water TOC concentration of 3 to 4 mg/L, with the cooling tower operating at 15 cycles of concentration.
 - Based on typical ratios between TOC, COD, and BOD in municipal wastewater; which represent these relationships when the TOC, COD, and BOD are not derived from petrochemical wastes.
 - Normal control range: 8.2 to 8.8 pH

There would also be a periodic wastewater stream generated when a gas turbine is shut down in order to wash the turbine blades and restore peak operating efficiency. This is done once per quarter per gas turbine at most, depending on blade fouling severity. The operation generates approximately 2,300 gallons of water per wash that contains dirt deposits removed from the blades, along with detergents used for the cleaning operation. The current plan, because it is not known what effect the detergent would have on the refinery's wastewater treatment system, is to collect this water in a sump and transport it offsite for treatment and disposal. The collected wash water would be tested, and if determined to be appropriate, would be treated by the refinery's wastewater treatment system and discharged to the Strait of Georgia through Outfall 001.

Anticipated water quality from the boiler blowdown is also listed in Table 3.4-4.

The streams generated during normal operation represent the majority of the wastewater flows and are proposed to be handled as follows:

- Raw Water Treatment Waste and Refinery Return Condensate Treatment Waste: Filters are used to remove the relatively small amount of suspended solids present in the water received from the PUD. Filtration is required as a first step in the production of high-quality BFW. Periodically, each of the three filters in the unit would be backwashed to remove the solids from the filter media. The backwash water is collected in a large tank (equalization tank), which is then pumped at a controlled rate to the refinery's wastewater treatment system.

The condensate being returned from the refinery to the cogeneration facility would be treated through a precoat filter system to remove any trace oil. When the precoat filter material is replaced, the spent precoat material (a mixture of powdered cellulose and powdered activated carbon) would be collected in a tank and dewatered for disposal. The water removed as a result of the dewatering process would be sent to the refinery wastewater treatment plant.

Ion exchange units are also used to purify water from the PUD and condensate returned from the refinery. Dissolved ionic species must be removed in order to generate high-pressure steam in the HRSGs without fouling or corroding the boiler tubes. The resins in the ion exchange units eventually become saturated as their capacity for removing ions has been reached. It is then necessary to regenerate these resins with dilute sulfuric acid and sodium hydroxide. These chemicals, along with the removed ions and rinse waters, are collected in the neutralization tank, neutralized to a pH of between 6.5 and 8.5, pumped to the equalization tank, and then pumped to the refinery's wastewater treatment system. The filter backwash is also part of this stream.

- Equipment Drains: Some pumps and steam turbines may use small quantities of water to cool bearings or lubricate seals. Water draining from this equipment has the potential to come in contact with surfaces that may have lubricating oil on them. As such, this wastewater has the potential to contain trace free oil. In addition, some equipment must be flushed with water prior to being opened for maintenance. This water may also contain impurities, which would require treatment. These waters would be collected in a sump, held in an equalization tank, and pumped to the refinery's wastewater treatment system.

- **Cooling Tower Blowdown:** The blowdown from the cogeneration facility cooling tower would be held in an equalization tank with other cogeneration wastewater streams (except sanitary wastes) and pumped at a controlled rate to the refinery wastewater treatment system.

After treatment in the refinery wastewater treatment system, wastewater from the cogeneration facility would be discharged along with the refinery wastewater to the Strait of Georgia. The cogeneration facility would add approximately 190 gpm on average, assuming 15 cycles of concentration in the cooling tower of non-recyclable process wastewater, to the refinery discharge. Table 3.4-5 presents a numerical analysis of the potential impact of the cogeneration facility wastewater on the refinery's wastewater stream. The impact analysis is based on the average discharge from the refinery wastewater treatment study that was conducted in July, August, and September of 2001.

Table 3.4-5: Potential Impact of Proposed Cogeneration Facility on the Existing Refinery Wastewater Discharge to Outfall 001 to the Strait of Georgia

Parameter	Cogeneration Process Wastewater	Refinery Process Wastewater after Treatment	Percentage of Increase with Cogeneration Contribution (after treatment by refinery) ¹
Discharge Flow (gpm)	190	2,338	8.1%
Biochemical Oxygen Demand (BOD) lbs./day mg/l	132	275	1%
Chemical Oxygen Demand (COD) lbs./day	323	2,235	0.6%
Total Suspended Solids (TSS) lbs./day	98	427	14.9%
Oil and Grease (lbs./day)	3	115	0.1%
Total Chromium (lbs./day)	0.32 (1.45)	0	²
Temperature (°F)	93.8	82.7	1%
pH	6.5 - 9.5	8.0 - 8.6 Minimum	-1%

1 Based upon treatment efficiencies documented in the BP Cherry Point Treatment Efficiency Study and Engineering Report, May 2002.

2 Not estimated – the Treatment Efficiency Study report does show that metal concentrations are reduced through the refinery wastewater treatment system.

Stormwater

The potential exists for impacts on stormwater quality from accidental spills of chemicals used during operations, from runoff across surfaces containing contaminants, or from runoff across areas of bare soil. Of these, runoff across bare soil is the least likely, given that most industrial facilities landscape those parts of the site that are not otherwise covered by buildings or pavement.

Chemicals anticipated to be used or stored during the cogeneration facility operation are listed in Table 3.4-6. There is a potential for accidental release of these chemicals to areas subject to stormwater runoff.

Table 3.4-6: Chemicals Used During Operations and Maintenance

Chemical	Estimated Quantity	Storage	Purpose
Lubricating oil	22,900 gallons	In STG and GTG equipment, lockers for smaller rotating equipment	Lubrication of rotating equipment
Control oil	230 gallons	In STG equipment	STG equipment
Hydrogen	60,400 scf	GTG/STG gas bottles	Coolant for power generation
Carbon dioxide	41,000 scf	GTG/STG gas bottles	Purge and fire protection for power generation equipment
Transformer oil	48,000 gallons	Combustion turbine transformers	Coolant
Transformer oil	30,000 gallons	Steam turbine transformer	Coolant
Transformer oil	6,000 gallons	Auxiliary transformers	Coolant
Anhydrous Ammonia	940,000 annually	Above grade horizontal cylindrical tank	No _x reduction
SCR Catalyst	4,800 ft ³	In HRSG	No _x reduction
CO Catalyst	990 ft ³	In HRSG	CO reduction
Propylene glycol	17,500 gallons	Above grade tank	Closed loop cooling water system
BPC-68170 (nitrate/borate) corrosion inhibitor	50 gallons	Drum	Closed loop cooling water system
BPB-59396 (diethyl hydroxylamine) oxygen scavenger	500 gallons	Tank	Water treatment system
BPB-59465 (morpholine) corrosion inhibitor	500 gallons	Tank	Water treatment system
Di- and trisodium phosphate pH/scale control agent	200 pounds	Bags/tank	Water treatment system
Cation resin	950 ft ³	Warehouse/tank	Water treatment system
Anion resin	900 ft ³	Warehouse/tank	Water treatment system
Caustic (50 wt%)	8,000 gallons	Tank	Water treatment system
Sulfuric acid (93 wt%)	8,000 gallons	Tank	Water treatment system
BPW-76321 (polyquaternary amine) polymer	350 gallons	Tank	Water treatment system
Natural Gas	N/A	Pipeline	Fuel

Source: Duke/Fluor Daniel 2001

Stormwater quality may also be impacted by runoff from surfaces containing oil and grease, such as parking areas or roadways.

A SWPP plan for operational procedures, in conjunction with the SPCC plan, would provide structural, operational, and erosion/spill control BMPs for all stormwater operational activities of the plant site.

The cogeneration facility site would be divided into three primary drainage areas for the purposes of runoff design. The first area would consist of the switchyard area on the eastern portion of the site. The second area would consist of the remainder of the developed site, which includes the power block, cooling tower, and administrative functions. The third would be stormwater that could become impacted from a storage tank accidental release.

The switchyard area would be surfaced with crushed rock to allow some percolation into the soil below. The area would be graded at about a 1 percent slope so as to sheet flow excess runoff toward a collection system consisting of swales, catch basins, manholes, and underground pipe.

Most of the remaining plant areas would be asphalt-paved, covered with crushed rock or grass, or covered with buildings or enclosures. The finish surfaces of the cogeneration facility site would be sloped from a high point located near the center of the main piperack toward low points along the edge of plant roads. Runoff would sheet flow across the site toward a collection system similar to that described above. All surface runoff would be captured by the surface drainage system then be directed through an underground piping system to the stormwater treatment and detention system. The stormwater treatment and detention system would consist of an oil/water separation system equipped with a shutoff valve in case of an accidental release for containment. Emergency cleanup equipment and supplies would be available onsite for rapid response. Stormwater would be discharged from the oil/water separation system into a final treatment and detention pond properly sized in accordance with Whatcom County and Ecology requirements. The detention pond, located in the same location as the construction stormwater detention pond (1), will either be lined or unlined. If unlined, a groundwater impact evaluation would need to be performed by the Applicant. Stormwater would be discharged to mitigation wetlands from the detention pond.

The third area for stormwater collection results from stormwater accumulating within the secondary containment structures for outside tanks and chemical storage areas. This stormwater, expected to be of small volume, would be separated from other stormwater because of releases that could potentially occur from the tanks. This stormwater would be retained within containment structures and analyzed for contaminants. If contaminants are present, this stormwater would be routed to the refinery wastewater system. The water would leave the cogeneration facility site along with the plant wastewater, be discharged into the existing refinery wastewater treatment system, and then processed by the refinery's wastewater treatment plant. If water quality analysis indicates no contaminants are present, the stormwater would be routed to the cogeneration facility's stormwater treatment system.

Sanitary Waste

Sanitary waste from cogeneration facility employees would be collected and routed for treatment by the Birch Bay Wastewater Treatment Plant (WWTP) via the refinery's sanitary wastewater system. The estimated amount of sanitary waste generated by the cogeneration facility is between 1 and 5 gpm. The Birch Bay Water and Sewer District has confirmed that it has the capacity to accommodate the incremental combined loading to its sanitary sewage wastewater treatment system from the refinery and the proposed cogeneration facility. The WWTP would treat the refinery and cogeneration facility sanitary wastes before discharge to the Strait of Georgia. The quantity of sanitary waste that would be generated by the cogeneration facility is not expected to affect receiving water quality in the Strait of Georgia.

Groundwater

Fuels, lubricants, and other chemicals that would be used during operation are listed in Table 3.4-6. There is a potential for short-term accidental spills or long-term leaks of these chemicals to affect the shallow (near surface) groundwater system. The upper water-bearing zone is at greatest risk due to its shallow depth. The deeper Deming aquifer is protected by the Bellingham drift aquitard and is at significantly less risk.

If an accidental release did occur, the surface soils and underlying Bellingham drift are expected to be an effective medium for chemical absorption and retardation. Both the surface soils and Bellingham drift contain fine-grained silts and clays, which would reduce infiltration and enhance retardation.

The operational SWPP plan and SPCC would outline measures to minimize and prevent impacts on groundwater from accidental spills during facility operations.

Refinery Interface

Maintenance activities on components of the refinery interface could result in chemical spills that could impact surface water and groundwater quality. Potential spills could enter the stormwater collection system, if not contained at the site of the spill, and eventually reach the oil/water separation system of the cogeneration facility stormwater collection and treatment system. Contaminated water would be isolated at the oil/water separator(s), collected, and treated as appropriate. Surface water and groundwater quality would not be affected.

Transmission System

Maintenance activities on the transmission system could result in chemical spills that could impact surface water and groundwater quality. A SWPP plan for maintenance procedures, in conjunction with the SPCC plan, would provide structural, operational, and erosion/spill control BMPs for all maintenance activities on the transmission system. The transmission intertie access roads and tower pads allow stormwater infiltration to occur and would not substantially increase the amount of stormwater runoff over existing conditions. The surrounding areas are undisturbed grassland and forest.

Custer/Intalco Transmission Line No. 2

Maintenance activities on the Custer/Intalco Transmission Line No. 2 could result in chemical spills that could impact surface water and groundwater quality. This element of the project would be owned and operated by the Bonneville Power Administration. Presumably, Bonneville has a SWPP plan for maintenance procedures, in conjunction with a SPCC plan that would provide structural, operational, and erosion/spill control BMPs for all maintenance activities on the transmission line.

Other Project Components

Operation and maintenance of the industrial water supply pipeline and associated components at the Alcoa Intalco Works could result in potential erosion/sedimentation and chemical spills that could impact surface water and groundwater quality. This element of the project would be owned and operated by Whatcom County PUD. Presumably, the PUD has a SWPP plan for maintenance procedures, in conjunction with a SPCC plan that would provide structural, operational, and erosion/spill control BMPs for maintenance activities at their facilities.

3.4.3 Impacts of No Action

Under the No Action Alternative, there would be no immediate plans to develop the proposed site. There would, therefore, be none of the impacts on water quality that are described above. The area is within the Heavy Impact Industrial area could be developed for another project in the future. Presumably, future industrial projects would have similar impacts to those described for the cogeneration project.

3.4.4 Secondary and Cumulative Impacts

Secondary Impacts

Construction and operation of the cogeneration project would result in the removal of 30.51 acres of wetland from the cogeneration facility site and laydown areas. There is a potential water quality impact to water reaching Terrell Creek from the loss of water quality treatment that those wetlands currently provide. This would be offset by the establishment of construction and operation stormwater collection and treatment systems on the affected areas and mitigation wetlands associated with the project.

Cumulative Impacts

Several industrial dischargers are located in the general vicinity of the proposed cogeneration project. These include the BP Cherry Point Refinery, the Conoco-Phillips Refinery, Tenaska Washington Cogeneration Power Plant, and Alcoa/Intalco. All these facilities currently discharge to the Strait of Georgia. Also in the general vicinity is the Birch Bay sewage treatment plant which discharges to Birch Bay, an embayment of the Strait of Georgia. The area is zoned heavy industrial. It is possible that additional industrial development would occur in the area in the future. Future industries locating in this area would likely discharge wastewater to the Strait of Georgia and stormwater to the Terrell Creek and California Creek basins.

The cogeneration facility would add 190 gpm of treated wastewater to the Strait of Georgia at Cherry Point, which is an increase of about 8% over the current discharge from the BP Cherry Point Refinery. Although a relatively small increase, this adds to the overall burden to water quality of the Strait of Georgia.

3.4.5 Mitigation Measures

Mitigation measures for potential water quality impacts from the project are discussed below. Much of what would typically be considered mitigation for impacts is inherent in the project design, and is discussed in greater detail in the impacts discussion above. Water quality impact mitigation would primarily be addressed by development and implementation of construction and operation SWPP plans that include erosion and sedimentation control plans and SPCC plans. A required State Waste Discharge Permit and Fact Sheet for construction and operation of the project are currently under development by EFSEC. The permit and fact sheet would outline water quality and quantity effluent limitations, required treatment strategies, and performance standards.

Construction

Mitigation Proposed by the Applicant

Industrial Water Mitigation Measures

Water used for hydrostatic testing would require capture and discharge. The destination of the hydrostatic test water would be to the refinery wastewater system. The quality of the water would be tested prior to discharge to that system. Hydrostatic test water would only be discharged to the refinery's wastewater treatment system if testing confirmed that it was within acceptable limits for discharge to that system. After treatment, the hydrostatic test water would be discharged to the Strait of Georgia through the Refinery Outfall 001.

Stormwater Mitigation Measures

Stormwater quality will be preserved during construction by preventing erosion on the site to the greatest extent possible and using settling and detention basins prior to discharging the stormwater into the natural drainage system north of Grandview Road. The construction stormwater treatment system design is discussed in Section 3.4.2. SWPP plans for construction activities would be prepared for the cogeneration facility site, and would include stormwater management procedures. The SWPP plan for construction would include a TESC plan for each phase of cogeneration facility construction. The SWPP plan and TESC plan would include the specification of all necessary BMPs for construction activities as specified in the Stormwater Management Manual for Western Washington (Ecology 2001b). The grading plan for the site would also specify the necessary BMPs for erosion. All erosion control BMPs would be in place and functioning prior to the start of construction.

The SWPP plan for construction would include a TESC plan with the 12 elements required by Ecology:

1. Mark Clearing Limits
2. Establish Construction Access
3. Control Flow Rates
4. Install Sediment Controls

5. Stabilize Soils
6. Protect Slopes
7. Protect Drain Inlets
8. Stabilize Channels and Outlets
9. Control Pollutants
10. Control Dewatering
11. Maintain BMPs
12. Manage the Project

The SWPP plan for construction also would include general operation and maintenance descriptions of the BMPs used onsite. This plan would be completed and onsite for implementation upon commencement of construction. Containment pits or other means of confinement would be provided locally near each potential source of contaminating materials to protect against spillage.

BMPs as described in the Stormwater Management Manual for Western Washington (Ecology 2001b) would be used to control stormwater runoff during construction and to minimize soil erosion. The stormwater design for the project is described in detail in Section 3.4.2.

Wastewater Mitigation Measures

Wastewater would be generated for HRSG and export steam line steam-blow and hydrostatic tests necessary for commissioning the cogeneration facility, natural gas connections, and water supply/discharge connections. About 15.5 million gallons of water would be needed for HRSG steam-blow testing. Export steam line steam-blow testing would require about 1.2 million gallons, and hydrostatic testing would likely require no more than 4.8 million gallons. Testing would take place near completion of construction over a period of two to three months.

The water generated from these activities is anticipated to be clean, but could contain small amounts of oil and grease. Consequently, the Applicant plans to collect and discharge the test water to the refinery's wastewater treatment system. The potential for deleterious impacts on the refinery system is expected to be low; the Applicant has stated that large volumes of test water have been routed to the refinery system in the past without difficulty (BP 2002, Responses to Comments).

Groundwater Mitigation Measures

A SWPP plan would be prepared and implemented for construction activities, which would include worker training, refueling procedures, and operational/structural controls to minimize the potential for spills and leaks to occur. To minimize the potential release of chemicals during construction, BMPs would be employed. These would include good housekeeping measures, inspections, containment facilities, minimum onsite inventory, and spill prevention practices. Construction personnel would be instructed regarding the management requirements, and the Applicant's onsite Project Manager would be responsible for their implementation.

Additional Recommended Mitigation Measures

EFSEC is currently developing State Waste Discharge Permit conditions for construction of the cogeneration facility project. These conditions would include elements of the proposed project design intended to reduce or eliminate impacts on water quality as well as additional measures not currently included in the project design. The State Waste Discharge Permit would specify construction stormwater effluent limits and monitoring requirements. The draft State Waste Discharge Permit effluent limitations are described in Table 3.4-7.

Monitoring of stormwater would commence at the beginning of construction.

Also covered under the State Waste Discharge Permit are conditions related to hydrostatic test water. The Applicant would be required to develop and implement a plan to characterize the hydrostatic test wastewater for conventional and priority pollutants and determine if this wastewater can be properly disposed of in the refinery's wastewater treatment system prior to discharge.

Table 3.4-7: Stormwater Effluent Limitations

Parameter	Daily Maximum	Monthly Average
Oil and Grease ¹	15 mg/L ²	10 mg/L
Total Suspended Solids ³	25 mg/L	15 mg/L
Toxics	No toxics in toxic amounts ⁴	

1 Measured at discharge of oil/water separators.

2 The oil and grease concentration shall not exceed 10 mg/l more than three days each month.

3 Measured at discharge of stormwater treatment/detention pond.

4 No toxics in toxic amounts" is generally evaluated by comparing the results of priority pollutant testing to state and federal water quality standards to determine compliance.

Operation

Mitigation Proposed by the Applicant

Stormwater Mitigation Measures

SWPP plans for operational activities would be prepared for the cogeneration facility, and would include stormwater management procedures. The SWPP plan for operation would include structural and operational BMPs; a SPCC plan; a final stormwater management plan; and general operating procedures. This plan would be completed and onsite upon commencement of plant operation. The SPCC plan for operation would include structural, operational, and treatment BMPs. Structural BMPs would include impervious containment, covers, and spill control and cleanup equipment. Operational BMPs would include good housekeeping, employee training, spill prevention procedures, preventative maintenance, and inspections. Treatment BMPs would include oil-water separation systems and treatment/detention ponds as discussed below. The stormwater design for cogeneration facility operation is described in Section 3.4.2.

During cogeneration facility operation, runoff from operational areas within the facility site would be within required limits after treatment. Runoff from surfaces, which potentially may be impacted by grease or oil, would be treated using an oil-water separation system. Stormwater effluent limits would be contained within the State Waste Discharge Permit being prepared by EFSEC. Draft effluent limits for stormwater are presented in Table 3.4.7.

Runoff quantities from the water supply and natural gas connections during operation would be approximately the same as the natural (existing) conditions. Runoff quality from these areas would be controlled by revegetation of the surface after installation and backfilling. Therefore, additional mitigation would not be needed.

Wastewater Mitigation Measures

Industrial wastewater from the cogeneration facility would be treated in the refinery's wastewater treatment system prior to discharge to the Strait of Georgia through the refinery's NPDES-permitted outfall. Sanitary wastewater would be routed to the WWTP for treatment and discharge to the Strait of Georgia through Birch Bay Sewer District's NPDES permitted outfall.

Groundwater Mitigation Measures

Prior to operation of the cogeneration facility, a SPCC plan would be prepared. The SPCC plan would contain spill response, containment, and prevention procedures. The SPCC plan for operation of the facility would include structural, operational, and treatment BMPs. Structural BMPs include impervious containment, covers, and spill control kits. Operational BMPs include good housekeeping, employee training, spill prevention, preventative maintenance, and inspections. Treatment BMPs include Stormwater Treatment Pond 1 and oil water separators as discussed above.

A number of safeguards would be incorporated to mitigate the risks of a release to the environment from stored operational chemicals. These include but are not limited to secondary containment, tank overfill protection, routine maintenance, safe handling practices, supervision of all loading/unloading by plant personnel and the truck driver, and appropriate training of operation and maintenance staff.

Additional Recommended Mitigation Measures

EFSEC has developed draft State Waste Discharge Permit conditions for operation of the cogeneration facility. These conditions include discharge limitations, monitoring requirements, reporting and record keeping requirements, an operation and maintenance plan for water quality treatment facilities, development of SPCC and hazardous waste management plans, and a SWPP plan.

Stormwater effluent limits are presented in Table 3.4-7. Additionally, no discharge that causes or contributes to a violation of water quality standards established under section 307(a) of the Clean Water Act or Chapter 173-201A WAC shall be allowed. There shall be no discharge of

polychlorinated biphenyl and there shall be no detectable concentrations in the discharge of priority pollutants as listed in 40 CFR Part 423.

Process water monitoring must begin 90 days after startup of the cogeneration facility. Monitoring will include measurement of pH, flow, and temperature on a daily basis, and priority pollutant metals semi-annually the first year and annually thereafter.

Additionally, it is recommended that bioswales be established at the outlet of detention pond 1 to further treat water quality and attenuate flow of treated stormwater being discharged from the pond.

3.4.6 Significant Unavoidable Adverse Impacts

Construction and operation of the cogeneration facility has the potential to affect surface and groundwater quality through contaminated stormwater runoff and wastewater discharge. The proposed project has numerous design elements and mitigation measures that, if employed, would reduce or eliminate impacts on water quality. Therefore, no significant unavoidable adverse impacts on water quality are expected.

3.5 WETLANDS

This section discusses existing wetland conditions, addresses potential impacts on wetlands associated with the proposed project, and identifies mitigation measures designed to limit those impacts. The wetland analysis in this section is based primarily on information found in the following technical reports: *Revised Wetland Delineation Report: BP Cherry Point Cogeneration Project* (BP 2002, Appendix H); *Revised Cogeneration Project Compensatory Mitigation Plan* (Appendix E); *Revised Cogeneration Project Compensatory Mitigation Areas Wetland Delineation Report BP Cherry Point* (Appendix E); and the *May 22, 2003 Addendum: Changes to Revised Cogeneration Project Compensatory Mitigation Plan* (Appendix E). The analysis of wetlands associated with the transmission lines is based on information from several technical reports including the *Environmental Resources Report: BPA Transmission Line Brown Road to Custer Substation* (Appendix B). Wetland delineations were not performed as part of the analysis of this last report. Wetland determinations were made during a reconnaissance-level investigation of the transmission line corridor. Wetlands were rated using Ecology's Wetland Rating System (Ecology 1993). Additional reports include the *Wetland Report for Arco Products Company: Proposed Cherry Point Refinery Distribution Lines, ROW Towers, and Substation* (Radian International and Dames and Moore 1999) and the *Wetland Compensatory Mitigation Plan for BPA/PUD Transmission Line Project: JARPA Application and SEPA checklist* (Arco Products Company 1999). Where additional sources of information have been used to evaluate the potential impacts associated with the proposed project, those sources have been cited.

3.5.1 Existing Conditions

Several wetland communities have been identified in the project vicinity. Wetland systems near or within the project site have been delineated wholly or partially and are shown in Figure 3.5-1. Three wetlands—Wetlands E, I, and K—were evaluated as part of the technical reports prepared for the project, but are located outside the footprint of the proposed project site and would not be disturbed under the proposed project (Figure 3.5-1). According to the U.S. Fish and Wildlife Service wetland classification system (Cowardin et al. 1979), most of the wetlands in the project vicinity are considered palustrine emergent (PEM), although some palustrine scrub-shrub (PSS) and palustrine forested (PFO) wetlands also are present. All of the wetlands associated with the project were rated as Category III wetlands based on Ecology's *Washington State Wetlands Rating System for Western Washington* (Ecology 1993). Before the Applicant acquired the property more than 30 years ago, wetland areas in the project site were associated with agricultural uses. The extent, types, and rating of wetlands within the various portions of the project site are identified in Tables 3.5-1, 3.5-3, and 3.5-4. Plant species observed in the proposed project area are presented in Table 3.5-2.

Table 3.5-1: Summary of Wetland Systems and Impact Areas Associated with the Cogeneration Facility, Refinery Interface, and the Transmission System (acres)

Location	Wetland	Classification ¹	Wetland Rating ²	Wetland Size	Impact Area
Cogeneration Facility	A	PEM/PFO	III	1.69	1.69
Cogeneration Facility	B1	PEM	III	0.14	0.14
Cogeneration Facility	B2	PEM	III	1.94	1.94
Cogeneration Facility ³	B3	PEM	III	1.31	1.31
Cogeneration Facility	C	PEM	III	4.25	0.88
Cogeneration Facility ⁴	D	PEM	III	39.33 ⁵	5.92
Refinery Interface (Laydown Area 2)	F	PEM/PSS	III	13.41	13.41
Refinery Interface (Laydown Area 3)	G	PEM	III	5.46	5.46
Refinery Interface (Access Road 2)	H	PEM	III	8.0 ⁶	0.23
Refinery Interface (Laydown Area 1)	J	PEM	III	4.39	4.39

1 Based on U.S. Fish and Wildlife Service wetland classification system (Cowardin et al. 1979).

2 Based on Ecology Wetland Rating System (Ecology 1993).

3 A small portion of Wetland B3 is within Laydown Area 4.

4 Wetland D is also located within the transmission system corridor and the footprint of Access Road 3.

5 Actually larger; extends unknown distance offsite.

6 Size estimated; extends offsite.

Table 3.5-2: Plant Species Observed in the Project Vicinity

Scientific Name	Common Name
Trees	
<i>Abies amabilis</i>	Pacific silver fir
<i>Acer circinatum</i>	vine maple
<i>Alnus rubra</i>	red alder
<i>Betula papyrifera</i>	paper birch
<i>Chamaecyparis nootkatensis</i>	Alaska cedar
<i>Crataegus</i> spp.	hawthorn
<i>Populus x generosa</i> ¹	hybrid poplar
<i>Populus tremuloides</i>	quaking aspen
<i>Populus trichocarpa</i>	black cottonwood
<i>Pseudotsuga menziesii</i>	Douglas-fir
<i>Thuja plicata</i>	western red cedar
Shrubs	
<i>Cornus servicea</i>	red-osier dogwood
<i>Holodiscus discolor</i>	oceanspray
<i>Lonicera involucrata</i>	twinberry
<i>Oemleria cerasiformis</i>	Indian plum
<i>Oplopanax horridus</i>	Devil's club
<i>Rosa pisocarpa</i>	wild rose
<i>Rubus laciniatus</i>	evergreen blackberry
<i>Rubus procerus</i>	Himalayan blackberry
<i>Rubus spectabilis</i>	salmonberry
<i>Salix lucida</i> var. <i>lasiandra</i>	Pacific willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Salix sitchensis</i>	Sitka willow
<i>Sambucus racemosa</i>	red elderberry
<i>Spiraea douglasii</i>	spirea
<i>Symphoricarpos albus</i>	snowberry

1 Specific hybrid not confirmed.

Table 3.5-2: Continued

Scientific Name	Common Name
Herbaceous	
<i>Agropyron repens</i>	quackgrass
<i>Agrostis alba</i>	red top
<i>Agrostis tenuis</i>	colonial bentgrass
<i>Alopecurus pratensis</i>	meadow foxtail
<i>Anthoxanthum odoratum</i>	sweet vernal grass
<i>Carex obnupta</i>	slough sedge
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	bull thistle
<i>Dactylis glomerata</i>	orchard grass
<i>Dicentra formosa</i>	bleeding heart
<i>Eleocharis acicularis</i>	least spikerush
<i>Elymus canadensis</i>	rye grass
<i>Equisetum telmateia</i>	giant horsetail
<i>Festuca arundinacea</i>	tall fescue
<i>Holcus lanatus</i>	velvet grass
<i>Hypochaeris glabra</i>	cat's ear
<i>Iris missouriensis</i>	iris
<i>Juncus balticus</i>	Baltic rush
<i>Juncus effusus</i>	soft rush
<i>Lotus corniculatus</i>	bird's foot trefoil
<i>Phalaris arundinacea</i>	reed canarygrass
<i>Plantago lanceolata</i>	English plantain
<i>Plantago major</i>	common plantain
<i>Poa pratensis</i>	bluegrass
<i>Poa trivialis</i>	rough bluegrass
<i>Polygonum persicaria</i>	lady's thumb
<i>Polystichum munitum</i>	sword fern
<i>Ranunculus repens</i>	creeping buttercup
<i>Rumex crispus</i>	curly dock
<i>Scirpus acutus</i>	hardstem bulrush
<i>Solanum dulcamara</i>	bittersweet nightshade
<i>Stellaria media</i>	chickweed
<i>Taraxacum officinale</i>	dandelion
<i>Tolmiea menziesii</i>	piggy-back plant
<i>Trifolium pratense</i>	red clover
<i>Urtica dioica</i>	stinging nettle
<i>Vicia hirsuta</i>	tiny vetch

Source: BP 2002, Section 3.4

Cogeneration Facility

Wetlands associated with the cogeneration facility are primarily PEM systems (Figures 3.5-1 and 3.5-2). Some PFO wetland habitat is associated with Wetland A.

Wetland A is a 1.69-acre PEM and PFO wetland system located in the northwest corner of the cogeneration facility site. Forested vegetation associated with Wetland A is part of a hybrid poplar plantation. Emergent vegetation species are dominated by creeping buttercup, bentgrass, and bluegrass.

Wetlands B1, B2, and B3 are PEM wetland systems located north of the main east-west drainage ditch within the cogeneration facility footprint. A small portion of Wetland B3 is within Laydown Area 4. Dominant vegetation species within these wetlands include rough bluegrass, velvet grass, bull thistle, tall fescue, Baltic rush, spike rush, and meadow foxtail.

Wetland C is a 4.25-acre PEM wetland system located within the eastern portion of the cogeneration facility. Dominant vegetation species within Wetland C include creeping buttercup, rough bluegrass, velvet grass, Baltic rush, and meadow foxtail.

Wetland D is a PEM wetland system located within the southern portion of the cogeneration facility. The total delineated area of Wetland D was 39.33 acres. Not all of Wetland D was delineated because the system extends east and south of the cogeneration facility. Reed canarygrass is the most prominent species in Wetland D. Additional species present in scattered locations within Wetland D include sweet vernal grass, Kentucky bluegrass, soft rush, slough sedge, colonial bentgrass, bird's foot trefoil, giant horsetail, and Canada thistle.

Thickets of Himalayan blackberry are the dominant wetland buffer vegetation of wetland systems associated with the cogeneration facility. Upland hummocks of Canada thistle and Himalayan blackberry occur within these wetland systems as well. The buffer area of Wetland C also includes patches of immature Douglas fir and stands of hybrid poplar.

Refinery Interface

Wetlands associated with components of the refinery interface (Laydown Areas 1, 2, and 3, and Access Road 2) are primarily PEM systems (Figures 3.5-1 and 3.5-2). Wetland F also includes several small patches of PSS wetland habitat.

Wetland F is a 13.41-acre PEM and PSS wetland system located within construction Laydown Area 2. Emergent vegetation is dominated by colonial bentgrass, meadow foxtail, velvet grass, and soft rush. Scrub-shrub vegetation associated with Wetland F occurs in several small patches of Pacific willow and Scouler's willow in the northwestern portion of the wetland. Each of these patches contains approximately three to five shrubs with an understory of soft rush.

Wetland F also includes an approximately 0.6-acre area of immature hybrid poplar (average dbh of 2 to 3 inches) in the northwest portion of the wetland.

Wetland G is a 5.46-acre, isolated PEM wetland system located within construction Laydown Area 3. Reed canarygrass is the dominant vegetation species within Wetland G. Subdominant species include meadow foxtail, velvet grass, and colonial bentgrass. English plantain, bull thistle, and Canadian thistle were also documented.

Figure 3.5-1

Figure 3.5-2

Wetland J is a 4.39-acre, isolated PEM wetland system located within construction Laydown Area 1. Reed canarygrass is the dominant vegetation species within Wetland J, often consisting of monotypic stands. Subdominant species include meadow foxtail, red top, and colonial bentgrass.

Wetland H is a PEM wetland system in the location of Access Road 2. Blaine Road separates Wetland H from Wetland G. The total area of Wetland H is estimated to be approximately 8 acres. The estimated impact area of Wetland H associated with Access Road 2, approximately 0.23 acre, was delineated. A complete delineation of Wetland H was not performed because approximately 10 inches of snow covered the ground at the time of the January 2002 site visit. Vegetation species within Wetland H are similar to that described above for Wetland G. Wetland buffers within the components of the refinery interface include parking lots, paved and unpaved roads, and upland grassland areas. The buffer area of Wetland F also includes a small patch of Douglas fir, about 10 to 15 feet tall.

Transmission System

Wetland D is located within a portion of the transmission system corridor. Wetland D, a PEM wetland system, is described above in the cogeneration facility discussion. Federal permits associated with the transmission system corridor have been previously approved (Arco Products Company 1999). Information from those permits, a JARPA application and SEPA checklist, identify PEM, PSS, and PFO wetland systems within the corridor. Wetland vegetation within the PEM, PSS, and PFO wetlands within the transmission system corridor was consistent with what was described for the cogeneration facility and refinery interface site.

Custer/Intalco Transmission Line No. 2

Several wetlands are located within the existing right-of-way of the transmission line corridor (Appendix B). Wetland delineations were not performed within the transmission line corridor. Wetland determinations were made during a reconnaissance-level investigation. Based on the investigation, wetlands were rated using Ecology's Wetland Rating System (Ecology 1993). Wetland delineations would need to be performed where impacts are proposed before wetland permits could be issued.

Wetlands within the transmission line corridor are primarily PEM systems. Wetland vegetation within these PEM wetlands was consistent with that described for the cogeneration facility and refinery interface site. The majority of these PEM wetlands are disturbed due to regular mowing and livestock grazing. Some PSS and one PFO wetland system were also identified. Vegetation within the PSS and PFO wetlands include spirea, salmonberry, red-osier dogwood, willow, paper birch, and red alder (*Alnus rubra*). In most areas, trees growing in the PSS and PFO wetlands are removed or topped by Bonneville to maintain a safe distance between the trees and the electrical lines, typically about 25 feet.

Wetlands associated with the transmission line corridor are summarized in Table 3.5-3. The table identifies wetlands within each 1-mile segment of the approximately 5-mile transmission line corridor from west to east, as well as wetland classifications and the span of each wetland in linear feet within and parallel to the transmission line corridor.

Table 3.5-3: Summary of Wetland Systems Associated with the Custer/Intalco Transmission No. 2 Line Corridor

Study Area Mile	Wetland System Classification	Approximate Length in Corridor (feet)
Mile 1	PEM/PSS	1,200
	PEM	100
	PEM	250
	PEM	125
	PEM/PSS	375
	PEM	300
	PEM	250
	PEM	75
Mile 2	PEM	500
	PEM	30
	PEM	40
	PEM	50
	PEM	130
	PEM	60
	PEM/PSS/PFO	375
	PEM	200
Mile 3	PEM	50
	PEM	60
	PEM	500
	PEM	30
Mile 4	PEM	125
	PEM	375
	PEM	375
	PEM	40
	PEM	500
	PEM/PSS	150
	PEM	40
	PEM	300
Mile 5	PEM	180
	PEM	600
	PEM	60
	PEM	300
	PEM	60
	PEM	850

Source: Appendix B

Other Project Components

A small portion of Wetland B3 is within Laydown Area 4. Access Road 3 is partially located within Wetland D. Wetlands B3 and D, which are PEM wetland systems, are described above in the cogeneration facility discussion.

Two mitigation sites have been identified immediately north of the cogeneration facility and refinery interface site (Figure 3.5-3). The mitigation sites have been designated CMA 1 and 2. CMA 1 is 50.3 acres and CMA 2 is 59.8 acres (Table 3.5-4). According to the U.S. Fish and Wildlife Service wetland classification system (Cowardin et al. 1979), wetland communities in the proposed mitigation sites are considered temporarily flooded palustrine emergent (PEMA), seasonally flooded palustrine emergent (PEMC), seasonally flooded palustrine forested (PFOC), and temporarily flooded palustrine scrub-scrub (PSSA). Of the 50.3 acres of CMA 1, 38.3 acres includes wetland systems and 12 acres is upland habitat (Table 3.5-4). Of the 59.8 acres of CMA 2, 42.35 acres includes wetland systems and 18.4 acres is upland habitat (Table 3.5-4). Emergent wetlands associated with CMA 1 and CMA 2 are large systems that extend outside the boundaries of the proposed mitigation areas. Wetland systems associated with CMA 1 and 2 are in a degraded condition due to historical agricultural practices.

CMA 1 is composed primarily of emergent vegetation with scattered upland patches. Vegetation species include reed canarygrass (often consisting of monotypic stands), soft rush, velvet grass, bentgrass, and creeping buttercup. A small area of PFOC wetland in the center of the parcel is dominated by a dense grove of quaking aspen. Wetland communities cover about 76% of CMA 1. Much of this area is actively grazed.

Table 3.5-4: Summary of Wetland Systems and Upland Areas Associated with the Proposed Wetland Mitigation Area (acres)

Location	Wetland Classification ¹	Wetland Rating ²	Size	% of Site
CMA 1	PEMA	II	25.8	51%
CMA 1	PEMC	II	12.2	24%
CMA 1	PFOC	II	0.3	1%
CMA 1 Wetland Total	-	-	38.3	76%
CMA 1	Upland	-	12.0	24%
CMA 1 Total	-	-	50.3	100%
CMA 2	PEMA	II	29.7	50%
CMA 2	PEMC	II	11.6	19%
CMA 2	PSSA	II	0.27	1%
CMA 2 Wetland Total	-	-	41.56	69%
CMA 2	Upland	-	18.42	31%
CMA 2 Total	-	-	59.8	100%

1 Based on U.S. Fish and Wildlife Service wetland classification system (Cowardin et al. 1979).

2 Based on Ecology Wetland Rating System (Ecology 1993).

CMA 2 is composed primarily of emergent vegetation with scattered upland patches. Vegetation includes reed canarygrass (often consisting of monotypic stands), soft rush, velvet grass, bentgrass, and tall fescue. Spirea and willow dominate a small patch of PSSA wetland in the northeastern portion of CMA 2. Wetland communities cover about 70% of CMA 2.

Figure 3.5-3

Wetland Functions and Values Assessment

A wetland functions and values assessment was conducted for all of the wetlands associated with the proposed cogeneration project, refinery interface, and mitigation areas (BP 2002, Section 3.4, and BP 2002, Appendix H3). The functions and values assessment was based on Ecology's *Methods for Assessing Wetland Functions* (Ecology 1999). A numerical index of 0 to 10 (0 is very poor and 10 is very high) represents the potential level of performance for each assessed function. Overall, wetland functions and values were rated as low, due primarily to historical degradation from agricultural practices and the dominance of non-native vegetation species within the wetland systems. The majority of the parameters in the functions and values assessment for each of the evaluated wetlands received a value of 4 or less.

3.5.2 Impacts of the Proposed Action

This section describes potential impacts to wetlands from construction activities and project design elements proposed by the Applicant to minimize or compensate for those potential impacts. Potential impacts and design elements applicable to all project components are discussed first, followed by discussions specific to individual project components.

Construction

The permanent fill of wetlands and their buffer areas would be the primary impact associated with construction of the proposed project. Some wetlands would be cleared, graded, and filled for construction. Wetland buffers would also be affected. Implementation of BMPs and mitigation measures presented below would protect surface water features from the introduction of sediments or contaminants during construction.

Wetland functions that would be reduced as a result of construction include floodwater detention and retention, flood flow desynchronization, groundwater recharge and discharge, and water quality improvement. Vegetated wetland and adjacent upland areas that currently allow infiltration of rainwater would be replaced by impervious surfaces. Increases in impervious surfaces could change hydrologic functions in the wetlands. Based on the functions and values assessment prepared for the project, wetlands within the project site are functioning at a low level. Additional discussion of stormwater and water quality issues is included in Section 3.4, Water Quality.

Impacts on wetlands associated with the proposed project have been avoided and minimized to the extent practicable. Zoning regulations, as defined in Section 20 of the Whatcom County Municipal Code, require minimum setbacks from public roads associated with heavy industrial development. The proposed project site was located as close to Grandview Road as possible (250 feet) to avoid wetlands south of the project site, under these setback requirements.

Temporarily disturbed wetland areas would be restored to support native wetland communities. Permanent impacts to wetlands would be compensated by rehabilitating approximately 110 acres of nearby lands that currently consist mainly of degraded wetland systems. Proposed wetland restoration and compensatory mitigation would establish wetland and wetland buffer communities that perform wetland functions at moderate to high levels. In addition, proposed topographic and hydrologic modifications would restore historic drainage patterns.

Under the proposed project, 35.52 acres of Category III wetlands associated with the cogeneration facility, the refinery interface area, and the 0.8-mile transmission system would be temporarily or permanently disturbed (Table 3.5-5).

Table 3.5-5: Summary of Wetland Community Impact Areas Associated with the Cogeneration Facility, Refinery Interface Site, and the Transmission System (acres)

Location	Wetland	Temporary Impact Area	Permanent Impact Area
Cogeneration Facility	A	0.00	1.69
Cogeneration Facility	B1	0.00	0.14
Cogeneration Facility	B2	0.00	1.94
Cogeneration Facility	B3 ¹	0.20	1.11
Cogeneration Facility	C	0.00	0.88
Cogeneration Facility	D ²	0.00	5.92 ³
Cogeneration Facility Total	-	0.20	11.68
Refinery Interface (Laydown Area 2)	F	4.66	8.75
Refinery Interface (Laydown Area 3)	G	0.00	5.46
Refinery Interface (Laydown Area 1)	J	0.00	4.39
Refinery Interface (Access Road 2)	H	0.00	0.23
Refinery Interface Total	-	4.66	18.83
Transmission System	-	0.00	0.15 ⁴
Total Wetland Impacts	-	4.86	30.66

1 A small portion of Wetland B3 is within Laydown Area 4.

2 Wetland D is also located within the transmission system corridor and the footprint of Access Road 3.

3 Includes impacts associated with Access Road 3.

4 Wetland impacts associated with the transmission system have been permitted by the Corps under previous permits.

Cogeneration Facility

Construction activity associated with the cogeneration facility would result in the permanent fill or disturbance of 11.88 acres of PEM Category III wetlands. Of this amount, 11.68 acres would be permanently filled and 0.2 acres would be temporarily disturbed (Table 3.5-5). All of Wetlands B1, B2, and B3 would be cleared. While only about a third of Wetland A would be cleared, construction of the project would hydrologically isolate Wetland A. Therefore, all of Wetland A is considered disturbed as a result of the project. Approximately 0.2 acre of Wetland B3 associated with Laydown Area 4 would be restored after project construction is completed. Portions of Wetland C and D would be cleared. Laydown Area 4 and Access Road 3 are elements of the project included in the category of “other project components.” Impacts to Wetland B3

associated with Laydown Area 4 and to Wetland D associated with Access Road 3 are included in the cogeneration facility discussion and in Table 3.5-5 instead of partitioning impacts to these wetlands between different project components.

Refinery Interface

Construction activity associated with the refinery interface site would disturb approximately 23.49 acres of PEM Category III wetlands. Of this amount, 18.83 acres would be permanently filled and 4.66 acres would be temporarily disturbed. All of Wetlands F, G, and J would be cleared and filled. Approximately 4.66 acres of Wetland F would be temporarily disturbed, but would be restored after project construction is completed. Construction activity associated with Access Road 2 would result in the permanent fill of 0.23 acre of Wetland H. Under the current proposal, Access Road 2 would be wide enough to accommodate the natural gas and water supply pipes associated with the refinery interface. Wetland impacts associated with the elevated piperack have not been quantified at this time. Construction of the elevated piperack would include some minor additional temporary wetland impacts associated with construction of the footings. Permanent impacts associated with the footings of the elevated piperack would be minor. Construction Laydown Areas 1, 2, and 3 would be maintained as impervious areas after construction is completed to accommodate necessary storing and holding areas associated with operation of the refinery. Construction Laydown Area 4 would be converted to upland buffer with potential for wetland mitigation areas.

Transmission System

This 150-foot-wide, 0.8-mile transmission system corridor would require the construction of 5 towers. Construction activity associated with the transmission system would result in the permanent fill or disturbance of approximately 0.15 acre of PEM Category III wetlands. Wetlands would be cleared during construction of the transmission tower pads. The access road associated with the transmission system corridor has already been constructed under previously approved permits (Arco Products Company 1999). Trees growing in the PSS and PFO wetlands would be removed or topped during construction to maintain a safe distance between the trees and the electrical lines.

Custer/Intalco Transmission Line No. 2

Under Option 1, a RAS would install additional electrical equipment, such as new breakers and wiring, within the Custer and Intalco substations. This option would not require any changes to the existing lines or towers. No new towers would be constructed, but the option would require agreement among the Applicant, Alcoa Intalco Works, and Bonneville. No impacts on wetland systems associated with construction of the transmission line would occur under this option.

Under both Option 2a and Option 2b, a second transmission line would be installed inside the 125-foot right-of-way of the existing transmission line corridor from Custer substation to the transmission system interconnection. Under Option 2a new lattice style towers would be

constructed; under Option 2b new monopole style towers would be constructed. Some foundation work would be required to accommodate the new towers under either Option 2a or 2b. While the number of new towers required for either option has not been determined, more monopole towers than lattice towers would be required to accommodate a new electrical line because monopole towers require a shorter distance between towers. The location and amount of clearing that would be required to construct new towers have not been identified. Wetland systems and associated wetland buffers would be avoided where possible during construction of the transmission line. If wetland impacts cannot be avoided, wetland delineations would need to be performed before wetland impacts can be quantified and wetland permits can be issued.

Other Project Components

A small portion of Wetland B3 is within Laydown Area 4. Access Road 3 is located within Wetland D. Impacts associated with Wetlands B3 and D, PEM wetland systems, are described above in the cogeneration facility discussion and in Table 3.5-5 instead of partitioning impacts to these wetlands between different project components.

Wetland systems associated with CMA 1 and 2 will be enhanced to improve overall wetland functional performance and to convert low quality Category II wetlands dominated by reed canarygrass into high quality Category II wetlands composed of native grass, shrub, and tree species within 25 years. Existing native trees and shrubs within CMA 1 and 2 would not be disturbed. A reed canarygrass control program has been proposed to remove and control this invasive species.

Operation

Other than those communities affected by construction, operation of the project is not expected to affect existing wetland systems associated with the refinery interface, transmission system, Custer/Intalco Transmission Line No. 2, and other project components. A perimeter ditch adjacent to the cogeneration facility on the west side of Wetland C may affect the hydrology of Wetland C because of the ditch's sloped topography. See Section 3.3 for additional details. Operation activities associated with the project would occur within developed roads and surfaces.

3.5.3 Impacts of No Action

Under the No Action Alternative, new facilities would not be constructed at the site. Impacts to wetlands associated with the proposed project would not occur. No impacts or construction would occur that would entail removal or alteration of existing wetland habitat within the proposed project site.

The proposed wetland enhancement and the creation of new wetlands associated with the Proposed Action would not occur. As a result, associated increases in the quality of both wetland and wildlife communities and habitats within the watershed would not take place.

3.5.4 Secondary and Cumulative Impacts

The proposed project site is zoned as Heavy Impact Industrial by Whatcom County, and is located within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone as defined in the Whatcom County Comprehensive Plan (BP 2002, Section 3.6). The BP Cherry Point Refinery is located near the proposed project site. A variety of industrial facilities such as Alcoa Intalco Works, an aluminum smelter, and the Conoco-Phillips Refinery are located within a few miles of the proposed project site.

The temporary and permanent disturbance of 35.52 acres of wetland habitat, which would generally be considered of low quality, is unlikely to result in significant adverse cumulative impacts on wetland habitat within the area. Existing wetland habitats within the proposed project site are not unique and do not provide high functional values.

The proposed Georgia Strait Crossing project is anticipated to be constructed concurrently with the proposed project. At this time the County envisions growth and development in the general area. Potential impacts to wetland systems associated with these projects would depend on the quantity and quality of affected wetland systems. The proposed project would not contribute to potential cumulative impacts on wetland communities because proposed mitigation measures would create and enhance wetlands that would provide high functional values to replace disturbed wetlands with low functional values.

Additional development projects anticipated to occur in the project vicinity in future years would contribute to cumulative impacts on wetland habitat. Because of the zoning status, development options are limited to industrial use and would be consistent with zoning requirements and federal, state, and local regulations. The proposed project would not directly cause development or serve as a mechanism to enable it. The extent of cumulative impacts on wetland habitat associated with the proposed project would depend on the location, nature, and scale of future development projects in the general area.

3.5.5 Mitigation Measures

Construction

Mitigation measures consistent with those generally required by the U.S. Army Corps of Engineers and Washington Department of Ecology for Category III wetlands within western Washington would be implemented during construction and operation of the project to protect wetlands that would not be filled. Wetlands adjacent to the project site, such as Wetland I, would be protected using silt fencing and hay bales. The portions of Wetlands A, B, C, and D that

would not be disturbed would also be protected using silt fencing and hay bales. Approximately 4.66 acres of Wetland F and 0.2 acre of Wetland B3 would be temporarily disturbed and would be restored after project construction is completed. Under the proposed mitigation plan, in addition to the 0.2 acre of wetland restoration of Wetland B3, 0.3 acre of wetland creation would occur, for a total of 0.5 acre of wetland restoration and creation in this area of the project site (Appendix E).

To compensate for impacts on Wetlands A, B, C, D, F, G, H, and J, the Applicant has designed a mitigation plan in consultation with state and federal agencies. The proposed mitigation areas are in an area of low-quality wetlands north of Grandview Road that are good candidates for wetland rehabilitation and enhancement. A survey of site conditions, including a delineation of existing wetlands, has been completed to aid development of an appropriate mitigation plan.

The proposed location for the compensatory mitigation areas has a high potential for successful rehabilitation. Current performance of wetland functions is low due to historical degradation from agricultural practices. The Applicant is proposing to significantly improve wetland functional performance by establishing a mosaic of wetland habitats with diverse structure and species composition. This would be accomplished by filling ditches constructed to drain the areas and, in the case of CMA 2, diverting stormwater runoff from the cogeneration project site into the area to enhance wetland hydrology functions. Detailed information associated with proposed mitigation measures is provided in the *Revised Cogeneration Project Compensatory Mitigation Plan* (Appendix E) and the *May 22, 2003 Addendum: Changes to Revised Cogeneration Project Compensatory Mitigation Plan* (Appendix E).

Operation

A monitoring plan and a contingency plan have been prepared to monitor the status of the wetland mitigation areas following construction and to address any issues if wetland mitigation performance standards, such as planted vegetation survival and areal cover, required by agency permits are not fulfilled.

3.5.6 Significant Unavoidable Adverse Impacts

A total of 30.51 acres would be permanently converted to the cogeneration facility site and laydown areas within the refinery interface area. At this time it is not known if any wetland areas within the Custer/Intalco Transmission Line No. 2 corridor would be permanently affected; it would depend on tower spacing and foundation requirements. The permanent disturbance of 30.51 acres of generally low quality wetland systems would be compensated by the restoration and creation of 110 acres of higher quality wetlands.

An additional 4.86 acres of wetland within Laydown Areas 2 and 4 would be temporarily, but unavoidably, adversely affected. Mitigation for these impacts would entail restoration of wetland habitats following construction of the proposed project.

An additional 0.15 acre within the transmission system corridor would be permanently converted to transmission tower foundation pads and maintenance roads; these unavoidable adverse impacts have already received Clean Water Act Section 404 permit approval from the Corps of Engineers, but they have not been permitted by Whatcom County.

3.6 AGRICULTURAL LAND, CROPS, AND LIVESTOCK

3.6.1 Existing Conditions

Agricultural Land

The Natural Resources Conservation Service (NRCS) defines prime agricultural land as “land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, livestock, timber, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and/or labor. Prime farmland does not include land already in or committed to urban development or water storage” (NRCS 2003).

Whatcom County classifies prime agricultural land in five categories based on NRCS soil classification. The categories include:

- Category I – All areas are prime farmland
- Category II – Prime farmland when drained
- Category III – Prime farmland when protected from flooding
- Category IV – Prime farmland when irrigated
- Category V – Prime farmland when drained and protected from flooding

Whatcom County also has designated Agricultural Protection Overlay (APO) soils, APO Protection Areas, and Open Space (Whatcom County 1997, as amended). The purpose of the APO is to promote commercial agriculture and provide a reasonable mix of uses and a variety of land uses that are not inconsistent or incompatible with agricultural activities. Table 3.6-1 identifies components of the project site that include these APO designations. Figure 3.6-1 presents western Whatcom County's designations for APO soils and APO protection areas.

The area around the proposed project site has not been used for agricultural cultivation for approximately 30 years, with the exception of an area of hybrid poplar trees that the Applicant planted in 1989-1991. The existing grassland immediately to the west of the planted poplar trees and east of the Blaine Road right-of-way has not been cultivated since the Applicant purchased the land in the 1960s. Nearby lands are also fallow agricultural fields.

Cogeneration Facility

The cogeneration facility footprint is located within the Cherry Point Major Industrial/Port Industrial Urban Growth Area (UGA) and is zoned for industrial land uses. Because this area has been designated for long-term urban development, these lands do not meet the federal definition of prime farmlands protected under the Farmland Protection Policies Act (FPPA).

The Whatcom County Comprehensive Plan (Whatcom County 1997, as amended) indicates that portions within the fenceline of the cogeneration facility contain prime agricultural soils.

Although the comprehensive plan map is not at the scale to clearly identify soil types within the cogeneration facility fenceline, it appears that the cogeneration facility would be located within areas identified as Category I and Category II prime agricultural soils. APO designations within the cogeneration facility footprint are identified in Table 3.6-1 and Figure 3.6-1.

Table 3.6-1: Whatcom County-Designated APO Soils, APO Protection Areas, and Open Space Areas Mapped within Project Site Components

Project Element	APO Soils	APO Protection Areas	Open Space
Cogeneration Facility	yes	no	yes
Refinery Interface Area	yes	no	yes
Cogeneration Facility Transmission System	yes	no	yes
Custer/Intalco Transmission Line No. 2	yes, in less than half of corridor	yes, in majority of corridor	yes, in about half of corridor
Other Project Components	yes, in majority of area	no	yes, in majority of area

Source: Whatcom County 1997, as amended

Refinery Interface

The refinery interface area, located west of the cogeneration facility, is within the Cherry Point Major Industrial/Port Industrial UGA, and is zoned for industrial land uses. The interface area does not meet the federal definition of prime farmlands protected under the FPPA. Portions of the refinery interface area would be located within areas identified as Category I and Category II prime agricultural soils (Whatcom County 1997, as amended). APO designations within the refinery interface area are identified in Table 3.6-1 and Figure 3.6-1.

Transmission System

The transmission line corridor is located within the Cherry Point Major Industrial/Port Industrial UGA, is zoned for industrial land uses, and does not meet the federal definition of prime farmlands protected under the FPPA. Portions of the transmission line corridor would be located within areas identified as Category I and Category II prime agricultural soils (Whatcom County 1997, as amended). APO designations within the transmission line corridor are identified in Table 3.6-1 and Figure 3.6-1.

Custer/Intalco Transmission Line No. 2

The western portion of the transmission line corridor that runs north and south is located within the Cherry Point Major Industrial/Port Industrial UGA and is zoned for industrial land uses. Near where the transmission line begins to run east and west, the transmission line corridor is no longer within the UGA. Within the UGA, the transmission line corridor does not meet the federal definition of prime farmlands protected under the FPPA.

Figure 3.6-1

Portions of the transmission line corridor would be located within areas identified as Category I and Category II prime agricultural soils (Whatcom County 1997, as amended). APO designations within the transmission line corridor are identified in Table 3.6-1 and Figure 3.6-1.

Other Project Components

Other project components (Access Road 3, industrial water supply pipeline, Laydown Area 4, and CMA 1 and CMA 2) are located within the Cherry Point Major Industrial/Port Industrial UGA, are zoned for industrial land uses, and do not meet the federal definition of prime farmlands protected under the FPPA. These other project components would be located within areas identified as Category I and Category II prime agricultural soils (Whatcom County 1997, as amended). APO designations are identified in Table 3.6-1 and Figure 3.6-1.

Agricultural Crops

In 1997, the U.S. Department of Agriculture (USDA) reported 1,228 farms with a cumulative total of 103,600 acres of farmland in Whatcom County (USDA 2000). The number of farms and amount of agricultural cropland have decreased over the past decade. Table 3.6-2 shows crop farms and acreages per crop. Crops are dominated by hay-alfalfa. According to the 1997 Census of Agriculture, Whatcom County ranks sixth in the state and 95th in the country for the value of agricultural crops sold (USDA 1997).

Table 3.6-2: Crop Cultivation, Number of Farms, Acres Harvested, and Yield for Selected Crops

Crop	Farms	Acres Planted	Harvested Yield
Wheat	8	626	50,914 bushels
Hay-Alfalfa	658	40,910	146,740 tons
Corn	3	Data unavailable	4,334 bushels
Potatoes	12	1,585	475,550 hundred weight
Strawberries	14	297	2,306,552 pounds
Raspberries	107	5,255	36,500,750 pounds
Other domesticated berries	27	482	2,671,318 pounds
Fruit orchards	58	419	Data unavailable

Source: USDA 2000

In addition to the above crops, tree farming constitutes another agricultural activity in Whatcom County. Excluding state and national forests, some agricultural land in Whatcom County is used for tree farming, including growing Christmas trees and hybrid softwood trees for harvesting as pulpwood. No data are available on the actual number of acres dedicated to tree farming throughout Whatcom County.

Cogeneration Facility

From 1989 to 1991, the Applicant planted approximately 142 acres of hybrid poplar trees on the BP Cherry Point Refinery property for future harvesting as pulpwood. No records are available to confirm the density of the planting or actual number of trees planted by the Applicant. The Applicant has not actively managed the poplar crop since the original planting.

Visual inspections performed during wetland and wildlife surveys revealed that approximately 30 acres have grown into dense stands in the eastern portion of the planted area, east of the proposed cogeneration facility and close to the railway crossing near Chemco Industries. Tree heights within this area are uniform at approximately 45 to 50 feet high with a diameter at breast height (dbh) ranging from approximately 6 to 10 inches. Most of these trees have straight, uniform trunks.

Planted hybrid poplars within the cogeneration facility fenceline are generally concentrated west of Access Road 1 and east of the Blaine Road right-of-way. They generally exhibit poor growth characteristics and inconsistent spacing. These trees are generally less than 40 feet tall, although they have a similar diameter as those farther east of the proposed cogeneration facility. Several of the trees in this area exhibit split or forked trunks. The density of hybrid poplars in the eastern portion of the cogeneration facility is approximately 4 trees per 100 square feet. Poplars in the western portion, immediately east of Blaine Road, typically occur in patches with a density of 3 trees per 100 square feet.

The Applicant has no plan or schedule to harvest any of the planted hybrid poplars, except for those that may be removed during construction of the facility. Some of the hybrid poplar trees in the northwest area of the proposed cogeneration facility would be left in place as an aesthetic buffer between Grandview Road and the facility.

Refinery Interface

An approximately 0.6-acre area of immature hybrid poplars (average dbh of 2 to 3 inches) is located within the northwest portion of Wetland F within Laydown Area 2 (Figure 3.5-1).

Transmission System

The transmission line corridor crosses a narrow band of hybrid poplars that is part of the stands east of the cogeneration facility's footprint.

Custer/Intalco Transmission Line No. 2

Agricultural crop production has not been identified within the existing transmission line corridor (Appendix B). Some agricultural activity may occur adjacent to the corridor.

Other Project Components

No agricultural crops are grown within Access Road 3, the industrial water supply pipeline corridor, or CMA 2. North of Grandview Road and east of Blaine Road, in the area of CMA 1, the Applicant leases land to local farmers for hay production. Hybrid poplar stands are located within Laydown Area 4.

Livestock

In 1997, the USDA reported 800 farms with 120,652 total animals in livestock and poultry production in Whatcom County. Table 3.6-3 provides information on specific livestock production in Whatcom County, which is mostly composed of milk cows and chickens. Whatcom County is ranked third in Washington State in the commercial value of livestock and poultry production. There are no fisheries or aquaculture practices in Whatcom County (USDA 2000).

Table 3.6-3: Livestock Production in Whatcom County

Livestock Produced	Total Farms	Total Animals
Beef cattle	334	4,748
Milk cows	307	64,162
Hogs and pigs	36	350
Sheep and lambs	40	406
Broilers and other chickens	9	3,127,984

Source: USDA 2000

Cogeneration Facility

Livestock production has not occurred within the area of the cogeneration facility for at least 30 years since the Applicant has owned the property.

Refinery Interface

Livestock production has not occurred within the refinery interface area for at least 30 years since the Applicant has owned the property.

Transmission System

Livestock production has not occurred within the western portion of the transmission line for at least 30 years since the Applicant has owned the property. As recently as 1998, livestock grazing was occurring in the very eastern portion of the transmission line corridor (Arco Products Company 1999).

Custer/Intalco Transmission Line No. 2

Grassland habitat within the transmission line corridor is disturbed due to mowing and livestock grazing (Appendix B). Information was not available to quantify the amount of livestock activity currently occurring within the existing transmission line corridor. Grazing pastures for livestock within the corridor would be limited by maintenance activities and the variety of paved and unpaved roads that are located within and/or cross the transmission line corridor.

Other Project Components

North of Grandview Road and east of Blaine Road, the Applicant leases land to local farmers for cattle grazing. The majority of the 50.3-acre wetland compensatory mitigation area, CMA 1, is currently used for cattle grazing by a local dairy farmer under a five-year contract with the Applicant. Livestock production does not occur within the areas for Access Road 3 or Laydown Area 4.

3.6.2 Impacts of the Proposed Action

Construction

Agricultural Land

Cogeneration Facility

Construction of the cogeneration facility would not affect any prime farmlands because the cogeneration facility site has been designated for long-term urban development and does not meet the definition of prime farmlands protected under the FPPA.

Construction of the cogeneration facility would result in the development or modification of land that Whatcom County has identified as Category I and II prime farmland soils and mapped as APO soils and Open Space (Table 3.6-1).

Refinery Interface

Construction within the refinery interface area would not affect any prime farmlands protected under FPPA. Construction would, however, result in the development or modification of land that Whatcom County has identified as Category I and II prime farmland soils and mapped as APO soils and Open Space (Table 3.6-1).

Transmission System

Construction and erection of electrical transmission towers and improvement of the maintenance road within the transmission line corridor would not affect any prime farmlands protected under

FPPA. Construction would result in the development or modification of land that Whatcom County has identified as Category I and II prime farmland soils and mapped as APO soils and Open Space (Table 3.6-1).

Custer/Intalco Transmission Line No. 2

Option 1 - Remedial Action Scheme. Under Option 1, no additional transmission lines or supporting structures would be required for Custer/Intalco Transmission Line No. 2; therefore, there would be no impacts on agricultural land for this project element.

Option 2a - New Transmission Line with Lattice Towers. Under Option 2a, approximately 5 miles of Custer/Intalco Transmission Line No. 2 would be reconstructed between the Custer substation and the new 230-kV transmission system interconnection. The reconstruction would replace the existing single-circuit towers with new double-circuit steel lattice towers and install an additional 230-kV transmission line to be suspended from the new towers.

Approximately 3.5 miles of the transmission line to be reconstructed is located outside the Cherry Point UGA. This portion of the existing transmission corridor encompasses approximately 53 acres of land that is outside the UGA and potentially includes areas of prime farmland as designated by the NRCS under the FPPA. Whatcom County has identified portions of the transmission line corridor that contain Category I and II Prime Farmland soils, APO soils, APO Protection Areas, and designated Agricultural Open Space (see Table 3.6-1).

At this time, Bonneville has not determined the number or location of towers that would be used under this option; therefore, it is not possible to identify and quantify areas of specific impact on prime farmland. In general, construction activities within the transmission corridor would likely affect some areas of NRCS-designated prime farmland and Whatcom County-designated agricultural lands in the 53-acre portion of the corridor located outside the UGA. These impacts would typically consist of relatively small (0.25 acres or less) areas that would be permanently used for the new (or modified) tower sites, and the areas located between the towers that would be temporarily required for installation of the new overhead transmission lines.

Option 2b - New Transmission Line with Monopole Towers. Option 2b would be similar to Option 2a, except that steel monopole towers would be installed instead of steel lattice towers. Because monopole towers use a different foundation design and require a shorter span between towers than lattice towers, new foundations would be required for all towers, and a greater number of towers would need to be installed.

As with Option 2a, Bonneville has not determined the number or location of towers that would be used under this option. General impacts on agricultural land would be similar to those described for Option 2a, except that a greater number of sites within the 53-acre corridor modification area would be permanently used for construction of the towers.

Other Project Components

Construction activities associated with Access Road 3, the industrial water supply pipeline, Laydown Area 4, and CMA 1 and CMA 2, would not affect any prime farmlands. Construction activities would result in the development or modification of land that Whatcom County has identified as Category I and II prime farmland soils and mapped as APO soils and Agricultural Open Space (Table 3.6-1).

Agricultural Crops

Project construction would result in a direct and permanent loss of approximately 2.6 acres of existing hybrid poplars associated with the cogeneration facility, Access Road 1, and Laydown Areas 2 and 4. Of the 2.6 acres of hybrid poplars that would be cleared, 1.5 acres is associated with upland vegetation communities, 0.6 acre are associated with Wetland F (Laydown Area 2), and approximately 0.4 acre is associated with Wetland A (cogeneration facility).

Cogeneration Facility

As described above in the existing conditions section, hybrid poplars within the cogeneration facility site that would be cleared during construction are generally of poorer quality relative to the stands east of the footprint of the cogeneration facility.

Refinery Interface

An approximately 0.6-acre area of immature hybrid poplars located within the northwest portion of Wetland F, within Laydown Area 2, would be cleared.

Transmission System

The transmission line corridor would cross a narrow band of hybrid poplars that is part of the stand east of the cogeneration facility. Based on the design plan, transmission line tower pads would not be located in the area of the hybrid poplar stand (Arco Products Company 1999). No other agricultural crops are grown within the corridor.

Custer/Intalco Transmission Line No. 2

Agricultural crop production has not been identified within the existing transmission line corridor (Appendix B). Agricultural activity adjacent to the corridor would not be disturbed.

Other Project Components

No agricultural crops would be effected with the construction of Access Road 3, installation of the industrial water supply pipeline, or CMA 2. Land leased to local farmers for hay production

in CMA 1 would be converted to a wetland mitigation site. Hybrid poplars located within Laydown Area 4 would be cleared.

Livestock

Cogeneration Facility

There would be no impacts to livestock associated with the cogeneration facility. Livestock production does not occur within the area of the cogeneration facility.

Refinery Interface

There would be no impacts to livestock associated with the components of the refinery interface. Livestock production does not occur within the area of refinery interface components.

Transmission System

There would be no impacts to livestock associated with the majority of the transmission line corridor. The very eastern portion of the transmission line corridor traverses grazing pastures for livestock that were active in 1998 (Arco Products Company 1999). Current grazing activity in this portion of the corridor is unknown.

Custer/Intalco Transmission Line No. 2

Construction of transmission line tower pads would occur adjacent to the existing tower pads and “stringing” the new 230-kV transmission line would be done from the existing maintenance roads. Livestock currently graze on the upland vegetation within the existing transmission line corridor. Significant impacts on livestock or on vegetation within the transmission line corridor are not likely since the proposed construction activities would not significantly change habitat conditions within the corridor. A quantitative evaluation of the potential impacts, if any, would require additional information on livestock activity and an assessment of the condition of the vegetation habitats within the transmission corridor.

Other Project Components

The proposed compensatory wetland mitigation plan would preclude the continued use of mitigation area CMA 1 for cattle grazing. It is assumed that the current lessee would be able to lease other suitable grazing land. There would be no impacts to livestock associated with Access Road 3, the industrial water supply pipeline, Laydown Area 4, and CMA 2.

Operation

Air emissions from the proposed cogeneration facility that have the potential to affect agricultural lands, crops, and livestock include primary particulate matter and secondary formation of ammonium nitrate and ammonium sulfate. Air quality impacts resulting from operation of the facility are projected to be below the secondary ambient air quality standards established to protect public welfare. Air emissions from plant operations are addressed in Section 3.2.

Water-cooled condensers will be used for cooling and condensing low-pressure steam from the steam turbine. These condensers will be designed and operated to minimize the potential drift, or water droplet plume, that is typically associated with water-cooling towers. There would be a negligible impact on agricultural crops or livestock from drift emissions. Based on the results of the air dispersion modeling analyses, facility emissions are expected to have a negligible effect on soils and vegetation. Low-sulfur natural gas fuel will be the primary energy source, thus minimizing the emission of sulfur compounds. For emissions of NO_x (assuming full conversion to NO_2), potential vegetation damage could begin to occur with NO_2 concentrations of 15 to 50 ppb. However, according to the modeling results, the maximum annual concentration of NO_2 would be below $1.0 \mu\text{m}^3$ or about 1.1 ppb; no impacts on vegetation are anticipated.

The proposed project would store and use anhydrous ammonia in its emissions control system. Numerous design features would be used, including water deluge systems, to minimize the possibility of an ammonia release and to prevent the transport of any ammonia that is accidentally released. If anhydrous ammonia were released from within the cogeneration facility and transported offsite by winds, it would be in a gaseous state and released in minor amounts over time and would not be expected to adversely affect agricultural crops or livestock.

Operation of the project associated with the refinery interface, cogeneration facility transmission line, Custer/Intalco Transmission Line No. 2, and other project components are not anticipated to affect existing agricultural lands, crops, or livestock.

3.6.3 Impacts of No Action

Under the No Action Alternative, the proposed cogeneration project would not be constructed and operated. Because the area is zoned for industrial uses, it is possible that any future development of the project site would eventually affect some or all of the existing poplar trees on the site. Under the No Action Alternative, existing livestock grazing areas north of Grandview Road and east of Blaine Road would not be affected by the wetland mitigation proposed for the project.

3.6.4 Secondary and Cumulative Impacts

The project site is zoned for industrial uses and is located within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone as defined in the Whatcom County Comprehensive Plan. The potential cumulative impacts on agricultural lands and uses have been considered in the comprehensive planning and zoning process. Nevertheless, the conversion of up to 195 acres of land with prime agricultural soils and the harvest of approximately 0.6 acre of planted hybrid poplars would result in a relatively small contribution to any cumulative impact on agricultural land and crops in Whatcom County.

The potential loss of some grazing land north of Grandview Road on BP property would not contribute to a significant cumulative loss of grazing land because this area is incrementally being set aside as conservation easements and mitigation areas. There would be no cumulative loss of livestock associated with the proposed project because remaining pastureland north of Grandview Road beyond CMA 1 could accommodate the cattle currently grazing in this area.

The proposed Georgia Strait Crossing project, as described in Section 3.10, is anticipated to be constructed concurrently with the proposed project. At this time, the County envisions additional growth and development in the area of the proposed project. Impacts associated with these future projects would generally be similar to the type of cumulative impacts on agricultural crops, land, and livestock as described for the proposed project.

3.6.5 Mitigation Measures

Construction

No construction mitigation measures for agricultural land, crops, and livestock are proposed because there are no anticipated significant impacts on agricultural crops or livestock.

Operation

No mitigation measures for agricultural land, crops, and livestock are proposed.

3.6.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on agricultural land, crops, or livestock are anticipated. Whatcom County has zoned the project area for industrial land uses and therefore the loss of potential agricultural soils is not considered significant. In addition, no agricultural crops would be lost with the construction and operation of the project, and with the exception of the loss of grazing lands on leased land, no livestock would be adversely affected with the construction and operation of the proposed project.

3.7 UPLAND VEGETATION, WILDLIFE AND HABITAT, FISHERIES, AND THREATENED AND ENDANGERED SPECIES

This section discusses four elements: upland vegetation, wildlife and habitat, fisheries, and threatened and endangered species within the project site and surrounding area. It discusses existing conditions, addresses potential impacts on these elements associated with the proposed project, and identifies mitigation measures designed to limit those impacts. The analysis of existing conditions and potential effects resulting from the construction and operation of the proposed project is based on literature review, agency information, and onsite surveys conducted in 2001, 2002, and 2003. Where sources of information have been used to evaluate the potential impacts associated with the proposed project, those sources have been cited. Wildlife and habitat of the project site are discussed together because of the close interaction between these two resources. The fisheries section discusses the freshwater and marine habitat near the project site, and the threatened and endangered species section discusses species that are regulated under the Endangered Species Act (ESA). Wetland communities are discussed in Section 3.5.

Existing documentation and information from the U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries (previously known as National Marine Fisheries Service) were used to identify threatened and endangered species that may occur within the proposed project site. Existing documentation and information from the Washington Department of Fish and Wildlife (WDFW), including the WDFW Priority Habitats and Species database, also was reviewed regarding federal and state protected species that may use the proposed project site and to identify the presence of priority habitats near the proposed project site. The Washington Department of Natural Resources (WDNR) Natural Heritage Program was reviewed regarding priority habitats and sensitive plant and wildlife species that may be near the project site. A Biological Evaluation (BE) prepared by the Applicant for the project was reviewed to provide information on threatened and endangered species (BP 2002, Appendix H5).

The technical report *Environmental Resources Report: BPA Transmission Line Brown Road to Custer Substation* was reviewed to provide information on potential fish habitat within the transmission line corridor. This document is included as Appendix B.

3.7.1 Existing Conditions

Upland Vegetation

The proposed project site is located within the Fraser lowland ecological zone and lies within the western hemlock zone, which is characterized by a wet, mild, maritime climate (Franklin and Dyrness 1988).

Five types of upland vegetation communities are located within the proposed project site: grassland; shrubland; mixed coniferous/deciduous forest; coniferous forest; and deciduous forest

(Figure 3.5-2). Most or all of these five upland vegetation communities are present within each of the five project components discussed below. Plant species observed in the proposed project area are presented in Table 3.5-2.

Dominant habitats within the proposed project site are grassland and wetland communities. When the refinery acquired the property more than 30 years ago, grassland and wetland areas were associated with agricultural uses. Wetlands are described in Section 3.5. Vegetation within the grassland habitat includes a mixture of native and non-native upland and wetland species such as bentgrass, reed canarygrass, Canada thistle, velvetgrass, bird's foot trefoil, bull thistle, and horsetail.

Shrubland habitats are dominated by Himalayan blackberry, a non-native invasive plant species. Himalayan blackberry is located adjacent to the wetland and grassland communities. Additional species within the shrubland community include evergreen blackberry and stinging nettle. Shrub communities in the project site with vegetation such as salmonberry, red-osier dogwood, and willow, are associated with scrub-shrub wetland systems.

Forested communities include mixed coniferous/deciduous forest, coniferous forest, and deciduous forest. Coniferous forest habitat is characterized by patches of even-aged Douglas fir trees, typically 10 to 20 feet tall, within a shrub community dominated by Himalayan blackberry. Himalayan blackberry is also the dominant understory vegetation associated with Douglas fir.

Deciduous forest habitat is dominated by even-aged stands of hybrid poplars planted for harvesting. The hybrid poplar stands are typically 30 to 40 feet tall, with a dbh ranging from approximately 6 to 10 inches. Dominant understory species include creeping buttercup and reed canarygrass. An approximately 0.6-acre area of immature hybrid poplars (average dbh of 2 to 3 inches) is located within the northwestern portion of Wetland F.

Mixed coniferous/deciduous forest includes species such as Douglas fir, black cottonwood, western red cedar, quaking aspen, oceanspray, snowberry, and willow. Large areas of mixed coniferous/deciduous forest and deciduous forest habitats are located near the project site. Only a small amount of mixed coniferous/deciduous forest and deciduous forest habitat is located within the footprint of the proposed project site (Figure 3.5-2). Species of western red cedar and quaking aspen occur within the transmission system and transmission line corridors, but are not present within the footprints of the cogeneration facility, refinery interface, and other project components.

Cogeneration Facility

Upland vegetation communities associated with the cogeneration facility include grassland, shrubland, coniferous forest, and deciduous forest (Figure 3.5-2).

Grassland habitat within the cogeneration facility site is a mosaic of upland and wetland systems with a mixture of native and non-native upland and wetland species.

Coniferous forest habitat is limited to patches of young, even-aged Douglas fir trees within a shrub community dominated by Himalayan blackberry.

Planted hybrid poplars within the cogeneration facility site exhibit poor growth characteristics and inconsistent spacing. These are generally concentrated west of proposed Access Road 1 and east of the refinery boundary. These trees are generally less than 40 feet tall with a similar diameter as those farther east of the proposed cogeneration facility. Several of the trees in this area exhibit split or forked trunks. Hybrid poplar density in the eastern portion of the cogeneration facility footprint is approximately 4 trees per 100 square feet. Hybrid poplar in the western portion, immediately east of Blaine Road, typically occurs in patches with a density of 3 trees per 100 square feet.

Refinery Interface

Upland vegetation communities associated with the refinery interface include grassland, shrubland, and deciduous forest, similar to the discussion above for the cogeneration facility. These upland vegetation communities typically occur in patches surrounded by wetland systems (Figure 3.5-1). An approximately 0.6-acre area of immature hybrid poplar (average dbh of 2 to 3 inches) is located in the northwestern portion of Wetland F, within Laydown Area 2.

Transmission System

Upland vegetation communities associated with the transmission system corridor include deciduous forest and mixed coniferous/deciduous forest (Figure 3.5-2). A narrow band of black cottonwood is located along the perimeter of the mixed coniferous/deciduous forest habitat. These forested systems located east of the cogeneration facility footprint are generally more mature, less fragmented, and include fewer nonnative invasive species than the forested communities within the footprints of the cogeneration facility, refinery interface, and other project components.

Custer/Intalco Transmission Line No. 2

Upland vegetation communities associated with the transmission line corridor include grassland and shrubland habitat (Appendix B). An unpaved road is located along most of the corridor to provide access for maintenance. The majority of vegetation communities associated with the transmission line corridor is grassland habitat, which is disturbed due to mowing and livestock grazing. Shrubland habitats are dominated by Himalayan blackberry. Mixed coniferous/deciduous forest is located adjacent to the transmission line corridor in several areas but is not located within the corridor.

Other Project Components

Upland vegetation communities associated with the other project components (Access Road 3, Laydown Area 4, and CMA 1 and CMA 2) include grassland, shrubland, deciduous forest, and mixed coniferous/deciduous forest (Figure 3.5-2). Grassland, shrubland, and deciduous forest are described above. A small amount of mixed coniferous/deciduous forest is located in the northeast portion of Laydown Area 4 (Figure 3.5-3). Most of the vegetation associated with Access Road 3 is wetland systems.

Threatened and Endangered Plant Species

The WDNR Natural Heritage Program was reviewed regarding priority habitats; high quality ecosystems; and endangered, threatened, and sensitive plant species that may be near the project site. Information from WDNR indicates that there are no known occurrences of rare plants, priority habitats, or high-quality ecosystems near the proposed project site (WDNR 2001).

Noxious Weeds

Vegetation surveys conducted in the spring and summer of 2001 determined the presence and abundance of weed species considered Class C noxious weeds by Whatcom County (BP 2002, Section 3.4). These include reed canarygrass, bull thistle, and Canada thistle. Class C weeds are non-native weeds considered widespread in the state. Although not required, control of Class C weeds, particularly reed canarygrass, is encouraged.

Wildlife and Habitat

The majority of wildlife habitat associated with the proposed project site is a mosaic of upland grassland and wetland communities. Additional habitats include shrubland, mixed coniferous/deciduous forest, coniferous forest, and deciduous forest. These vegetation communities are described above in the upland vegetation section and in Section 3.5. Most of the upland habitat within the project site is in fragmented patches within the wetland systems. More than 4 acres of impervious surface is also located within the area of the refinery interface components. A variety of paved and unpaved roads are located within the transmission system corridor and the transmission line corridor.

The majority of wetlands within the proposed project site are emergent herbaceous and palustrine emergent systems with some patches of scrub-shrub habitat (Section 3.5). Grass and herbaceous species within these habitats include a mixture of upland and wetland species as described in Section 3.5. Reed canarygrass, a non-native invasive plant species, dominates a majority of the wetland habitat. Himalayan blackberry is frequently the dominant wetland buffer vegetation.

Proposed wetland mitigation sites CMA 1 and CMA 2 are composed primarily of emergent vegetation with scattered upland patches characterized by plant species similar to those described above in the vegetation section for the project site. Proposed wetland mitigation sites CMA 1 and CMA 2 are described in Section 3.5.

Riparian habitat is not located within approximately 0.5 mile of the cogeneration facility, refinery interface area, or the transmission system corridor. Riparian habitat is located adjacent to other project components (CMA 1 and CMA 2). Seven riparian corridors are located within the transmission line corridor. Riparian habitat is described below in the individual discussion of these project elements.

A moderate variety of native birds, mammals, reptiles, and amphibians are expected to inhabit grassland, shrubland, forested, and wetland habitats in the general project vicinity. Wildlife diversity is generally related to the structure and plant species composition within these vegetative communities. Wetlands and forested areas with well-developed vegetation layers are likely to support the greatest number of species and populations of wildlife (Brown 1985). Even-aged forest stands generally provide less diversity than mature mixed-aged forested areas.

Wetlands, grassland, shrubland, and forested habitat within the project site generally have low species diversity of vegetation and a dominant presence of nonnative invasive species. Himalayan blackberry and reed canarygrass provide dominant cover or understory cover in the majority of habitats within the project site. Forested communities of black cottonwood and Douglas fir within the project site are even-aged stands and often occur in fragmented patches. While wildlife habitat in the project site likely provides cover, foraging, and breeding habitat for a variety of wildlife species, wildlife habitat characteristics associated with the project site does not provide conditions typically associated with high-quality habitat for wildlife. Mixed deciduous/coniferous forest stands located near the project site generally provide higher quality habitat than the available habitats within the project site. Table 3.7-1 lists wildlife species that have been observed in the project vicinity or that occupy and breed in similar habitats in western Washington.

Table 3.7-1: Wildlife Species Observed in the Project Vicinity or Known to Occur in Similar Habitats in Western Washington

Common Name	Scientific Name
Amphibians	
northwestern salamander	<i>Ambystoma gracile</i>
Pacific chorus frog	<i>Pseudacris regilla</i>
red-legged frog	<i>Rana aurora</i>
rough-skinned newt	<i>Taricha granulosa</i>
western red-backed salamander	<i>Plethodon vehiculum</i>

Table 3.7-1: Continued

Common Name	Scientific Name
Reptiles	
northern alligator lizard	<i>Gerrhonotus coeruleus</i>
western fence lizard	<i>Sceloporus occidentalis</i>
western garter snake	<i>Thamnophis elegans</i>
Mammals	
bat	<i>Myotis</i> sp.
black bear	<i>Ursus americanus</i>
black-tailed deer	<i>Odocoileus hemionus columbianus</i>
coyote	<i>Canis latrans</i>
deer mouse	<i>Peromyscus maniculatus</i>
Douglas' squirrel	<i>Tamiasciurus douglasii</i>
eastern gray squirrel	<i>Sciurus carolinensis</i>
European rabbit	<i>Oryctolagus cuniculus</i>
least chipmunk	<i>Tamias minimus</i>
long-tailed weasel	<i>Mustela frenata</i>
norway rat	<i>Rattus norvegicus</i>
raccoon	<i>Procyon lotor</i>
shrew	<i>Sorex</i> sp.
striped skunk	<i>Mephitis mephitis</i>
Townsend's mole	<i>Scapanus townsendii</i>
Virginia opossum	<i>Didelphis virginiana</i>
vole	<i>Microtus</i> sp.
Birds	
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Carduelis tristis</i>
American robin	<i>Turdus migratorius</i>
black-capped chickadee	<i>Parus articapillus</i>
black-throated gray warbler	<i>Dendroica nigrescens</i>
bushtit	<i>Psaltiriparus minimus</i>
California quail	<i>Callipepla californica</i>
chestnut-backed chickadee	<i>Parus rufescens</i>
common yellowthroat	<i>Geothlypis trichas</i>
dark-eyed junco	<i>Junco hyemalis</i>
downy woodpecker	<i>Picoides pubescens</i>
European starling	<i>Sturnus vulgaris</i>
hairy woodpecker	<i>Picoides villosus</i>
house finch	<i>Carpodacus mexicanus</i>
house sparrow	<i>Passer domesticus</i>
house wren	<i>Troglodytes aedon</i>
northern flicker	<i>Colaptes auratus</i>
northern harrier	<i>Circus cyaneus</i>
red-breasted nuthatch	<i>Sitta canadensis</i>
red-tailed hawk	<i>Buteo jamaicensis</i>
red-winged blackbird	<i>Agelaius phoeniceus</i>
rock dove	<i>Columba livia</i>
ruby-crowned kinglet	<i>Regulus calendula</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
song sparrow	<i>Melospiza melodia</i>
spotted towhee	<i>Pipilo erythrophthalmus</i>
Steller's jay	<i>Cyanocitta stelleri</i>
varied thrush	<i>Ixoreus naevius</i>
yellow warbler	<i>Dendroica petechia</i>

Note: Table 3.7-1 is not a comprehensive list of all wildlife species that could occur on the project site, but a general summary of the variety of wildlife species known to occupy and breed in similar habitats in western Washington.

Wetlands provide habitat for amphibian, mammal, and bird species that depend on water for foraging and breeding. A wetland assessment prepared for the project concluded that wetlands within the project site function on a very low level for wetland-dependent wildlife species (Section 3.5).

Mammals likely to occur regularly in the forested habitat include species such as raccoon, eastern gray squirrel, striped skunk, coyote, and Virginia opossum. Black-tailed deer and black bear are known to occupy the forested habitat near the proposed project site (BP 2002, Section 3.6). Raptors such as red-tailed hawks and northern harrier likely use grassland habitat for foraging. A variety of resident and migratory bird species likely occupy the edge habitat associated with the forest and grassland habitats.

The WDFW Priority Habitats and Species database identifies wetlands within the proposed project site as priority habitats. Information from the WDNR Natural Heritage Program indicates that there are no known high-quality ecosystems located in the vicinity of the project site (WDNR 2001).

Habitats associated with specific project components are discussed below.

Cogeneration Facility

A mosaic of upland and wetland grassland communities is the dominant wildlife habitat within the cogeneration facility footprint. Patches of Himalayan blackberry and even-aged forest stands of black cottonwood and Douglas fir also are present. Overall, the fragmented nature and dominant presence of nonnative invasive plant species associated with these habitats reduces their effectiveness as quality habitat for wildlife.

Refinery Interface

Most of the wildlife habitat associated with the components of the refinery interface (Laydown Areas 1, 2, and 3, and Access Road 2) includes wetland systems with relatively small, isolated patches of upland grassland, Himalayan blackberry, small Douglas fir, and black cottonwood. Impervious surfaces, buildings, and other structures are also located within the components of the refinery interface.

Transmission System

The proposed transmission system corridor passes through an emergent wetland system, a narrow band of black cottonwood, and mixed coniferous/deciduous forest habitat. The black cottonwood and mixed deciduous/coniferous forest stands, located east of the cogeneration facility, generally provide higher quality habitat than the available habitats within the cogeneration facility, refinery interface, and the other project components. A diverse assemblage

of birds, amphibians, reptiles, and mammals likely occupy the forested habitats associated with the transmission system corridor.

Custer/Intalco Transmission Line No. 2

The transmission line corridor passes through a combination of grassland and shrubland wetland and upland wildlife habitat, with grassland as the dominant habitat (Appendix B). Upland and wetland grassland habitat are disturbed due to mowing and livestock grazing. Shrubland habitats are dominated by Himalayan blackberry. Mixed coniferous/deciduous forest habitat is located adjacent to the transmission line corridor in several areas but is not located within the corridor. An unpaved road is located along most of the corridor to provide access for maintenance. The corridor also passes over at least seven paved, public roads.

Four PSS and one PFO wetland are located within the transmission line corridor. Shrubs and trees associated with PSS and PFO wetlands are removed or topped by Bonneville to maintain a safe distance between the trees and the electrical lines, typically about 25 feet.

Seven riparian corridors are located within the transmission line corridor (Appendix B). Dominant riparian vegetation associated with each stream system within the transmission line corridor is presented on Table 3.7-2. As with other habitats associated with the project site, the dominance of nonnative invasive plant species associated with the riparian corridors reduces the potential quality of habitat for wildlife compared to habitats with diverse native vegetation.

Table 3.7-2: Dominant Riparian Vegetation of Stream Channels within the Transmission Line Corridor

Stream Name	Dominant Riparian Vegetation
California Creek	reed canarygrass
Tributary 1	Himalayan blackberry
Tributary 2	Himalayan blackberry
Tributary 3	spirea
Tributary 4	Himalayan blackberry, spirea, vine maple, red-osier dogwood, reed canarygrass
Fingalson Creek	Himalayan blackberry, red alder saplings
Terrell Creek	Himalayan blackberry

Source: Appendix E

Wetlands associated with the transmission line corridor are summarized in Table 3.5-3. Table 3.5-3 identifies wetlands within each 1-mile segment of the approximately 5-mile transmission line corridor from east to west and the span of each wetland in linear feet within the transmission line corridor. Based on this information, the linear feet of wetland habitat and non-wetland habitat (upland vegetation communities, unpaved roads, paved roads, and stream corridors not identified as wetlands) within the transmission line corridor was estimated and is provided below in Table

3.7-3. Based on these calculations, 33% of the transmission line corridor is comprised of wetland habitat and 67% is comprised of upland habitat.

Table 3.7-3: Summary of Wetland and Upland Habitat Associated with the Transmission Line Corridor

Corridor Mile	Approximate Length of Wetland Habitat in Corridor (feet)	Approximate Length of Upland Habitat in Corridor (feet)
Mile 1	2,675	2,605
Mile 2	1,385	3,895
Mile 3	640	4,640
Mile 4	1,905	3,375
Mile 5	2,050	3,230
Total	8,655	17,745

Based on the 5-mile transmission corridor length

Other Project Components

The majority of wildlife habitat associated with the other project components (Access Road 3, Laydown Area 4, and CMA 1 and CMA 2) include a mosaic of upland and wetland grassland communities with patches of Himalayan blackberry, black cottonwood, and Douglas fir. A small amount of mixed coniferous/deciduous forest is located in the northeast portion of Laydown Area 4 (Figure 3.5-2). The location of Access Road 3 is dominated by emergent wetland systems. Overall, the fragmented nature and dominant presence of nonnative invasive plant species associated with these habitats reduces their effectiveness as quality habitat for wildlife.

Forested riparian habitat associated with Terrell Creek is located adjacent to the north sides of CMA 1 and CMA 2. The WDFW Priority Habitat and Species database identifies the riparian habitat of Terrell Creek as priority habitat.

Fisheries

Based on the literature review and information in the WDFW Priority Habitat and Species database, fish-bearing aquatic resources in the project site vicinity include Terrell Creek, Fingalson Creek, California Creek, four unnamed tributaries to California Creek, Lake Terrell, and Puget Sound (see Figure 2-2).

Drainage ditches that traverse components of the project site and the surrounding area were originally created to drain wetlands for agricultural use. They are no longer maintained and many are partially vegetated. These drainages lack organic debris, pools, and natural meanders. Wetlands and surface water runoff are the apparent source of these drainages. The drainages are seasonally inundated and do not provide habitat for resident or anadromous fish (Williams et. al. 1975; WDFW 2001). The drainage system eventually connects with Terrell Creek outside of the

project site boundary. The marine waters that receive the treated wastewater from the BP Cherry Point Refinery would also receive the combined treated wastewater associated with the proposed project. The refinery discharges industrial wastewater in the area of Cherry Point (Figure 2-2).

Terrell Creek is an 8.7-mile-long stream that flows from Lake Terrell and discharges to the marine waters of Birch Bay in Puget Sound. Terrell Creek flows east and north of the proposed project site (Figure 3.7-1). Birch Bay is approximately 1.5 miles northwest of the proposed project site (Figure 2-2). The WDFW Priority Habitat and Species database identifies the riparian habitat of Terrell Creek as priority habitat.

According to WDFW, anadromous and resident fish species occurring in Terrell Creek include coho salmon (*Oncorhynchus kisutch*), sea-run cutthroat (*O. clarki*), resident cutthroat (*O. clarki*), and winter steelhead (*O. mykiss*). WDFW regional habitat biologists have documented coho, resident cutthroat juveniles, and largemouth bass (*Micropterus salmoides*) in the creek (Huddle, pers. comm., 2002; Warinner, pers. comm., 2002).

Lake Terrell is approximately 1 mile southeast of the proposed project site. The WDFW Priority Habitat and Species database identifies wetlands associated with Lake Terrell as priority habitat (WDFW 2001).

Fingalson Creek flows into Terrell Creek east of the proposed project site. Sea-run cutthroat and winter steelhead are documented in Fingalson Creek (Huddle, pers. comm., 2002; Warinner, pers. comm., 2002). The WDFW Priority Habitat and Species database identifies the riparian habitat of Fingalson Creek as priority habitat (WDFW 2001).

California Creek is a 7.25-mile-long stream that discharges to the marine waters of Drayton Harbor (Strait of Georgia). California Creek flows north of the proposed project site (Figure 3.7-1). Drayton Harbor is approximately 3 miles northwest of the proposed project site (Figure 2-2). Anadromous fish species occurring in California Creek include coho and chum salmon (*O. keta*) (Williams et. al 1975, WDFW 2001). The WDFW Priority Habitat and Species database identifies the riparian habitat of California Creek as priority habitat.

Four unnamed tributaries to California Creek are located within the project site. These tributaries are not identified in the WDFW Priority Habitat and Species database. Fish use of these systems is unknown (Williams et. al 1975).

The marine environment of Puget Sound provides habitat for a variety of shellfish, anadromous salmon, and other marine fish species. Nearshore habitats and characteristic species near the wastewater discharge at Cherry Point are typical of those found along the Cherry Point shoreline. The seafloor habitat within the industrial wastewater chronic dilution zone is silty gravelly sand sediment with relatively strong tidal currents (1 or more knots during maximum ebbs and floods). This habitat is characterized by a sparse epifauna.

Figure 3.7-1

A variety of salmonids are known to occur along the Cherry Point shoreline. Large numbers of pink (*O. gorbuscha*), chum, coho, and chinook (*O. tshawytscha*) salmon have been found in the cobble habitats of the Cherry Point shoreline and in the protected eelgrass beds of Birch Bay. Juvenile sockeye salmon (*O. nerka*) were also found in Birch Bay, but were generally less abundant than other species (BP 2002, Section 3.7). These species can be expected to migrate and feed along the Cherry Point shoreline. Pacific herring (*Clupea pallasii*) and surf smelt (*Hypomesus pretiosus*) use beaches north and south of the wastewater discharge location for spawning from June through August.

Aquatic resources with potential fish habitat are not located within about 0.5 mile of the cogeneration facility footprint, refinery interface footprint, or the transmission system corridor. Aquatic resources associated with other project components (CMA 1 and CMA 2) and the transmission line corridor are discussed below.

Custer/Intalco Transmission Line No. 2

Seven stream channels, Terrell Creek, Fingalson Creek, California Creek, and four unnamed tributaries to California Creek, flow within the proposed transmission line corridor (Appendix B). Ditches and swales present within the transmission line corridor are isolated systems associated with wetland habitat. Characteristics of stream channels associated with the transmission line corridor are described in Table 3.7-4 in the order they occur from east to west.

Table 3.7-4: Characteristics of Stream Channels within the Transmission Line Corridor

Corridor Mile	Stream Name	Location	Size and Shape	Comments
Mile 1	California Creek	southwest of Custer substation	straightened channel, 2 to 3 feet deep, 2 feet wide	flow 5 to 7 cfs, water very silty
Mile 2	Tributary 1	east of Elk Road	bottom of 50-foot-wide and 30-foot-deep gully, 10 to 15 feet wide	flows through 24-inch culvert beneath unpaved road, flow 0.25 cfs
Mile 2	Tributary 2	joins Tributary 1 from the southeast within corridor	larger stream than Tributary 1	flows through 24-inch culvert beneath unpaved road prior to joining with Tributary 1
Mile 2	Tributary 3	west of Elk Road	30-foot-wide, V-shaped channel, steep-banked gully 10 feet deep downstream of confluence	flows west within north part of corridor for about 300 feet before joining Tributary 4 within corridor, flow 0.3 cfs, continues offsite for more than 2 miles before joining California Creek
Mile 2	Tributary 4	west of Elk Road	smaller stream than Tributary 3	flows northwest across corridor before joining Tributary 3, flow 0.15 cfs

Table 3.7-4: Continued

Corridor Mile	Stream Name	Location	Size and Shape	Comments
Mile 4	Fingalson Creek	about 2,500 feet east of Kickerville Road	6 to 10 feet wide, steep-banked gully 40 feet deep	flows west within south part of corridor for about 500 feet before flowing out of the corridor to the south, flow 0.25 cfs
Mile 4	Fingalson Creek	about 1,500 feet east of Kickerville Road	6 to 10 feet wide	crosses corridor from south about 1,000 feet west from where stream exited corridor, drains into Terrell Creek about 300 feet after crossing corridor
Mile 4	Terrell Creek	about 700 feet east of Kickerville Road	4 feet wide with steep banks	flows north across corridor, flow 10 cfs

Source: Appendix E

Other Project Components

Aquatic resources with potential fish habitat are not located within about 0.5 mile of Access Road 3 or Laydown Area 4. Proposed wetland mitigation sites CMA 1 and CMA 2 are located adjacent to the forested riparian corridor of Terrell Creek (Figure 3.5-2).

Threatened and Endangered Species

Section 7(c) of the ESA of 1973 requires an analysis of the effects of construction projects with a federal nexus (permits, funds, land) on any federally listed or proposed threatened or endangered species that may use the project site. Consultation with USFWS and NOAA Fisheries is necessary if any threatened or endangered species would be adversely affected by the project. Applicable regulations are found in 50 CFR 17. The ESA does not protect candidate species or species of concern, but if a species were to be elevated to the proposed, endangered, or threatened category once the project had begun, additional analysis would be required to determine the project's potential effects on that species.

A BE prepared for the project in 2002 was reviewed to provide information on threatened and endangered species documented as potentially occurring near the proposed project site (BP 2003, Appendix H5). Wildlife and fish species identified by USFWS, NOAA Fisheries, and/or WDFW as likely to occur in the project vicinity are discussed below.

USFWS indicates that there are two federally listed threatened species under USFWS jurisdiction that are likely to occur in the project vicinity: the bald eagle (*Haliaeetus leucocephalus*) and the Coastal-Puget Sound population of bull trout (*Salvelinus confluentus*) (USFWS 2001) (Table 3.7-2).

NOAA Fisheries identifies two federally listed endangered species, two federally listed threatened species, and one species that is currently a candidate for listing, as potentially occurring near the project site. Humpback whale (*Megaptera novaeangliae*) and leatherback sea turtle (*Dermochelys coriacea*) are federally listed endangered species. Steller sea lion (*Eumetopias jubatus*) and Puget Sound chinook salmon (*Oncorhynchus tshawytscha*) are federally listed threatened species. Puget Sound/Strait of Georgia coho salmon (*Oncorhynchus kisutch*) is a candidate for listing (NOAA Fisheries 2003) (Table 3.7-2).

According to the WDFW Priority Habitats and Species database, no federal or state-listed sensitive, threatened, or endangered wildlife species regularly forage, breed, or occur within the proposed project site (WDFW 2001). Information from the WDNR Natural Heritage Program indicates that there are no known occurrences of priority habitats or high-quality ecosystems near the proposed project site (WDNR 2001) (Table 3.7-5).

Table 3.7-5: Threatened, Endangered, Proposed, Candidate Species, and Species of Concern Potentially Occurring in the Project Vicinity

Common Name	Scientific Name	Federal Status	State Status
USFWS			
bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	Threatened
bull trout (Coastal-Puget Sound Distinct Population Segment)	<i>Salvelinus confluentus</i>	Threatened	Candidate
long-eared myotis	<i>Myotis evotis</i>	Species of Concern	None
long-legged myotis	<i>Myotis volans</i>	Species of Concern	None
olive-sided flycatcher	<i>Contopus cooperi</i>	Species of Concern	None
Pacific lamprey	<i>Entosphenus tridentatus</i>	Species of Concern	None
river lamprey	<i>Lampetra ayresi</i>	Species of Concern	Candidate
NOAA Fisheries			
humpback whale	<i>Megaptera novaeangliae</i>	Endangered	Endangered
leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	Endangered
Steller sea lion	<i>Eumetopias jubatus</i>	Threatened	Threatened
Chinook salmon (Puget Sound Evolutionarily Significant Unit)	<i>Oncorhynchus tshawytscha</i>	Threatened	Candidate
Coho salmon (Puget Sound/Strait of Georgia Evolutionarily Significant Unit)	<i>Oncorhynchus kisutch</i>	Candidate	None

Source: USFWS 2001; NOAA Fisheries 2003

Federally Listed Endangered Species

Humpback whale sightings are a common occurrence along the Washington outer coast, with occasional sightings in the Strait of Juan de Fuca (Everitt et al. 1980). While humpback whales may wander into Puget Sound during migrations between summer breeding grounds in coastal Alaska and wintering grounds around subtropical coastal areas, their presence in Puget Sound is rare. There have been only two or three sightings in Washington inland waters in the last 10 years (Norberg, pers. comm., 2000).

The leatherback sea turtle may occasionally wander into Puget Sound from coastal Washington but is not known to breed in inland waters. These turtles breed in tropical and subtropical habitats. Sightings in Washington waters have been rare, with only one or two unconfirmed sightings off the outer coast of Washington in the last 10 years (Norberg, pers. comm., 2000).

Federally Listed Threatened Species

Bald eagles typically nest in large trees within view of a foraging area. Bald eagles prefer foraging in or near open water. Fish is the major component of their diet, but waterfowl, seagulls, and carrion are also eaten (Federal Register 1999). Bald eagle breeding habitat typically requires an adequate supply of moderate- to large-sized fish, nearby nesting sites of large coniferous trees within 0.6 mile of water, and a reasonable degree of freedom from disturbance during the nesting period (Johnsgard 1990). Wintering populations of bald eagles use shoreline areas along Puget Sound for foraging and perch sites.

The WDFW Priority Habitats and Species database and WDFW personnel identify several bald eagle breeding sites within 2 miles of the proposed project site (WDFW 2001). The closest nest is approximately 1.2 miles northwest of the site near Birch Bay. Sixteen breeding occurrences associated with Lake Terrell have been documented, more than 1.5 miles southeast of the project site (WDFW 2001; Reed, pers. comm., 2001). Quality perching and foraging habitat typically associated with bald eagles is not located within the project site.

Bull trout live in cold mountain waters spanning from the northern United States into Canada. Terrell Creek does not provide suitable cold water habitat required by bull trout for spawning. The closest known stream that contains bull trout is the Nooksack River, which drains into Bellingham Bay. Bull trout associated with the Nooksack River could occur in the marine waters off Cherry Point. These adults could use nearshore waters and habitats for feeding. Adults or juveniles could incidentally use the lower reaches of Terrell Creek for feeding (Huddle, pers. comm., 2002).

Steller sea lions range from Southern California through coastal Oregon, Washington, British Columbia, and Alaska. These species are typically associated with coastal Washington and are not regularly observed in Puget Sound waters (NOAA Fisheries 2003). There are no known breeding or haulout sites for sea lions in the Cherry Point vicinity.

The Puget Sound chinook salmon Evolutionarily Significant Unit (ESU) includes all naturally spawning populations of chinook salmon from rivers and streams flowing into Puget Sound, including the Strait of Juan De Fuca from the Elwha River eastward, and the rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington (NOAA Fisheries 2003).

The nearest stream used by chinook salmon for spawning is the Nooksack River (Berger/ABAM 2000; Williams et al. 1975). Adult chinook salmon use offshore waters for feeding or during migration. Some adult fish could be found along Cherry Point and Birch Bay from March through October. Juveniles of chinook salmon would be expected to use nearshore marine habitats off Cherry Point for feeding and refuge during migration. Juveniles are likely to be found along Cherry Point and Birch Bay from March through August (Myers et al. 1998; Williams et al. 1975). Chinook salmon are not known to use Terrell Creek for spawning. WDFW has not observed use of Terrell Creek by chinook salmon adults or juveniles (WDFW 2001).

Candidate Species

The Puget Sound/Strait of Georgia ESU includes all naturally spawning populations of coho salmon from drainages of Puget Sound and Hood Canal, the eastern Olympic Peninsula, and the Strait of Georgia from the eastern side of Vancouver Island and the British Columbia mainland (NOAA Fisheries 2003).

WDFW regional habitat biologists have documented coho salmon in Terrell Creek (Williams et al. 1975). Coho salmon may use Terrell Creek for spawning. However, no actual spawning has been documented by WDFW. If spawning occurred, adult fish would be expected in Terrell Creek from November through January. Juvenile coho salmon would be expected in the nearshore waters off Cherry Point from March through July (Huddle, pers. comm., 2002).

Species of Concern

USFWS identified five species of concern that may occur in the project vicinity: long-eared myotis, long-legged myotis, olive-sided flycatcher, Pacific lamprey, and river lamprey (Table 3.7-5). Species of concern are not protected under the ESA, but if a species were to be elevated to the proposed category after the project had begun, additional analysis in the BE would be required to determine the project's potential effects on this species. Quality terrestrial habitat typically associated with these species (mature forests) do not occur within the proposed project site. Freshwater streams are located within the transmission line corridor, as described in the fisheries section above.

State Priority Species

A review of the WDFW Priority Habitats and Species database revealed that no federal or state-listed sensitive, threatened, or endangered wildlife species regularly use or breed within the proposed project site (WDFW 2001). The WDFW Priority Habitats and Species database does identify habitat for several state priority species located more than 1 mile from the proposed project site.

Pacific herring Cherry Point stock (*Clupea pallasii*) is a state priority species. Herring stocks are defined by WDFW by spawning grounds, one of which is the Cherry Point shoreline from Birch

Bay to Sandy Point in the southeast Strait of Georgia. Most Washington state herring stocks spawn from late January through early April. The Cherry Point stock is an exception to this spawning time, spawning from early April through early June. Herring deposit their eggs on subtidal eelgrass and marine algae (WDFW 2003).

Sea-run cutthroat is a state priority species. According to the WDFW Priority Habitat Species database, this species is known to occur in Terrell Creek and Fingalson Creek. WDFW regional habitat biologists have documented cutthroat juveniles in Terrell Creek (Huddle, pers. comm., 2002; Warinner, pers. comm., 2002). Spawning activities have not been observed.

Surf smelt (*Hypomesus pretiosus*) are state forage fish. Surf smelt occur within the upper intertidal zone within gravel beaches. There are known spawning areas on beaches north of Cherry Point.

Common loon (*Gavia immer*), a state sensitive species, and trumpeter swan (*Cygnus buccinator*), a state priority species, are known to occur in habitat associated with Lake Terrell. Birch Bay is known to support relatively high concentrations of great blue heron (*Ardea herodias*) nests on land that was placed in a conservation trust by the Applicant. Great blue heron are a state monitor species. Birch Bay and Lake Terrell are approximately 1.5 miles and 1 mile, respectively, from the proposed project site

The WDFW Priority Habitats and Species Data System also indicates that two gray wolves (*Canis lupus*) were reported near the proposed project site in 1991. Gray wolves are a federally listed threatened species under USFWS jurisdiction. USFWS does not identify gray wolves as likely to occur in the project vicinity (USFWS 2001). Although there are occasional reports of wolf sightings in the state, there are no documented wolf breeding pairs or packs currently in the state. WDFW believes that sightings here involve lone wolves from Canada or wolf/dog hybrids that have been released into the wild (Leigh, pers. comm., 2001).

Based on the literature review and information from natural resource agencies, no federal or state protected species regularly forage, breed, or occur within the proposed cogeneration facility area, refinery interface footprint, transmission system corridor, or the other project components. Breeding or foraging habitat typically associated with federal or state protected species is not located within the footprint of these elements of the project.

Custer/Intalco Transmission Line No. 2

No federal or state protected terrestrial species regularly forage, breed, or occur within the transmission line corridor. Federal or state protected fish species may occur in the reaches of Terrell Creek, Fingalson Creek, and California Creek that flow through the transmission line corridor.

3.7.2 Impacts of the Proposed Action

Potential impacts associated with the proposed project would be minimized and avoided through implementation of the BMPs described in the Mitigation Measures section below. The impacts described below assume implementation of all of the proposed BMPs.

Construction

This section describes potential impacts from associated construction activities and project design elements, including mitigation measures proposed by the Applicant to minimize or eliminate those potential impacts. Potential impacts and design elements applicable to all project components are discussed first, followed by discussions specific to individual project components. Detailed information associated with proposed mitigation measures is provided in the *Revised Cogeneration Project Compensatory Mitigation Plan* and the *May 22, 2003 Addendum: Changes to Revised Cogeneration Project Compensatory Mitigation Plan* (Appendix E).

Upland Vegetation

The primary impact construction of the proposed project would have on vegetation communities is the direct removal of vegetation, soil, and water. It is anticipated that the conversion of vegetation communities to impervious surfaces would be permanent. Therefore, vegetation would no longer occur in those areas of the proposed project site that would be converted to impervious surfaces during construction.

Vegetation communities in the project area contain a mixture of native and non-native plant species. Non-native vegetation is the dominant cover in the shrub habitat. Additionally, non-native vegetation is established throughout the grassland, coniferous forest, and deciduous forest habitats. Grading and clearing of the proposed project site would remove existing noxious weed species. This is not considered an adverse impact because eradication of Class C noxious weeds is strongly encouraged by both the state and local noxious weed control boards.

No federal or state endangered, threatened, or sensitive plant species occur within the proposed project site and therefore none would be affected by construction of the proposed project.

Cogeneration Facility

Upland vegetation community impacts associated with the cogeneration facility, the refinery interface site (Access Road 2 and Laydown Areas 1, 2, and 3), and elements of the other project components (Access Road 3 and Laydown Area 4) include the clearing and removal of grassland, shrubland, mixed coniferous/deciduous forest, coniferous forest, and deciduous forest (Table 3.7-6).

Table 3.7-6: Summary of Vegetation Community Impacts Associated with the Cogeneration Facility, Refinery Interface, and Other Project Components (acres)

Vegetation Community	Acres
Coniferous forest	7.3
Deciduous forest	1.5
Mixed coniferous/deciduous forest	0.2
Shrubland	1.2
Grassland	19.7
Wetland	35.37
Existing impervious surface	3.6
Total	68.9

Source: BP 2002, Section 3.4
Totals may not sum due to rounding.

Upland vegetation communities in the northern portion of the cogeneration facility near Grandview Road, west of Laydown Area 4, would not be disturbed or cleared as part of the project (Figure 3.7-1). A reed canarygrass control program has been developed to remove and control this invasive species within the project site. Zoning regulations, as defined in Title 20 of the Whatcom County Municipal Code, require minimum setbacks from public roads associated with heavy industrial development. The proposed project site was located as close to Grandview Road as possible (250 feet) to avoid upland and wetland communities south of the project site, under these setback requirements. BMPs would be implemented to avoid and reduce impacts resulting from construction.

Refinery Interface

Construction activity associated with the refinery interface site would disturb small upland patches of grassland, Himalayan blackberry, and black cottonwood surrounded by wetland systems (Table 3.7-6). As part of the restoration effort associated with Wetland F in the northern portion near Grandview Road, upland vegetation communities would be restored and enhanced following construction with native grass, shrub, and forested vegetation. Construction Laydown Areas 1, 2, and 3 would be maintained as impervious areas after construction is completed to accommodate necessary storing and holding areas associated with operation of the project.

Transmission System

This new 0.8-mile-long and 150-foot-wide electrical transmission system corridor has not yet been cleared of trees, although the access/maintenance roads leading to the transmission system line corridor have been constructed under previously approved permits (ARCO Products

Company 1999). Trees growing in the corridor would be removed or topped during construction to maintain a safe distance between the trees and the electrical lines. The transmission system line would require the construction of five towers. The gravel pads for the towers are approximately 50 feet by 50 feet, a total area of 12,500 square feet or 0.29 acre. Approximately 0.15 acre of PEM Category III wetland impacts have been identified associated with the tower pad construction (Section 3.5). Therefore, up to 0.14 acre of upland vegetation associated with the transmission system would be cleared. The tower pads are likely to be constructed in grassland and mixed coniferous/deciduous forest habitats. BMPs, including silt fences, straw bales, and mulch, would be used as necessary during clearing of the corridor and construction of tower pads to control erosion until the area can be stabilized with gravel or vegetation.

Custer/Intalco Transmission Line No. 2

Existing access/maintenance roads are located within the approximately 5-mile transmission line corridor. No road construction would be associated with this component of the project.

Under Option 1, a RAS would install additional electrical equipment, such as new breakers and wiring, within the Custer and Intalco substations. This option would not require any changes to the existing lines or towers and no new towers would be constructed, but this would require agreement among the Applicant, Alcoa Intalco Works, and Bonneville. No impacts to upland vegetation associated with construction of the transmission line would occur under this option.

Under both Option 2a and Option 2b, a second transmission line would be installed inside the existing 125-foot right-of-way of the existing transmission line corridor. Under Option 2a, new lattice-style towers would be constructed. Under Option 2b, new monopole-style towers would be constructed. Some foundation work would be required to accommodate the new towers under either Option 2a or 2b. While the number of new towers required for either option has not been determined, more monopole-style towers than lattice towers would be required to accommodate a new electrical line because monopole-style towers require a shorter distance between towers. The location and amount of clearing that would be required to construct new towers has not been identified. The majority of upland vegetation communities associated with the transmission line corridor that would be disturbed during tower construction is grassland habitat that is disturbed due to mowing and livestock grazing (Appendix B). Himalayan blackberry shrub habitat would also be disturbed. Implementation of appropriate BMPs would protect against adverse impacts on upland vegetation communities.

Other Project Components

Impacts associated with Laydown Area 4 and Access Road 3 are included in Table 3.7-6. A small amount of mixed coniferous/deciduous forest is located in the northeast portion of Laydown Area 4. Following construction, the entire 4.74-acre area of Laydown Area 4 would be restored. The restoration of Laydown Area 4 would include 2.9 acres of wetland (0.5 acre) and upland (2.4) restoration and creation within the cogeneration facility fenceline. The other 1.8 acres in the

eastern portion of Laydown Area 4 would include restoration of upland habitat outside the fenceline. Laydown Area 4 would be restored and enhanced with native grass, shrub, and forested vegetation. Most of the vegetation associated with Access Road 3 is associated with wetland systems.

As shown on Table 3.5-4 in Section 3.5, 12 acres (24%) of CMA 1 and 18.42 acres (30%) of CMA 2 is comprised of upland vegetation communities. Upland vegetation associated with CMA 1 and 2 would be enhanced by removing non-native invasive plant species. Some replanting of native species would also occur. These measures will improve the functional performance of upland areas as wetlands in this area are converted from low quality Category II wetlands into high quality Category II wetlands. The cogeneration project compensatory mitigation plan documents are included in Appendix E. Existing native trees and shrubs within upland areas in CMA 1 and 2 would not be disturbed. A reed canarygrass control program has been developed to remove and control this invasive species. Implementation of appropriate BMPs would protect against adverse impacts on upland vegetation communities.

Wildlife and Habitat

The primary effect from project construction would be removal and loss of habitat. In general, the severity of impact varies depending on the type and quantity of affected vegetation. Loss of plant communities that offer limited wildlife habitat, such as shrub communities dominated by Himalayan blackberry, would result in less of an adverse effect than loss of more complex vegetation associations, such as forested upland and wetland areas.

Grassland and wetland communities are the primary habitats that would be cleared under the proposed project. Other habitats that would be cleared include shrubland, mixed coniferous/deciduous forest, coniferous forest, and deciduous forest.

Clearing of vegetation during construction would eliminate and modify existing wildlife habitat. Such impacts to habitats would displace and/or eliminate wildlife that currently depend on this vegetation. Most wildlife species (such as birds, raccoons, or coyotes) would be able to move away from areas of disturbance. Wildlife populations are generally considered to be at or near carrying capacity in all habitat types (Krebs 1994; Morrison et. al. 1992; Miller 1990; Robinson and Bolen 1989; Wallace 1987). Once vegetation has been removed, wildlife displaced into adjacent habitats may be unsuccessful in colonizing nearby suitable habitats because these areas are usually already occupied. The increased stress of competition for limited resources and susceptibility to predation may cause displaced animals to perish or to displace other individuals that in turn may perish. Small mammals, amphibians, and reptiles would be directly affected by construction because of their limited mobility. Some individuals of such species would perish during construction operations.

Disturbances caused by construction may affect wildlife in adjacent habitats by disrupting feeding and nesting activities. Increased noise levels created by heavy machinery could cause

birds to abandon their nests and may displace wildlife during construction. Construction activities could result in avoidance behavior by some wildlife species. Wildlife would likely inhabit available habitat once construction is complete. Some wildlife species in the project vicinity are likely acclimated to human disturbance because human-related disturbance associated with the BP Cherry Point Refinery has been occurring in the project vicinity for more than 30 years.

Cogeneration Facility

The cogeneration facility would occupy approximately 33.4 acres of the project site. Conversion of wildlife habitat to developed areas is described and quantified above in the upland vegetation discussion (Table 3.7-6). Permanent loss of habitat would occur in developing the cogeneration facility, which would lead to direct impacts on wildlife species using this area. Generally, the fragmented nature and dominant presence of nonnative invasive plant species associated with wildlife habitat within the cogeneration facility does not provide conditions typically associated with high quality habitat for native wildlife. BMPs would be implemented during construction to avoid and reduce impacts to wildlife habitat resulting from construction activities.

No critical or priority upland habitat is located within the proposed cogeneration facility footprint. Wetland systems within the cogeneration facility are identified by WDFW as priority habitat. As described in Section 3.5, wetlands within the project site function on a very low level for wildlife species, and proposed wetland mitigation would convert emergent wetlands with low functional performance into higher quality scrub-shrub and forested wetlands systems. Upland wetland buffers would also be restored and enhanced (Appendix E).

Overall, impacts on wildlife and habitat associated with the cogeneration facility, with implementation of the recommended mitigation measures, are expected to be small and are unlikely to result in a significant impact on native wildlife.

Refinery Interface

Components of the refinery interface (Laydown Areas 1, 2, and 3) would occupy 31.46 acres of the project site. BMPs would be implemented during construction to avoid and reduce impacts on wildlife habitat resulting from construction activities. All of construction Laydown Areas 1 and 3, and portions of Laydown Area 2, would be maintained as impervious areas after construction is completed to accommodate necessary storing and holding areas associated with operation of the refinery. Wildlife habitat within the refinery interface is similar to habitat associated with the cogeneration facility. Overall, impacts on wildlife and habitat associated with construction of the refinery interface are consistent with those described for the cogeneration facility above.

As discussed in Section 3.5 (Table 3.5-5), 4.66 acres of wetland habitat and associated wetland buffer habitat within Laydown Area 2 would be restored and enhanced following construction with native grass, shrub, and forested vegetation (Appendix E).

No critical or priority upland habitat is located within the refinery interface area. Wetland systems within the refinery interface are identified by WDFW as priority habitat. As described above for the cogeneration facility, wetlands within the project site function on a very low level and proposed wetland mitigation would create higher quality wetlands systems.

Overall, impacts on wildlife and habitat associated with the refinery interface, with implementation of the recommended mitigation measures, are expected to be small and are unlikely to result in a significant impact on native wildlife.

Transmission System

Installation of the transmission system requires a 150-foot-wide, 0.8-mile-long corridor consisting of five new towers. This transmission system corridor has not yet been cleared of trees, although the access/maintenance roads leading to the transmission system line corridor have been constructed under previously approved permits (ARCO Products Company 1999). Trees growing in the corridor would be removed or topped during construction to maintain a safe distance between them and the electrical lines. As described above in the upland vegetation section, the five tower pads would cover approximately 0.29 acre. The total area within the transmission system corridor is 14.6 acres. Estimated impacts on wildlife habitat associated with tower pad construction would include the clearing of 0.15 acre of PEM wetlands and up to 0.14 acre of upland grassland and mixed coniferous/deciduous forest habitats. Noise levels associated with construction of the towers may displace wildlife during construction. BMPs, including silt fences, straw bales, and mulch, will be used as necessary during clearing of the corridor and construction of the tower pads to control erosion until the area can be stabilized with gravel or vegetation.

No critical or priority upland habitat is located within the transmission system corridor. Wetland systems within the transmission system corridor are identified by WDFW as priority habitat. As described above in the cogeneration facility section, wetlands within the project site function on a very low level and proposed wetland mitigation would create higher quality wetlands systems.

Overall, with implementation of the recommended mitigation measures, impacts associated with the transmission system on wildlife would be temporary and habitat impacts would be small and not significantly affect most wildlife populations.

Custer/Intalco Transmission Line No. 2

The transmission line corridor passes through a combination of grassland and shrub wetland, as well as upland wildlife habitat that is disturbed due to mowing and livestock grazing (Appendix

B). Mixed coniferous/deciduous forest habitats are located adjacent to the transmission line corridor in several areas but are not located within the corridor and would not be cleared during construction. Seven riparian corridors are located within the transmission line corridor. Riparian habitat within the transmission corridor is degraded due to steep banks and a dominant presence of nonnative invasive vegetation species (Table 3.7-2). An estimated 33% of the transmission line corridor is comprised of wetland habitat and 67% is comprised of upland habitat. Wetlands associated with the transmission line corridor are described in Section 3.5 and summarized in Table 3.5-3.

An unpaved road located along most of the corridor provides access for maintenance, and paved roads cross the corridor in several locations. No road construction would be associated with the transmission line corridor. Shrubs and trees within the corridor are currently removed or topped by Bonneville to maintain a safe distance between the trees and the electrical lines, typically about 25 feet.

As described above in the upland vegetation section, Option 1 would not require any changes to the existing lines or towers and no new towers would be constructed. No impacts on wildlife habitat associated with construction of the transmission line would occur under Option 1.

The other two transmission line options, replacing the existing tower structures with lattice towers (Option 2a) or monopole-style towers (Option 2b), are described above in the upland vegetation section. The location and amount of clearing that would be required to construct new towers has not yet been identified. The majority of habitat associated with the transmission line corridor that would be disturbed during tower construction is grassland that has been disturbed due to mowing and livestock grazing and Himalayan blackberry shrub habitat. Sensitive areas, wetland systems, stream channels, and associated wetland and stream buffers would be avoided, where possible, during construction of the transmission line tower pads. If wetland impacts cannot be avoided, wetland delineations would need to be performed where impacts are proposed before wetland impacts can be quantified and wetland permits can be issued. BMPs, including silt fences, straw bales, and mulch will be used as necessary during clearing of the corridor and construction of tower pads to control erosion until the area can be stabilized with gravel or vegetation.

WDFW priority habitat located within the transmission system corridor, stream channels, and wetlands would be avoided where possible. No tower pad construction would occur within stream channels or associated riparian buffers. Some PEM wetland systems may be disturbed during construction. As discussed above for the cogeneration facility, wetlands within the project site function on a very low level and proposed wetland mitigation would create higher quality wetlands systems.

Overall, tower pad construction would require the clearing of a relatively small area within the existing 70-acre transmission line corridor. With implementation of the recommended mitigation measures, impacts associated with the transmission line on wildlife would be temporary and

habitat impacts would be small. The proposed transmission line corridor would not significantly affect most wildlife populations.

Other Project Components

Impacts associated with Laydown Area 4 and Access Road 3 would be the same as those described above for the cogeneration facility and the refinery interface. Most of the habitat that would be cleared is disturbed and is generally of low quality. A small amount of mixed coniferous/deciduous forest habitat, approximately 0.2 acre, in the northeast portion of Laydown Area 4 would be cleared. Vegetation communities in Laydown Area 4 would be restored and enhanced following construction with native grass, shrub, and forested vegetation (Appendix E). Implementation of appropriate BMPs would protect against adverse impacts on wildlife habitat.

As discussed in Section 3.5 under the proposed mitigation plan, in addition to the 0.2 acre of wetland restoration of Wetland B3, 0.3 acre of wetland creation would occur, for a total of 0.5 acre of wetland restoration and creation in Laydown Area 4 (Appendix E).

Existing native trees and shrubs within CMA 1 and CMA 2 would not be disturbed. A reed canarygrass control program has been developed to remove and control this invasive species within the mitigation areas.

Proposed wetland enhancement and the creation of new wetlands associated with proposed wetland mitigation sites CMA 1 and CMA 2 would result in an increase in habitat quality, would benefit wildlife species that currently use the area, and would likely attract a more diverse assortment of wildlife species. The riparian corridor of Terrell Creek is adjacent to CMA 1 and CMA 2. Wetland enhancement associated with CMA 1 and CMA 2 would provide a significant benefit to the overall quality of wildlife habitat of the Terrell Creek system.

No critical or priority upland habitat is located within the other project components. Wetland systems within CMA 1 and CMA 2 are identified by WDFW as priority habitat. As described previously, wetlands within the project site function on a very low level and proposed wetland mitigation would create higher quality wetlands systems.

Overall, with implementation of the recommended mitigation measures, impacts associated with Laydown Area 4 and Access Road 3 on wildlife would be temporary and habitat impacts would be small and would not significantly affect most wildlife populations. Wetland enhancement associated with CMA 1 and CMA 2 would provide a significant benefit to the overall quality of wildlife and habitat in the project vicinity.

Fisheries

Potential impacts on fish or fish habitat associated with construction of the proposed project include impacts on water quality and changes in water quantity. No construction activity would

occur within 1.5 miles of the waters of Puget Sound. Wetlands within the project site are hydrologically isolated with no known fish use. General mitigation measures associated with potential water quality and quantity changes have been developed to minimize potential impacts on fish and fish habitat. In addition, mitigation measures and impacts would be further detailed and refined as the design phase proceeds prior to construction.

Water quality can be degraded by accidental spills of petroleum hydrocarbons from construction activities and exposure to construction waste, such as concrete wash water. Potential significant impacts due to erosion and sedimentation are not likely because stormwater detention ponds would trap and filter runoff associated with construction activities. Potential water quality impacts related to construction are expected to be short term and negligible with proper management. Section 3.4, Water Quality, contains more detailed information on water quality impacts. There are no aquatic resources with potential fish habitat located within or near (about 0.5 mile) the footprint of the cogeneration facility, components of the refinery interface, or the transmission system corridor. With implementation of the recommended mitigation measures, impacts on fish or fish habitat associated with construction of these components of the project would not occur.

Custer/Intalco Transmission Line No. 2

Seven stream channels, Terrell Creek, Fingalson Creek, California Creek, and four unnamed tributaries to California Creek, flow within the proposed transmission line corridor (Table 3.7-4). The WDFW Priority Habitats and Species database identifies the riparian corridors of Terrell Creek, Fingalson Creek, and California Creek within the transmission line corridor as priority habitats (WDFW 2001). Ditches and swales within the transmission line corridor associated with wetland habitat are seasonally inundated and are unlikely to provide habitat for fish.

An unpaved road is located along most of the corridor to provide access for maintenance, and paved roads cross the corridor in several locations. No road construction would be associated with the transmission line.

As described above in the upland vegetation section, Option 1 would not require any changes to the existing lines or towers and no new towers would be constructed. With implementation of the recommended mitigation measures, no impacts on fish or fish habitat associated with construction of the transmission line would occur under this option.

The other two transmission line options, replacing the existing tower structures with lattice towers (Option 2a) or monopole-style towers (Option 2b), are described above in the upland vegetation section. The number of new towers required for either option has not been determined. Even with construction of monopole-style towers or lattice towers, impacts on fish or fish habitat are unlikely because the towers would be placed outside of stream and associated riparian zone buffers. The existing maintenance road would be used, so no new roads, culverts, or stream crossings would be constructed. A SWPP plan and BMPs, including silt fences, straw bales, and

mulch, would be used as necessary during clearing of the corridor and construction of the tower pads to control erosion until the area can be stabilized with gravel or vegetation.

Overall, with implementation of the recommended mitigation measures and avoidance of stream and riparian habitat, impacts associated with the transmission line would not significantly affect fish or fish habitat.

Other Project Components

Aquatic resources with potential fish habitat are not located within the footprint of the other project components. Potential fish habitat is not located within about 0.5 mile of Access Road 3 or Laydown Area 4. Proposed wetland mitigation sites CMA 1 and CMA 2 are located adjacent to the forested riparian corridor of Terrell Creek. The WDFW Priority Habitats and Species database identifies the riparian corridor of Terrell Creek as priority habitat.

Construction activity associated with wetland mitigation sites CMA 1 and CMA 2 would not disturb fish or fish habitat associated with Terrell Creek. BMPs would be implemented to avoid and reduce impacts on fish habitat resulting from construction of the wetland mitigation sites.

Wetland enhancement and the creation of new wetlands associated with the proposed wetland mitigation sites CMA 1 and CMA 2, located adjacent to the forested riparian corridor of Terrell Creek, would increase the quality of habitat in vegetation communities near the riparian corridor of Terrell Creek.

Overall, with implementation of the recommended mitigation measures and avoidance of stream and riparian habitat, impacts associated with the other project components would not significantly affect fish or fish habitat.

Threatened and Endangered Species

As part of the project, several documents analyzed potential project impacts on federally listed threatened and endangered species. A BE was prepared, pursuant to the ESA, associated with the cogeneration facility, refinery interface area, and the other project components (BP 2003, Appendix H). A SEPA checklist and JARPA application was prepared for the transmission system corridor (ARCO Products Company 1999). An environmental resources report evaluated the transmission line component of the project (Appendix B).

Existing documentation and information from the USFWS, NOAA Fisheries, and WDFW were used to identify federal and state protected species that may use the proposed project site and to identify the presence of priority habitats near the proposed project site.

Based on an analysis and review of natural resource documents and information from natural resource agencies, no federal or state protected species regularly forage, breed, or occur within the

cogeneration facility, refinery interface area, transmission system corridor, or the other project components of the project site. Breeding or foraging habitat typically associated with federal or state protected species is not located within the area of these elements of the project. No breeding or foraging habitats associated with protected species would be affected by construction activities associated with these elements of the proposed project.

Custer/Intalco Transmission Line No. 2

No federal or state protected terrestrial species regularly forage, breed, or occur within the transmission line corridor. No breeding or foraging habitats associated with protected terrestrial species would be affected by construction activities associated with these elements of the proposed project.

Federal or state protected fish species may occur in the reaches of Terrell Creek, Fingalson Creek, and California Creek that flow through the transmission line corridor. As described above in the fisheries section, under the option to connect with the existing transmission line additional electrical equipment and wiring would be needed but new towers would not be constructed. No impacts on protected fish or fish habitat associated with construction of the transmission line would occur under this option. The existing maintenance road would be used, so no new roads, culverts, or stream crossings would be constructed.

The number of new towers required for either the monopole-style towers or lattice towers option has not been determined. Even with the construction of monopole-style towers or lattice towers, impacts on protected fish or fish habitat are unlikely because the towers would be placed outside of stream and associated riparian zone buffers. BMPs, including silt fences, straw bales, and mulch, will be used as necessary for clearing the corridor and construction of tower pads to control erosion until the area can be stabilized with gravel or vegetation.

Overall, with implementation of the recommended mitigation measures and avoidance of stream and riparian habitat, impacts associated with the transmission line would not significantly affect protected fish or fish habitat.

Operation

Upland Vegetation

Other than those communities affected by construction, operation of the project would not affect existing vegetation communities associated with the cogeneration facility, refinery interface, or the other project components. Long-term vegetation maintenance objectives would be implemented from guidance in a landscaping plan (Appendix E). A weed control program would be implemented during operation of the proposed facility (BP 2002, Section 3.6). Ornamental species or lawn may be planted near the facilities. Some areas currently dominated by noxious weed species may be converted to landscaped areas. These areas would require maintenance. The

establishment of noxious weed species may occur within the proposed site. These species would be controlled by procedures acceptable to the Whatcom County Noxious Weed Control Board.

Transmission System

Operation and maintenance associated with the transmission system corridor would include removing or topping trees to maintain a safe distance between the trees beneath the electrical lines. Existing access and maintenance roads associated with the transmission system corridor would be maintained to prevent vegetation from growing in these areas. Vegetation that becomes established in disturbed areas such as unpaved roads are often nonnative invasive species.

Custer/Intalco Transmission Line No. 2

Operation and maintenance measures associated with the transmission line corridor would be similar to those described above for the transmission system corridor. Since the transmission line is currently in operation, mowing, tree trimming, and road maintenance would be a continuation of current activity.

Wildlife and Habitat

Cogeneration Facility

Other than wildlife habitat affected by construction, operation of the proposed project is not expected to affect existing wildlife habitats associated with the cogeneration facility. Under the proposed project, adverse operational impacts on wildlife would be minor. Wildlife has coexisted with the BP Cherry Point Refinery for over 30 years. Noise levels associated with operation of the proposed project are expected to be consistent with current ambient noise levels. The cogeneration facility would not block wildlife movement corridors, because areas to the east would remain available for species use.

Refinery Interface

Potential impacts associated with operation of the refinery interface would be the same as those described for the cogeneration facility.

Transmission System

Transmission system operation and maintenance activities would include road grading and vegetation clearing, as described above for upland vegetation. Some wildlife habitat loss, noise, and disturbance could occur during maintenance activities. Impacts associated with maintenance would be similar to those associated with construction activities, but would not be as extensive.

Custer/Intalco Transmission Line No. 2

Transmission line operation and maintenance activities would be the same as those described for the transmission system, except that operation and maintenance of the transmission line would be a continuation of current activity.

Other Project Components

Potential impacts associated with operation of the other project components would be the same as those described for the cogeneration facility.

Fisheries

Operation activities associated with the proposed project that could affect fish or fish habitat include stormwater, water use, and wastewater. Potential impacts resulting from operation of the proposed project are unlikely due to the absence of streams within about 0.5 mile of the cogeneration facility, components of the refinery interface, or the transmission system corridor. Water resources within the area of these project components are limited to wetland habitat with no known fish use. Operation of the project would have negligible impacts on fish and fish habitat if proper drainage, erosion-control plans, and stormwater management practices are implemented. The proposed design approach, operational procedures, mitigation measures, BMPs, and other pollution prevention measures described in detail in Sections 2.2 and 3.3 would protect water quality associated with the proposed project and freshwater habitat downstream of the proposed project site.

Cogeneration Facility

The quantity and quality of stormwater runoff could be affected by operation of the cogeneration facility because of the increase in impervious surfaces, which could result in impacts on fisheries habitats downstream of the project site if not mitigated. Stormwater runoff associated with existing impervious surfaces within the BP Cherry Point Refinery are currently routed to treatment facilities and detention ponds prior to being discharged to mitigation wetlands north of Grandview Road. Drainage ditches associated with these wetlands eventually connect with Terrell Creek, about 0.5 mile from the project site. Stormwater from new impervious surfaces associated with the cogeneration facility would be collected and diverted into detention and treatment facilities. Treated stormwater would be discharged to the existing wetland drainage system as part of the wetland mitigation. No component of the proposed project would be built near Terrell Creek, and no storm or other surface water would be discharged directly to it.

A Construction SWPP plan would be developed in accordance with BMPs and would detail the sediment and erosion control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality. These may include such things as silt fencing and hay bales,

and placement of polyethylene tarps to cover exposed surfaces. Control of fuel storage and equipment fueling operations for spill prevention and control would be detailed in the SWPP plan. Stormwater impacts and management are discussed in additional detail in Section 3.4, Water Quality.

Based on the mitigation methods that would be implemented and the distance between the proposed project and the stream, effects on fish or fish habitat associated with stormwater runoff are unlikely.

Contaminated industrial process wastewater associated with the proposed project would be discharged to the Strait of Georgia via the BP Cherry Point Refinery's wastewater treatment system. The Nooksack River is the source of industrial process water for the project. The Whatcom County PUD would pipe water from the Nooksack River to the site, either from once through non-contact cooling water from a jacketed air compressor at the Alcoa Intalco Works facility if that facility is operational, or directly from the river. Water quality parameters of once through non-contact cooling water are presented in Table 3.4-1. Cogeneration facility wastewater would be treated and combined with the refinery's wastewater and discharged through the NPDES-permitted (WA-002290-0) Outfall 001. Table 3.4-4 in Section 3.4 presents the flows and chemical composition of the project's wastewater, except for sanitary wastewater. Net process wastewater from the cogeneration facility to the refinery wastewater treatment plant would be approximately 190 gpm, assuming 15 cycles of concentration in the cooling tower. Table 3.4-5 presents a numerical analysis of the potential impact of the project wastewater on the refinery's wastewater stream. The impact analysis is based on the average discharge from the refinery over the months of July, August, and September 2001. Because the volume of wastewater is small and contains very low levels of contaminants, it would have little to no effect on the quality of water discharged.

Treated wastewater associated with the NPDES permitted outfall is not likely to significantly affect Puget Sound habitat that supports a variety of aquatic species such as salmon, other fish, shellfish, and other marine wildlife.

Sanitary waste from cogeneration facility employees would be collected and routed for treatment by the Birch Bay WWTP via the refinery's sanitary wastewater system. The estimated amount of sanitary waste generated by the cogeneration facility is between 1 and 5 gpm. The Birch Bay Water and Sewer District has confirmed that it has the capacity to accommodate the incremental combined loading to its sanitary sewage wastewater treatment system from the refinery and the proposed cogeneration facility. The Birch Bay WWTP would treat the refinery and cogeneration facility sanitary wastes before discharge to the Strait of Georgia. The quantity of sanitary waste that would be generated by the cogeneration facility is not expected to impact receiving water quality in the Strait of Georgia.

Refinery Interface

Stormwater runoff associated with impervious surfaces of the refinery interface components would be treated for water quality and quantity as described above for the cogeneration facility. Potential stormwater impacts associated with operation of the refinery interface would be the same as those described for the cogeneration facility.

Transmission System

Maintenance and operation activities associated with the transmission system could result in chemical spills that could affect fish habitat. A SWPP plan for maintenance procedures, in conjunction with the SPCC plan, would provide structural, operational, and erosion/spill control BMPs for all maintenance activities. The transmission system access roads and tower pads allow stormwater infiltration to occur and would not substantially increase the amount of stormwater runoff over existing conditions.

Custer/Intalco Transmission Line No. 2

Maintenance and operation activities associated with the transmission line could result in chemical spills that could affect fish habitat. This element of the project would be owned and operated by the Bonneville Power Administration. Bonneville has a SWPP plan for maintenance procedures, in conjunction with a SPCC plan that would provide structural, operational, and erosion/spill control BMPs for all maintenance activities on the transmission line.

Overall, transmission line operation and maintenance would be a continuation of current activities. Impacts associated with operation and maintenance of the transmission line with implementation of the recommended mitigation measures and avoidance of stream and riparian habitat, would not significantly affect fish or fish habitat.

Other Project Components

Stormwater runoff associated with Access Road 3 would be treated for water quality and quantity as described above for the cogeneration facility. Laydown Area 4 would not be converted to impervious surfaces and would be restored and enhanced following construction with native grass, shrub, and forested vegetation (Appendix E).

Operation activity associated with wetland mitigation sites CMA 1 and CMA 2 would not disturb fish or fish habitat associated with Terrell Creek. A reed canarygrass control program has been developed to remove and control this invasive species within the mitigation areas, which would benefit the riparian habitat of Terrell Creek.

Overall, with implementation of the recommended mitigation measures and avoidance of stream and riparian habitat, operation impacts associated with the other project components would not significantly affect fish or fish habitat.

Threatened and Endangered Species

No federal or state protected species regularly occur within the cogeneration facility, refinery interface area, transmission system corridor, or the other project components of the project site. Operation impacts on protected species are not likely. Treated wastewater associated with the NPDES-permitted outfall is not likely to have a significantly adverse impact on Puget Sound habitat that supports species such as chinook and coho salmon.

Custer/Intalco Transmission Line No. 2

No federal or state protected terrestrial species regularly forage, breed, or occur within the transmission line corridor. No breeding or foraging habitats associated with protected terrestrial species would be affected by operation activities associated with this component of the proposed project.

Federal or state protected fish species may occur in the reaches of Terrell Creek, Fingalson Creek, and California Creek that flow through the transmission line corridor. As described above in the fisheries section, with implementation of the recommended mitigation measures and avoidance of stream and riparian habitat, operation impacts associated with the transmission line would not significantly affect protected fish or fish habitat.

3.7.3 Impacts of No Action

Under the No Action Alternative, new facilities would not be constructed at the site. Impacts on upland vegetation, wildlife and habitat, fisheries, and threatened and endangered species associated with the proposed project would not occur. No impacts or construction would occur that would entail removal or alteration of existing habitat within the proposed project site.

Proposed wetland enhancement and the creation of new wetlands would not occur. Withdrawal from the Nooksack River would not change. Industrial wastewater from the Alcoa Intalco Works would continue to be discharged to marine waters while the smelter was operating.

3.7.4 Secondary and Cumulative Impacts

The proposed project site is zoned as Heavy Impact Industrial by Whatcom County, and is located within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone as defined in the Whatcom County Comprehensive Plan (Whatcom County 1997, as amended). The BP Cherry Point Refinery is adjacent to the proposed project site. A variety of industrial

facilities such as Alcoa Intalco Works, an aluminum smelter, and the Conoco-Phillips Refinery, are located within a few miles of the proposed project site.

The loss of approximately 33 acres of upland vegetation from the project site would not result in significant adverse cumulative impacts to wildlife habitat of the area. Wildlife habitats within the proposed project site are not unique or valuable relative to the native forested communities that existed in the area prior to land use conversion.

As part of the proposed enhancement associated with the project, existing ponds and wetland mitigation areas would be connected through corridors to the enhanced wetland area. These measures would increase habitat quality, benefit wildlife species that currently use the area, and likely attract a more diverse assortment of wildlife species.

The proposed Georgia Strait Crossing project, as described in Section 3.10, is anticipated to be constructed concurrently with the proposed project. At this time, the County envisions additional growth and development in the area of the proposed project. Impacts associated with these future projects would generally be similar to the type of cumulative impacts on wildlife and associated habitat as described for the proposed project. Aquatic resources within the boundaries of the proposed Georgia Strait Crossing project would include Terrell Creek and Puget Sound. The proposed project would not contribute to potential cumulative impacts on fish or fish habitat because impacts to aquatic resources are not anticipated under the proposed project.

Additional development projects anticipated to occur in the project vicinity in future years would contribute to cumulative impacts to wildlife, fish, and associated habitat. Because of the zoning status, development options are limited to industrial use and would be consistent with zoning requirements and regulations. The proposed project would not directly cause development or serve as a mechanism to enable it. The extent of cumulative impacts on wildlife and habitat associated with the proposed project would depend on the location, nature, and scale of current and planned future development projects in the region.

The addition of the proposed project would add impervious surfaces to the watershed and create stormwater runoff. Stormwater runoff would be contained and treated before entering mitigation wetlands. The proposed project would not result in significant adverse cumulative impacts on fish or fish habitat in the region.

No breeding or foraging habitats associated with listed threatened and endangered species would be affected by the proposed project. The proposed project would not result in significant adverse cumulative impacts on listed threatened and endangered species.

3.7.5 Mitigation Measures

Much of what would typically be considered mitigation for impacts is inherent in the project design, and is discussed in greater detail under the impacts discussion above.

BMPs would be implemented to protect upland vegetation communities within the proposed project site that are not disturbed during construction. Native vegetation, including seed mixes with native grasses, would be used to replace vegetation, particularly areas infested by weedy species that are disturbed due to construction activities. A landscaping plan would be prepared and implemented that includes long-term weed control measures. To minimize and control the spread of noxious weed species, all equipment would be cleaned before leaving the site.

A portion of Laydown Area 2, about 4.66 acres, would be restored following construction as part of the wetland mitigation proposal. The entire 4.74-acre area of Laydown Area 4 would be restored. The restoration of Laydown Area 4 would include 2.9 acres of wetland (0.5 acre) and upland (2.4) restoration and creation within the cogeneration facility fenceline. The other 1.8 acres of Laydown Area 4 would include restoration of upland habitat outside the fenceline. These restored areas would provide wetland, upland, wildlife habitat, and a visual buffer between the proposed project and Grandview Road. As part of the proposed enhancement associated with the proposed project, existing ponds and wetland mitigation areas would be connected through corridors to the enhanced wetland area. Replacing invasive, non-native vegetation such as reed canarygrass and Himalayan blackberry with native grass, shrub, and tree vegetation would increase habitat quality and diversity, which would benefit wildlife species that currently use the area. High-quality native vegetation communities could attract a more diverse assortment of wildlife species. See Section 3.5 for additional details of mitigation measures recommended for wetlands. Detailed information associated with proposed mitigation measures is provided in the *Revised Cogeneration Project Compensatory Mitigation Plan* and the *May 22, 2003 Addendum: Changes to Revised Cogeneration Project Compensatory Mitigation Plan* (Appendix E).

Fish habitat is not located within 0.5 mile of construction and operation activities associated with the cogeneration facility, the refinery interface, or the transmission system corridor. Wetland enhancement and the creation of new wetlands associated with the proposed wetland mitigation sites CMA 1 and CMA 2, located adjacent to the forested riparian corridor of Terrell Creek, would increase habitat quality of vegetation communities near the riparian corridor of Terrell Creek. Construction and operation activities would avoid stream channels within the transmission line corridor. Water resources that could be affected by the proposed project are limited to wetlands with no known fish use.

Water quality-related design guidelines and other forms of mitigation would be required to comply with various federal, state, and local permit requirements. Conditions of permits or government approvals include erosion- and sediment-control plans, stormwater management plans, and BMPs (e.g., mulching, hydroseeding, check dams, biofiltration swales, phased clearing, silt fencing, and sediment ponds). These mitigation requirements are expected to prevent significant impacts on water quality from construction and operation of the proposed project. Stormwater and runoff increases due to increases in impervious surface area would be contained in stormwater detention ponds and then treated before being discharged into wetland mitigation sites.

Wastewater associated with the project would be retained, treated, and monitored prior to discharge. Water quality impact mitigation would primarily be addressed by development and implementation of construction and operation SWPP plans that include erosion and sedimentation control plans and SPCC plans. A required State Waste Discharge Permit and Fact Sheet for construction and operation of the project is currently under development by EFSEC. The permit and fact sheet would outline water quality and quantity effluent limitations, required treatment strategies, and performance standards. BMPs would detail the sediment and erosion control measures and accidental spill prevention and control measures. The BMPs would be implemented, inspected, and maintained to minimize the potential for adversely affecting downstream water quality. BMPs may include silt fencing and hay bales, and placement of polyethylene tarps to cover exposed surfaces. Control of fuel storage and equipment fueling operations for spill prevention and control would be detailed in the SWPP plan. A more detailed discussion of potential permit requirements, construction BMPs, and stormwater treatment pertaining to potential water quality impacts is presented in Section 3.4, Water Quality.

Potential impacts on migratory birds may be mitigated through a variety of measures. USFWS has developed guidelines to aid in the reduction of fatal bird collisions with prominent structures, including HRSG stacks. The primary mitigation measure applicable to the proposed project is to use best engineering practices to construct the transmission towers at the minimum height allowable with no guy wires or lighting, to avoid impacts to birds. The transmission lines and tower design would be defined by the Bonneville interconnection agreement.

In addition, the HRSG exhaust stacks would not be lighted. Studies performed on Ontario Hydro's two HRSG stacks suggest that the use of lights on HRSG exhaust stacks actually attracts birds and may increase fatalities (BP 2002, Section 3.6).

3.7.6 Significant Unavoidable Adverse Impacts

With implementation of the recommended mitigation measures and avoidance of sensitive areas such as stream and riparian corridors, no significant unavoidable adverse impacts on upland vegetation, wildlife and habitat, fish, and threatened and endangered species are identified. The proposed project would be located adjacent to a facility with associated human-related disturbance that has been operating for more than 30 years. Vegetation communities that provide habitat for wildlife would be cleared, but that vegetation is generally of low quality. Proposed wetland and upland creation and restoration efforts would create higher quality habitat that is likely to attract a more diverse variety of native wildlife species than currently occupy the project site. Fish habitat is not located within about 0.5 mile of the footprint of the cogeneration facility, the refinery interface, or the transmission system corridor. Wetland mitigation sites CMA 1 and CMA 2 would enhance habitat adjacent to the riparian corridor of Terrell Creek. Construction and operation activities would avoid stream channels within the transmission line corridor. Breeding and foraging habitat typically associated with federal and state protected species or listed threatened and endangered species would not be disturbed under the proposed project.

3.8 ENERGY AND NATURAL RESOURCES

This section discusses the anticipated energy and natural resources use of the proposed project, the sources and availability of energy for the cogeneration facility, the facility's impacts on energy and natural resources, and mitigation measures to be implemented. The analysis in this section is primarily based on information provided by the Applicant in the ASC (BP 2002, Section 3.8). Where additional information has been used to evaluate the potential impacts associated with the proposal, that information has been referenced. Information regarding water use and conservation is presented in Sections 3.3 and 3.4.

3.8.1 Existing Conditions

Energy Resources

Existing energy resources within the project vicinity primarily include electricity, natural gas, and a variety of petroleum products, including gasoline, diesel fuel, and lubricating oils. Figure 2-3 presents the existing electrical and natural gas infrastructure in the project vicinity.

Electricity

Project Area

Sources of electricity in the project vicinity include power provided by Puget Sound Energy (PSE) and Bonneville.

Two power plants are in the vicinity of the BP Cherry Point Refinery: the PSE Point Whitehorn Power Generation Plant and the Tenaska Cogeneration Plant. The PSE Point Whitehorn Plant is just west of the refinery. This 150-MW power plant can be fired by natural gas, diesel, or jet fuel and is primarily used to provide power during peak demand periods. Tenaska Power Partners operates a 249-MW gas-fired cogeneration power plant at the Conoco-Phillips Refinery, located a few miles south of the BP Cherry Point Refinery. A third power plant, the Sumas Energy 2 (SE2) project, is a 660-MW natural gas-fired power plant proposed in Sumas, Washington, approximately 25 miles east of the proposed cogeneration site. The SE2 plant has been permitted, but not yet constructed.

Electricity is supplied to the refinery by PSE through two 115-kV transmission lines that are routed within easements adjacent to Aldergrove and Blaine roads. The power lines enter the refinery area adjacent to Blaine Road and connect to a substation within the refinery boundaries.

Bonneville owns a substation at Custer, Washington (approximately 4 miles northeast of the refinery), from where two 230-kV transmission lines are routed west and then south to the Intalco substation at the Alcoa Intalco Works aluminum smelter. The Applicant has proposed the construction of a 0.8-mile-long 230-kV electrical transmission line (referred to throughout this EIS as the "transmission system") to provide a connection between the cogeneration facility and the Custer/Intalco Transmission Line No. 2.

In 1999, an earlier version of the transmission system was proposed by the Applicant to provide a means for supplying the refinery and other industrial customers in the area with electrical power from the Bonneville transmission system. That proposal received federal wetland permit and water quality certification approvals and has been partially constructed (two transmission line maintenance roads and three transmission tower gravel pads).

The transmission system element of the current cogeneration project proposal, which would supersede the original transmission line proposal, would use a portion of the original permitted transmission line design. Instead of using the new transmission line to supply power to the refinery and other customers from the Bonneville transmission system, the transmission line would normally be used to export power generated by the cogeneration facility to the Bonneville transmission system for distribution within the western power market. See Section 2 for additional discussion of the transmission system.

Northwest Region

Regional Demand. Based on data published by the Northwest Power and Conservation Council (NWPCC), electricity demand for the Council's four-state Pacific Northwest planning region (Washington, Oregon, Idaho, and Montana) was 20,080 average megawatts in 2000 (NWPCC 2003).

As shown below in Table 3.8-1, the Council's recently revised 20-year demand forecast projects that electricity demand in the region will grow from 20,080 average megawatts in 2000 to 25,423 average megawatts by 2025 (medium forecast), an average annual growth rate of just less than 1% per year. While the Council's forecast indicates that the most likely range of demand growth (between the medium-low and medium-high forecasts) is between 0.4 and 1.50% per year, the low to high forecast range used by the Council recognizes that growth as low as -0.5% per year, or as high as 2.4% per year, is possible although relatively unlikely (NWPCC 2003).

Table 3.8-1: Projected Pacific Northwest Electricity Demand, 2000-2025

Forecast Scenario	Electricity Demand (Average Megawatts)			Growth Rates (Percent Change)	
	2000	2015	2025	2000-2015	2000-2025
Low	20,080	17,489	17,822	-0.92	-0.48
Medium Low	20,080	19,942	21,934	-0.05	0.35
Medium	20,080	22,105	25,423	0.64	0.95
Medium High	20,080	24,200	29,138	1.25	1.50
High	20,080	27,687	35,897	2.16	2.35

Source: NWPCC 2003

Bonneville Transmission System. Bonneville owns and operates 15,000 miles of power lines that carry power from the dams and other power plants to utility customers throughout the Pacific Northwest. The Bonneville service area includes Oregon, Washington, Idaho, western Montana, and small portions of Wyoming, Nevada, Utah, California, and eastern Montana.

Generation resources typically require interconnection with a high-voltage electrical transmission system for delivery to purchasing retail utilities. Bonneville owns and operates the FCRTS, comprising more than three-fourths of the high-voltage transmission grid in the Pacific Northwest, including extra regional transmission facilities. Bonneville operates the FCRTS in part to integrate and transmit “electric power from existing or additional Federal or non-Federal generating units.” Interconnection with the FCRTS is essential to deliver power from many generation facilities to loads both within and outside the Pacific Northwest.

Public agencies get preference to power from Bonneville. About half the power Bonneville sells goes to Northwest public utility districts, city light departments, and rural electric cooperatives. An additional 15% of Bonneville's annual sales is to investor-owned utilities. Sales to Northwest aluminum companies and a few other large industries account for about one-fourth of Bonneville's annual revenues. After Northwest customers are served, Bonneville sells any surplus power to utilities outside the region.

System Constraints. Bonneville has indicated that portions of the Northwest transmission system are approaching gridlock, resulting in chronic congestion on a number of critical transmission paths, which has curtailed firm power deliveries. One effect of these constraints is that they limit wholesale power trading, which in turn drives up prices for all consumers in the West. As of 2001, approximately 1,000 MW of generation projects under construction had contracted for wheeling (transferring power) over the Bonneville system. An additional 3,000 MW of new generation is proposed by 2004, and developers for nearly 30,000 MW of generation have requested interconnection. While many of the proposed generation projects will not be built, Bonneville has determined that a transmission capacity shortfall of approximately 3,000 MW will occur by 2004 (Bonneville 2001d).

Planned Generation Projects. As of April 2003, there were 39 new merchant power generation projects proposed in the State of Washington, representing in excess of 10,000 MW of additional generation capacity (see Table 3.8-2). While not all of these will be constructed, it is likely that additional generation capacity will continue to be added in the Northwest during the next two to three years. In 2002, over 1,100 MW of additional capacity has become operational in the region, with gas-fired facilities comprising a majority of the newly installed capacity (see Table 3.8-3). Table 3.8-4 lists four additional plants currently under construction in Washington with their expected commercial operation dates (PSE 2003).

Table 3.8-2: Proposed Generation Projects in Washington

Facility	Developer	Facility Type	Size (MW)
Bickleton	PacifiCorp Power Marketing, Inc.	Wind	200
Big Horn	PacifiCorp Power Marketing, Inc.	Wind	200
BP Cherry Point Refinery	BP Cherry Point Refinery	Combined Cycle/Cogen	720
Columbia River 1	Nordic Electric, Llc	Combust Turbine	100
Columbia River 2	Nordic Electric, Llc	Combust Turbine	100
Cowlitz Cogeneration	Weyerhaeuser Co.	Combined Cycle/Cogen	405
Darrington	National Energy Systems Co.	Boiler/Cogen	15
Everett Delta Power Project	FPL Energy, Inc.	Combined Cycle	248
Frederickson (USGECO)	PG&E Generating Co.	Combust Turbine	100

Table 3.8-2: Continued

Facility	Developer	Facility Type	Size (MW)
Frederickson (Tahoma)	Tahoma Energy	Combined Cycle	270
Frederickson 2	EPCOR	Combined Cycle	290
Goldendale Smelter	Westward Energy Llc	Combined Cycle	300
Horse Heaven	Washington Winds Inc.	Wind	150
King County Fuel Cell Plant	Fuel Cell Energy Inc	Other	1
Kittitas Valley	Sagebrush Power Partners (Zilkha)	Wind	250
Klickitat	Columbia Wind Power	Waste	80
Longview (MIR)	Mirant Corp.	Combined Cycle	286
Moses Lake	National Energy Systems Co.	CC/Cogen	306
Plymouth Energy LLC	Plymouth Energy Llc	Combined Cycle	306
Port Of Washington	Continental Energy Services, Inc.	Combust Turbine	290
Rainier	National Energy Systems Co.	Combined Cycle	306
Richland (COMPOW)	Composite Power Corp.	Combust Turbine	2600
Roosevelt (SEENGR)	SeaWest Energy Group, Inc.	Wind	150
Roosevelt Landfill	PUD No. 1 of Klickitat County Intern	Combustion	13
Seattle (Globaltex)	Globaltex Industries Inc.	Coal	249
Six Prong	SeaWest Energy Group, Inc.	Wind	150
Stateline Wind Project (Wash)	FPL Energy, Inc.	Wind	40
Sumas Energy 2, Inc.	Sumas Energy 2, Inc.	Combined Cycle	530
Sumas Energy 2, Inc.	Sumas Energy 2, Inc.	Duct Firing	130
Sumner (PG&E)	PG&E Dispersed Generating Co.,	Combust Turbine	87
Tacoma (Mscg)	Morgan Stanley Capital Group, Inc.	Combust Turbine	324
Underwood	PacifiCorp Power Marketing, Inc.	Wind	70
Waitsburg	SeaWest Energy Group, Inc.	Wind	50
Wallula	Newport Northwest	Combined Cycle	1000
Wallula	Newport Northwest	Duct Firing	300
Washington (Elcap)	El Cap I	Combust Turbine	10
Wild Horse Wind Power	Wind Ridge Power Partners (Zilkha)	Wind	250

Source: PSE 2003; Makarow, pers. comm., 2003

Table 3.8-3: Washington/Oregon Generation Facilities Online in 2002

Facility	Developer	Facility Type	Size (MW)	On-Line Date
Boulder Park	Avista Corp	Intern Combust	25	5/31/2002
Centralia (TRAENE)	TransAlta Energy Corp.	Comb Cycle	248	8/12/2002
Frederickson Power	Frederickson Power (EPCOR)	Comb Cycle	248	8/19/2002
Hermiston	Calpine	Comb Cycle	630	6/1/2002
Klondike	Northwest Wind Power	Wind	25	4/30/2002
Nine Canyon Wind Project	Energy Northwest	Wind	50	9/25/2002

Source: PSE 2003

Table 3.8-4: Washington Generation Facilities Currently Under Construction

Facility	Developer	Facility Type	Size (MW)	On-Line Date
Chehalis Power Station	Tractebel Power, Inc.	Comb Cycle	520	Qtr. 3/2003
Coyote Springs 2	Avista	Comb Cycle	260	Qtr. 3/2003
Goldendale	Calpine Corp.	Comb Cycle	248	Qtr. 2/2004
Satsop CT Project	Duke Energy	Comb Cycle	650	Construction Suspended

Source: PSE 2003

Planned Transmission Projects. Bonneville has determined that there is a need to upgrade portions of the Northwest transmission grid, and has identified nine high priority projects in Washington and Oregon that would improve Bonneville's ability to maintain reliable service to loads, integrate new generation, and restore or enhance transfer capability across key transmission paths. While none of the projects is in Whatcom County, three projects (G1, G6, and G8) would address north-south transmission capacity along the I-5 corridor. The identified priority projects are summarized below (from Bonneville 2001d).

- G1. Kangley - Echo Lake 500 kV line
 - Build approximately 9 miles of new 500-kV line from Echo Lake to a point on the Schultz-Raver 500-kV line (near the community of Kangley).
 - Move the existing Monroe-Sammamish-SnoKing 230-kV tap to the Monroe-Echo Lake 500-kV line and add a new 500/230-kV transformer at SnoKing.
 - Tap the Bothell-Sammamish 230-kV line into SnoKing.
 - Remove the Horse Ranch tap from the Monroe-Snohomish 230-kV lines and reterminate the Horse Ranch line directly to the Snohomish 230-kV bus.
 - Reconfigure Bothell substation to add fifth bus section.
 - Add another transformer bank in the Puget Sound area in 2005-2006. Possible locations are Covington or Maple Valley.
- G6. Schultz series capacitors
 - Add two 500-kV series capacitors at Schultz substation in the Schultz-Echo Lake #2 and Schultz-Raver #1 500-kV lines.
- G8. Monroe - Echo Lake 500 kV line
 - Construct approximately 32 miles of a new single-circuit 500-kV line between Bonneville's Echo Lake substation and Monroe substation.
 - Add terminal facilities at Monroe and Echo Lake substations to terminate the new line.
 - To meet the Western System Coordinating Council reliability criteria for simultaneous multiple-circuit outages, it is recommended that this line be constructed on a separate ROW, at least 1,200 feet from the existing 500-kV ROW.

Natural Gas

Transmission Facilities

Approximately 80% of the natural gas used in the Northwest comes from Canada. Natural gas exported from Canada to the Northwest and other western states uses either the Duke Energy, Inc. pipeline that transports gas through British Columbia to the border at Sumas, Washington, or through Alberta on the Alberta Natural Gas Pipeline (TransCanada) to the border at Kingsgate, British Columbia. Two interstate natural gas transmission pipelines, the Northwest Pipeline operated by the Williams Company and the Gas Transmission, Northwest (GTN) Pipeline operated by PG&E National Energy Group (PG&E), supply natural gas to the Pacific Northwest

and other western states from Canada and the Rocky Mountain region. The two transmission lines interconnect just south of the Washington border near Hermiston, Oregon. Natural gas from either pipeline can be delivered to any point in the state currently served by a natural gas distribution system (Washington State Office of Trade and Economic Development [OTED] 2001a).

Northwest Pipeline. The Northwest Pipeline Corporation (a subsidiary of Williams Company) owns and operates a natural gas transmission system from interconnections with El Paso Natural Gas Company and Transwestern Pipeline Company near Blanco, New Mexico. Northwest Pipeline can deliver gas to northwest Washington from both the Rocky Mountains and Canada. The Northwest Pipeline connects with West Coast Energy and Sumas International Pipeline near the Canadian border in Sumas. The pipeline is a bi-directional pipeline that relies on a combination of physical and displacement capacity to meet firm contract commitments. Northwest Pipeline is a one-third owner of the Jackson Prairie Storage Project in Lewis County, Washington, and also owns and operates the Plymouth LNG facility in Benton County, Washington, both used by Northwest Pipeline to provide contract storage services. Northwest Pipeline also has contracted for underground natural gas storage capacity from Questar in the Clay Basin Field in Utah (OTED 2001b). Total firm delivery capacity of the Northwest Pipeline at the receipt point is 2,580 MDth/day (million decatherms per day).

Capacity on Northwest Pipeline is fully subscribed, although some capacity is sold under short-term arrangements. Because of the design and physical capacity of the system, under certain conditions capacity on the system becomes constrained and displacement must be used to meet contract demand (OTED 2001b).

Gas Transmission, Northwest Pipeline. The GTN pipeline is owned and operated by PG&E, a subsidiary of PG&E Corporation, which also owns Pacific Gas and Electric Company of San Francisco. The GTN pipeline is routed across the southeast corner of the state, interconnecting with TransCanada at Kingsgate, British Columbia; Northwest Pipeline at Spokane and Palouse, Washington, and Stanfield, Oregon; and Pacific Gas and Electric Company and Tuscarora Gas Transmission Company at Malin, Oregon (OTED 2001b). GTN also connects with Avista Utilities and Cascade Natural Gas. The GTN pipeline is a dual pipeline system consisting of approximately 630 miles of 36-inch-diameter gas transmission pipeline, and approximately 590 miles of 42-inch transmission pipeline. The GTN natural gas transmission pipelines can transport a total of 2,700 MDth/day to the Pacific Northwest, of which more than 1,800 MDth/day can be sent on to California and Nevada. In 2000, typical deliveries to the Pacific Northwest from the GTN system averaged 522 MDth/day in the winter and 300 MDth/day in the summer (OTED 2001b).

GTN has 2,732 MDth of firm transportation capacity under contract, or 100% of its nominal transportation capacity. Nearly all of these contracts have expiration dates in 2005 or later. The majority of gas transported by large customers like Pacific Gas & Electric Company is passing through the GTN system en route to California. The exceptions are Avista Corporation, Northwest Natural Gas Company, Puget Sound Energy, Pan-Alberta Gas (US), Inc., PanCanadian Energy Services, Duke Energy, and Chevron USA Inc., all of which deliver to points in Washington and Oregon (OTED 2001b).

Ferndale Pipeline. Within the Cherry Point industrial area, the Applicant and Alcoa jointly own the proprietary Ferndale gas pipeline that transports natural gas from the Sumas gas-trading hub to the BP Cherry Point Refinery and the Alcoa Intalco Works aluminum smelter. Arco and Alcoa constructed the Ferndale pipeline in 1990 to provide natural gas service to the BP (formerly Arco) Cherry Point Refinery and the Alcoa Intalco Works facility. The 16-inch pipeline extends for approximately 31 miles.

The Ferndale pipeline has a nominal design capacity of approximately 104 million standard cubic feet per day, or approximately 104,000 decatherms per day (Dth/d), with a supply pressure of 500 psig at Sumas and a minimum delivery pressure of 350 psig at Cherry Point. Current demands on the Ferndale pipeline typically range from approximately 6,000 to 38,000 Dth/day, with average demand typically in the 15,000 to 20,000 Dth/day range. An 8-inch lateral line continues south from the BP Cherry Point Refinery to supply Alcoa Intalco Works (Torpey, pers. comm., 2002).

Cascade Natural Gas Pipeline. Cascade Natural Gas owns a second distribution pipeline in the Cherry Point industrial area that parallels Grandview Road adjacent to the refinery and provides gas to the PSE Point Whitehorn generation facility. This pipeline previously transported natural gas to the refinery until the Ferndale pipeline was constructed in 1990.

Georgia Strait Crossing Pipeline (Proposed). A third natural gas pipeline has been proposed within the Cherry Point industrial area. BC Hydro and the Williams Company have formed a joint venture to construct the GSX pipeline. The proposed project would include 32 miles of 20-inch pipeline from an interconnection station at Sumas, Washington, to a new compressor station to be constructed near Cherry Point. From the compressor station, approximately 53 miles of 16-inch onshore and offshore pipeline would be constructed to extend the pipeline to Vancouver Island, British Columbia. Within the immediate cogeneration project vicinity, the proposed pipeline corridor runs east-west along the north side of Grandview Road and would connect to a new compression station to be constructed on the west side of Jackson Road. From there, the pipeline would run south to the Strait of Georgia along the west side of Jackson Road.

The proposed pipeline would provide natural gas to Vancouver Island, and would have an initial design capacity of 95,700 Dth/d. Although providing natural gas to customers in Whatcom County is not specifically part of the GSX proposal, the project would include the installation of a tap valve assembly at the Cherry Point compression station to facilitate the potential future addition of a major industrial customer in the area (FERC 2002). See Section 3.10.5 for additional discussion of this planned project.

Transmission System Outlook. A 2001 survey of the Pacific Northwest natural gas industry prepared by the OTED concluded that the natural gas transmission system supplying Washington State is severely constrained. Among its findings, the report noted:

- The Northwest and GTN pipelines are currently operating at or near their capacity;
- There is no firm capacity available and as the load factor on the pipelines grow, the availability of non-firm capacity is likely to be limited;

- The existing pipelines are not sized to meet large new demands for natural gas;
- Demand for gas has increased at a much faster rate than expected by pipeline companies and major shippers largely because of greatly increased use of natural gas for electric generation necessitated by higher electric demand and lower hydroelectric production;
- Recent price volatility and large price differentials at various points on pipelines serving West Coast markets have demonstrated that even the existing level of gas consumption for electric generation during low water years is not sustainable with current infrastructure; and
- Meeting new demand will require major investments in pipeline capacity (OTED 2001b).

However, the report also noted that pipeline expansion activities are under way, and that these expansions will likely ease some of the constraints on the existing pipelines. The report concluded that expansions on upstream pipelines such as TransCanada and Westcoast would be required to bring additional Canadian gas supplies to the region.

Transmission System Expansion Projects. Interstate natural gas providers serving Washington have identified plans for expansion of their transmission facilities to meet current and future demand in the region. These planned projects are listed in Tables 3.8-5 and 3.8-6.

Table 3.8-5: Northwest Pipeline/Williams Expansion Plans

	Capacity (MDth/day)	Cost (million \$)	Compression (horsepower)	New Pipe (miles)	Service Commencement
Columbia Gorge Expansion	50	35.5	14,600	6	Completed Nov. 1, 1999
Sumas to Chehalis Expansion	224	N/A	N/A	N/A	June 2003
Opal to Stanfield Displacement Replacement	175	125	24,000	90	Nov. 2003
Georgia Strait Pipeline	94	159	9,400	85	Nov. 2003
Grants Pass Lateral Expansion	136	64.9	14,300	45.4	Project postponed

Source: OTED 2001b

Table 3.8-6: GTN Pipeline Expansion Plans

	Capacity MDth/day	Cost (million \$)	Compression (horsepower)	Pipeline (miles)	Timeline
2002 Expansion – Kingsgate to Malin	200	115	75,000	21 (looping)	June 2002
2003 Expansion – Kingsgate to Malin (depends on interest)	200-500 TBD	-- TBD	-- TBD	-- Late 2003	-- --
Phase 2 – Vantage Pipeline	300-500 (speculative)	More than Phase 1	Much less than Phase 1	260-270 (new)	2004
Phase 3 – Alaskan and MacKenzie Delta Pipeline	6,000 – 7,000	unknown	unknown	unknown	2008

Source: OTED 2001b

Canadian Expansion Plans

Expansion of the GTN and Northwest pipelines would not result in additional ability to deliver gas to consuming areas in Washington unless pipeline capacity from producing fields in northern British Columbia and Alberta to interconnection points at Sumas and Kingsgate is also expanded. At least two options for expanding this capacity are under consideration.

Westcoast Pipeline. Westcoast has identified approximately 300 MDth/day of additions on its main line from the British Columbia gas fields to Sumas. These would involve a slightly higher delivery rate than the current pipeline transportation tariff. In February 2001, Westcoast announced that shippers had fully renewed all firm service on its Southern mainline transportation facilities. This means that all available annual contractible firm service on Westcoast's mainline north of Compressor Station 2 (with the exception of certain facilities in the Fort St. John area) and on Westcoast's Southern mainline from Compressor Station 2 to Sumas are fully contracted on a firm basis. Westcoast is now assessing options for expanding capacity on its Southern mainline to meet growing demand in traditional markets and new gas-fired generation in the Pacific Northwest.

Southern Crossing/IPC Pipeline. BC Gas is planning an extension of its existing Southern Crossing Pipeline to Sumas. The Southern Crossing Pipeline, completed in November 2000, connects the TransCanada system to the BC Gas distribution system in the southern interior of British Columbia. The current capacity is 250 MDth/day, which is used to displace capacity on Westcoast, which formerly served the southern interior areas.

The project would involve 150 miles of 24-inch pipe and additional compression, and would bring up to 350 MDth/day of new capacity to Sumas. The project is expected to cost around \$300 million (U.S.), resulting in a transportation toll of approximately 34 cents per MMBtu. BC Gas is currently in discussion with TransCanada about a matching expansion of that system upstream of the interconnection point at Yahk, British Columbia. BC Gas is targeting an in-service date of November 2003.

Natural Gas Supply

In 2001, total demand for natural gas in the U.S was approximately 22.7 trillion cubic feet (tcf). Between 2001 and 2025, annual natural gas demand in the West (including Alaska, western Canadian and most of the offshore Gulf of Mexico) is projected to increase by 2.1 tcf. The U.S. Energy Information Administration estimates that national demand will increase by an average annual rate of 1.8% between 2001 and 2025, resulting in an annual consumption of 34.9 tcf by 2025 (U.S. Energy Information Administration 2003).

Projected future demand is expected to be largely driven by rapid growth in the demand for electricity generation. Most new electricity generation capacity is expected to be fueled by natural gas, and natural gas consumption in the electricity generation sector is projected to grow rapidly as electricity consumption increases. Demand by electricity generators is expected to account for 33% of total end-use natural gas consumption in 2025 (U.S. Energy Information Administration 2003).

The U.S. Energy Information Administration estimates that the lower 48 states and Canada have approximately 230 tcf of proven natural gas reserves (OTED 2001b). Total foreign and domestic natural gas supplies are projected to grow by 11.4 tcf between 2001 and 2025. Domestic natural gas production is expected to increase by 7.3 tcf, accounting for 64% of the total growth in supply, and net imports are projected to increase by 4.1 tcf, accounting for the remaining 36%.

The largest increase in domestic natural gas production from 2001 through 2025 is projected to come from the Rocky Mountain region, predominantly from unconventional sources. Rocky Mountain natural gas production is projected to increase by 2.7 tcf between 2001 and 2025. Another large increase in domestic production is projected to come from Alaska, primarily as a result of the expected completion of a pipeline from the North Slope. Alaskan natural gas production in 2025 is expected to be 2.2 tcf above its 2001 level. Other production regions, both onshore and offshore, are projected to collectively increase domestic natural gas production by a projected 2.4 tcf between 2001 and 2025.

Net imports of Canadian natural gas are projected to provide 15% of total U.S. supply in 2025, about the same as in 2001 (U.S. Energy Information Administration 2003). Canada's natural gas reserves are found primarily in the Western Canada Sedimentary Basin of British Columbia, Alberta, and Saskatchewan. A recent report from the Canadian National Energy Board estimated that 271 tcf of this resource is recoverable. At current rates of production in Canada, this is approximately a 50-year supply (BP 2002, Section 3.8).

Petroleum Products

Several petroleum fuel pipelines are located within the general vicinity of the proposed cogeneration facility; however, the project would not be connected to these pipelines. A number of petroleum products, including vehicle, equipment gasoline, and diesel fuels, and machinery lubricants are available from numerous commercial outlets in the project vicinity.

Other Nonrenewable Resources

Other nonrenewable resources in the project vicinity are primarily sand and gravel that are extracted from local sources and used locally. Primary consumption of these resources is related to construction projects (sand, gravel, and other mineral resources as used in steel, aluminum, concrete, and other building products).

Washington State is ranked seventh in the nation in annual tonnage of sand and gravel extracted and six of the top 100 producers of sand and gravel in the U.S. operate facilities in or adjacent to Whatcom County. The largest gravel mines in Whatcom County account for approximately 68 million tons of gravel, including one deposit of 12.8 million tons that is currently not permitted. Total gravel resource reserves in the County equal approximately 105 million tons. Total gravel resources that have been permitted for extraction in the County equal approximately 55.2 million tons. See Section 3.1 for additional discussion regarding the distribution of sand and gravel resources in Whatcom County (BP 2002, Section 3.8).

Renewable Resources and Conservation

Renewable resources are materials that can be regenerated, such as wood, other fibers, wind, and sunlight. Neither wind nor sunlight is present at this location in sufficient quantifiable amounts to make them usable for bulk electricity generation, given the current state of technology.

Hybrid poplar trees used for making pulp have been planted at the BP Cherry Point Refinery and approximately half an acre of these trees would be affected by the project. No specific schedule for harvesting these trees has been established by the Applicant.

The Applicant has a conservation program in place at the refinery and has conducted both energy and water audits to find ways to conserve these resources. In addition, the Applicant has a pollution prevention plan that identifies areas where it can conserve or reduce the amount of hazardous and other materials it uses at the refinery. The Applicant has committed to a resource conservation plan similar to that in existence at the refinery and would continue to seek ways to minimize the use of both nonrenewable and renewable resources.

3.8.2 Impacts of the Proposed Action

Construction

Cogeneration Facility, Refinery Interface, and Other Project Components

Construction of the cogeneration facility, systems, and components that interface with the refinery, construction laydown areas, wetland mitigation areas, facility access roads, and industrial water supply modification at Alcoa Intalco Works would require the use of both nonrenewable and renewable resources. Required resources would include such materials as gravel, sand, steel, glass, concrete, asphalt, paper products, and wood. The demand for these materials would primarily be associated with project construction; large quantities of these materials would not be required on an ongoing basis during operation of the proposed project. The approximately half-acre of existing hybrid poplar trees on the project site would be removed as part of cogeneration project site preparation.

Construction would also consume various forms of energy, including electricity, natural gas, and petroleum products. The use of these resources would continue after the cogeneration facility is operational. A discussion of the impacts related to the use of energy and materials during the construction phase of the project follows below.

Energy Resources

Electricity. During construction, electricity would be used for lighting and heating in construction offices, temporary lighting at the facility, and to power various pieces of construction equipment. During non-working hours, electricity consumption would include lighting for security purposes. The estimated peak electrical demand during construction is 2.5 million volt amps at 480 volts.

Natural Gas. Natural and propane gas would be consumed in very small quantities during the construction process. Typical uses would include the operation of construction equipment and heaters.

Petroleum Products. During construction, diesel fuel and gasoline would be delivered to the project site by trucks and would be consumed by portable generators, vehicles transporting workers and materials, and other construction equipment. It is estimated that construction of the proposed project would consume 592,000 gallons of petroleum products.

Other Nonrenewable Resources

Other natural resources that would be used in the construction of the project include imported fill, sand, gravel, concrete (from aggregate, sand, cement quarries, and pits), and steel (from iron ore). Table 3.8-7 lists estimated quantities of materials to be used during construction of the proposed project. This list does not include bulk materials included in equipment packages or systems purchased from equipment suppliers.

Table 3.8-7: Construction Materials and Commodities Consumed

Material	Quantity
Imported Fill	126,000 cubic yards
Sand	7,500 cubic yards
Gravel	18,150 cubic yards
Concrete	25,200 cubic yards
Steel	1,050 tons

Source: BP 2002, Section 3.8

Acquisition of fill material, sand, and gravel would be the responsibility of the construction contractor, who would be required to obtain these materials from an approved source. In Whatcom County, total gravel resources that have been permitted for extraction equal approximately 55.2 million tons. Based on estimates developed for construction of the cogeneration facility, approximately 27,000 tons of gravel would be required. This amount of gravel represents a small percentage (less than 0.05%) of the permitted local supply; therefore, the construction of the cogeneration project is not expected to significantly affect local availability of this resource.

Transmission Facility and Custer/Intalco Transmission Line No. 2

Aluminum, steel, wood, gravel, sand, concrete, and other nonrenewable material would be used to construct the transmission line's tower structures and foundations, conductors, insulators, and other transmission line components. Aluminum and steel would be obtained from mills and fabrication facilities. Sand, gravel, and crushed rock would be obtained from approved local sources. Some petroleum-based fuels would be used for construction vehicles and equipment.

Operation

Cogeneration Facility, Refinery Interface, and Other Project Components

Energy Resources

The cogeneration facility design includes high efficiency natural gas combustion turbines, heat-recovery steam generators, a steam turbine generator, and an integrated steam system to supply the BP Cherry Point Refinery. In addition to generating electrical energy, the cogeneration facility would generate steam for use at the refinery. The cogeneration facility is projected to export approximately 4,200 million pounds (MMlb) of steam per year to the refinery based on a rate of approximately 510 thousand pounds per hour (kp/h) and a pressure of 600 pounds per square inch (psi). The Applicant anticipates that the cogeneration facility and the refinery would execute an operating agreement that would specify the terms and conditions under which the cogeneration facility would provide the refinery with electrical power and steam to ensure a reliable supply of these energy sources for the refinery (Torpey, pers. comm., 2003). See Section 2.2 Description of the Proposed Action for an operational overview of the proposed facility.

Cogeneration offers efficiency and environmental benefits because it turns otherwise wasted heat into a useful energy source. The main benefit of cogeneration is the more efficient use of fossil fuels when used for the generation of electricity and production of steam. The efficiencies arise from the use of the latent heat of the steam in the refinery. This heat would otherwise be lost in the steam turbine condenser. Thus, cogeneration eliminates the need to burn additional fuels for the sole purpose of providing steam. This normally reduces the overall costs of producing electricity and heat because less fuel is consumed.

Electricity. The primary purpose of the cogeneration facility would be to generate electrical power and steam for the refinery. The projected electrical power that would be produced by the facility's four generators (three gas turbines and one steam turbine) is shown in Table 3.8-8. The power output estimate reflects the maximum annual electrical energy output, and assumes 94% availability of the cogeneration facility to allow for routine scheduled maintenance activities that would require taking the facility's generators off-line temporarily from time to time. The actual output may be less depending on market conditions, but in all cases would include provision of electrical power to the refinery.

Table 3.8-8: Estimated Maximum Annual Electrical Energy Output

Component	Each Train (MWh/yr)	Total (Three Trains) (MWh/yr)
Combustion gas turbine gross output (172.5 MW ea.)	1,418,787	4,256,361
Steam turbine generator gross output (214 MW ea.)	1,827,213	1,827,213
Gross power output	3,246,000	6,083,574
Auxiliary power used by cogeneration project		146,325
Net power output		5,937,249

Source: BP 2002, Section 3.8

Notes: Basis - Average ambient conditions at 50°F, 44% relative humidity and lower heat value fuel, 94% capacity factor.

The cogeneration facility is projected to consume approximately 146,325 MWh of electrical power annually during operation at 94% capacity factor and would supply its own electrical energy from its own generators. For initial startup power or to restart the entire cogeneration unit, power would be back-fed from the Bonneville system via the 230-kV transmission system. The general cogeneration facility components that consume power are shown in Table 3.8-9.

Table 3.8-9: Cogeneration Facility Power Demand

Cogeneration Facility Component	Power Demand
Station power (cogeneration facility auxiliary load)	17.8 MW
Natural gas compression station	3.5 MW
Total project auxiliaries	21.3 MW

Source: BP 2002, Section 3.8

Electrical energy produced in excess of the operating needs of the refinery and the cogeneration facility (up to approximately 635 MW) would be exported from the site to the Northwest power grid through the 230-kV transmission system to the Bonneville transmission system. Electrical power transmitted to the Northwest power grid is sold to public utility districts, city light departments, and rural electric cooperatives from within the region. Regional power customers include public agencies, investor-owned utilities, and a number of large industrial concerns. After Northwest customers are served, Bonneville sells any surplus power to utilities outside the region.

Bonneville has determined that modifications would need to occur to the Bonneville system to accommodate the cogeneration facility's interconnection. Two interconnection options have been identified.

Option 1 – Remedial Action Scheme. Under Option 1, a RAS would install additional electrical equipment within the Custer and Intalco substations, which would automatically reduce the load at Alcoa Intalco Works if thermal operating limits were to be exceeded on the Bonneville transmission lines. This option would require an operating agreement among the Applicant, Alcoa Intalco Works, and Bonneville.

Option 2 – New Transmission Line. Under Option 2, a second 230-kV transmission line would be installed between the Custer substation and the cogeneration facility's interconnection to increase transmission capacity along this segment of the Bonneville transmission system. Refer to Chapter 2 for additional discussion of the Bonneville transmission system's interconnection options.

Natural Gas. The cogeneration facility would use natural gas as its only source of fuel to generate electrical power. The source of natural gas for the project would be the Sumas gas-trading hub. Although the Applicant has not made a commitment to purchase natural gas from a particular provider, it is anticipated that natural gas would be supplied by the Sumas hub via the existing Ferndale and/or Cascade pipelines that are routed through the refinery in the utility corridor immediately east of Blaine Road. A new natural gas pipeline interconnection would be

installed within the refinery at the existing Ferndale pipeline metering station. At this time, the Applicant has not determined who would design, construct, own, or operate the proposed pipeline interconnection.

Natural gas would be delivered to the project at a pressure of approximately 250-300 psig. The cogeneration facility and some refinery operations require a higher fuel pressure, so a natural gas compressor station would be constructed in the refinery to raise the pressure of the gas to approximately 500 psig. At this time, it has not been determined who would design, construct, own, or operate the natural gas compressor station.

The annual natural gas consumption for operation of the cogeneration facility would be approximately 42,457,356 MMBtu, or approximately 43 MDth as shown in Table 3.8-10. This projection reflects 94% availability of the cogeneration facility because of the need for scheduled routine maintenance shutdowns. The consumption estimates also depend on actual cogeneration facility output, which may be less depending on market circumstances.

The cogeneration facility's projected annual natural gas consumption would be relatively small in comparison to the region's existing and projected future supply, and would not be expected to significantly affect the overall supply for other users in northwest Washington.

The proposed project would, however, have an effect on the transmission capacity of the Ferndale pipeline. Although a new compression station would need to be installed in the refinery to provide "end of the line" compression that would increase the capacity of the pipeline to approximately 130,000 Dth/d, there may be periods when the combined demands of the cogeneration facility and the refinery exceed the pipeline's increased delivery capacity. During periods of peak demand, the Applicant estimates that up to about 40,000 Dth/d of additional capacity of may be needed. The Applicant anticipates that the additional natural gas would be supplied by a third party in the area with extra capacity (Torpey, pers. comm., 2002).

The cogeneration facility would not have an alternative or emergency source of fuel if natural gas were not available. In the unlikely event that gas supplies are curtailed, the cogeneration facility would go through a series of steps to reduce power and steam production. If the natural gas supply were completely curtailed, the cogeneration facility and the refinery would not be able to operate.

Table 3.8-10: Estimated Maximum Annual Natural Gas Energy Consumption

Natural Gas Energy Consumption by Facility Component	MMBtu/year (lower heat value)	
	One Train	Total (Three Trains)
Combustion gas turbine (1,613.7 MMBtu/hr lower heat value)	13,287,840	39,863,520
HRSG duct burners (105 MMBtu/hr lower heat value)	864,612	2,593,836
Total fuel (natural gas)	14,152,452	42,457,356

Source: BP 2002, Section 3.8

Notes: Basis - Average ambient conditions at 50°F, 65% relative humidity, and 94% capacity factor.

Petroleum Products. Operation of the cogeneration facility would consume petroleum products, primarily lubricants associated with the operation of equipment and a minor amount of gas and diesel fuel for vehicles around the facility. A 1,500-kW diesel-powered emergency generator would consume diesel fuel in the event of a total grid power failure at the cogeneration facility. In addition, a 265-horsepower (hp) diesel-powered fire suppression water pump would consume diesel fuel in the event of a power failure or low water supply situation. Onsite storage capacities for the emergency generator and fire suppression water pump would be approximately 1,500 gallons and 460 gallons, respectively. The use of petroleum products at the cogeneration facility is not expected to have a significant impact on the availability of petroleum products locally.

Other Nonrenewable Resources

The demand for nonrenewable materials such as sand, gravel, and other minerals used in the manufacture of steel, aluminum, and other building products would primarily be associated with project construction. Significant quantities of these materials would not be required on an ongoing basis during operation of the cogeneration project.

The cogeneration facility would use various chemicals during operation to facilitate desired chemical reactions, control water quality, and for other facility operational purposes. See Table 3.16-5 for an estimate of the chemicals that would be used during operation and maintenance of the facility.

Transmission Facility and Custer/Intalco Transmission Line No. 2

The new 230-kV transmission system and the modifications to Custer/Intalco Transmission Line No. 2 would be permanent additions to the Bonneville transmission network. Over the life of the transmission line, relatively small quantities of fuel for maintenance vehicles and helicopters engaged in transmission line surveillance and monitoring would be consumed. Small amounts of electricity would be consumed to maintain and operate equipment at the Custer substation. Road maintenance activities would require the use of crushed rock, gravel, and sand over the years on an as-needed basis. Periodic replacement of conductor wires, ground wires, fiber-optic cables, insulators, and structural elements may be required over time. The quantities of fuel and materials required for operation and maintenance activities would not be sufficient to create impacts on the availability of fuel and materials locally, regionally, or nationally.

3.8.3 Impacts of No Action

Under the No Action Alternative, the cogeneration facility, refinery interface, 230-kV transmission facility, and other project components would not be constructed and the consumption of energy or natural resources associated with construction and operation of the project would not occur. The Applicant would likely continue to meet the electrical power needs of the refinery with a combination of onsite generation and purchase of electrical power from other sources. The existing refinery boiler system would continue to be used to meet the refinery's steam demand.

Under this alternative, the cogeneration facility would not generate and transmit electrical power for use on the Northwest power grid. The No Action Alternative would not remove the need for power production; it would potentially transfer the impacts to another site and potentially another technology. There would be no increase in the power supply reliability for the BP Cherry Point Refinery and no contribution to new electrical generation required to meet increasing power demands in the Pacific Northwest and adjoining regions.

3.8.4 Secondary and Cumulative Impacts

The project would consume 42,457,356 MMBtu (approximately 43 MDth) of natural gas annually in the production of electrical energy and steam. The proposed project would result in an incremental contribution to the regional demand for natural gas, however, and given existing natural gas transmission system capacity in the region, would represent an additional increment of demand on the system.

The project would use 146,325 MWh of electrical power annually in the generation of electricity and steam. However, the overall impacts of electrical energy use would not be significant compared to the total amount of energy being produced by the proposed facility. Operation of the cogeneration facility would cumulatively add to the availability of energy in the Pacific Northwest by generating up to 635 MW of electrical power for distribution on the Northwest power grid.

Approximately 176,850 cubic yards of sand, gravel, fill dirt, and concrete, and 1,050 tons of steel would be used to construct the cogeneration facility, representing an incremental contribution to the regional consumption of these resources. Total permitted gravel resources in Whatcom County are estimated to be approximately 55.2 million tons. The proposed project would use less than 0.05% of the total permitted gravel sources in Whatcom County and would not result in a significant cumulative impact on these resources.

3.8.5 Mitigation Measures

Construction

The Applicant has proposed the following mitigation measure to minimize impacts on natural resources and energy associated with the construction of the project:

- Conservation of energy and natural resources during construction of the cogeneration facility could take place through the implementation and use of industry standard BMPs by the selected contractor. These BMPs may include using energy-efficient lighting, lighting only critical areas during non-working hours, encouraging carpooling, scheduling construction crews efficiently, minimizing idling of construction equipment, recycling used motor oils and hydraulic fluids, and installing signs to remind construction workers to conserve energy and other resources.

Although not proposed by the Applicant, the following mitigation measure could be implemented to minimize impacts on natural resources and energy associated with the construction of the project:

- Construction could be coordinated with energy and natural resource providers to ensure that other users in the area would not experience any service interruptions. For example, as part of the proposed project, modifications to the natural gas pipeline that supplies Alcoa Intalco Works are proposed at the Ferndale metering station. This work could be coordinated with Ferndale pipeline staff and the management of Alcoa Intalco Works to ensure that the required piping modifications do not disrupt natural gas service to Alcoa Intalco Works or that any necessary disruptions are minimized.

Operation

The Applicant has identified the following mitigation measures to reduce potential impacts on energy and natural resources during operation and maintenance of the project:

- Because the cogeneration facility would produce enough steam to meet the operating needs of the refinery, the existing boilers currently providing steam to the refinery would be taken out of service.
- The cogeneration design of the facility would provide for a more efficient use of natural gas by using the residual steam from the cogeneration facility to meet the needs of the refinery, as compared with a combined-cycle plant without cogeneration capability.

3.8.6 Significant Unavoidable Adverse Impacts

The proposed project would consume approximately 42,457,356 MMBtu (approximately 43 MDth) of natural gas annually in the production of electricity and steam for the BP Cherry Point Refinery and electrical power for distribution on the Bonneville transmission system. However, the project design features high efficiency natural gas combustion turbines used in a cogeneration facility design. This design provides for a more efficient use of fossil fuels in the generation of electricity and production of steam.

3.9 NOISE

This section documents existing noise conditions at 15 locations in the project vicinity and presents projected noise levels resulting from the operation of the proposed project. For the purpose of this evaluation, projected noise levels must exceed regulatory residential, commercial, or industrial noise standards to be considered an impact requiring mitigation.

According to an EPA study, average noise levels in an urban environment are not hazardous to human hearing (EPA 1974). Urban noise would be more appropriately classified as an annoyance resulting in interference with activity, particularly speech communication (EPA 1974). Since most buildings offer effective noise shielding for their occupants, this section focuses on annoyance and interference with outside activities resulting from operational noise associated with the proposed project. Noise mitigation resulting from construction activities is not addressed because the potential impacts are exempt from local and state regulations. There are no federal regulations that apply to mitigation of construction noise.

3.9.1 Noise Background and Characteristics

Sound is created when objects vibrate, resulting in a minute variation in surrounding atmospheric pressure called sound pressure. The human response to sound depends on the magnitude of a sound as a function of its frequency and time pattern (EPA 1974). Magnitude describes the physical sound in the air. The range of magnitude from the faintest to the loudest sound humans can hear is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). Magnitudes of typical noise levels are presented in Table 3.9-1.

Table 3.9-1: Sound Pressure Levels of Representative Noises

Source	Decibels	Description
Large rocket engine (nearby)	180	Pain threshold
Jet takeoff (nearby)	150	
Pneumatic riveter	130	
Jet takeoff (200 feet)	120	
Construction noise (10 feet)	110	
Subway train	100	Constant exposure endangers hearing
Heavy truck (50 feet) and Niagara Falls	90	
Average factory	80	
Busy traffic	70	
Normal conversation (3 feet)	60	
Quiet office	50	Quiet
Library	40	
Soft whisper (16 feet)	30	Very quiet
Rustling leaves	20	
Normal breathing	10	Barely audible
Hearing threshold	0	

Source: Tipler 1976

Humans respond to a sound's frequency or pitch. Environmental noise is composed of many frequencies, each occurring simultaneously at its own sound pressure level. As measured by an electronic sound level meter, frequency weighting combines the overall sound frequency into one sound level. The commonly used frequency weighting for environmental noise is A-weighting, or dBA, which approximates how an average person hears sounds. C-weighting, or dBC, is a measure of the lowest frequencies of sound and vibration. Low frequency noise is usually described as humming or engine-like sounds or a feeling of pressure or vibration.

Loudness, compared to physical sound measurement, refers to how people subjectively judge a sound and varies from person to person. A listener often judges an increase of 10 dBA to be twice as loud. In general, an increase in noise from 1 to 3 dBA will not be noticeable, 3 to 5 dBA will be noticeable to most people, 5 to 7 dBA will be easily heard, and 7 to 10 dBA will be judged as substantial.

Because of the logarithmic decibel scale, a doubling of the number of noise sources, such as traffic volume, increases noise levels by 3 dBA. A tenfold increase in the number of noise sources will add 10 dBA. Thus, a noise source emitting a noise level of 60 dBA combined with another noise source of 60 dBA results in a combined noise level of 63 dBA, not 120 dBA.

Audible noise levels depend on a variety of factors including, but not limited to, topography, vegetation, distance from the source to receptor, and whether the source of the noise is stationary or moving. Noise levels decrease with distance from the noise source. Traffic noise levels will decrease 3 dBA over hard ground (concrete or pavement) or 4.5 dBA over soft ground (grass) for every doubling of distance between the source and the receptor. For a point source such as stationary construction equipment, noise levels will decrease between 6 and 7.5 dBA for every doubling of distance from the noise source.

A descriptor for audible noise is the equivalent sound level (L_{eq}). L_{eq} is defined as the constant level that, over a given period of time, transmits to the receptor the same amount of acoustical energy as the actual time-varying sound. For example, two sounds, one of which contains twice as much energy but lasts only half as long, have the same L_{eq} noise levels. The L_{eq} can be considered a measure of the average noise level during a specified period of time. It is a measure of total noise, a summation of all sounds during a time period. As such, it places more emphasis on occasional high noise levels than accompanying general background noise levels.

Noise Regulations

Applicable agency noise regulations and guidelines provide a basis for defining and evaluating noise impacts and mitigation for the proposed project. Noise regulations and guidelines specify limits of noise levels, above which noise is considered an impact. Maximum permissible noise levels apply to a single source of noise and depend on the zoning district of both the source of noise and the receptor property.

Federal Noise Regulations

Other than the Occupational Safety and Health Administration (OSHA) regulations, no other federal noise regulations would govern sound at the proposed project.

Washington State Department of Ecology Noise Standards

Chapter 173-60 of the WAC specifies maximum environmental noise levels. The limits are based on the noise source and the receptor. The noise level designations shown below are the maximum levels permitted from an industrial facility:

Residential Day (7 a.m. to 10 p.m.)/Night (10 p.m. to 7 a.m.): 60/50 dBA

- Commercial: 65 dBA
- Industrial: 70 dBA

Maximum noise levels outlined above are allowed a 5 dBA increase for 15 minutes in one hour, a 10 dBA increase for 5 minutes in one hour, or a 15 dBA increase for 1.5 minutes in one hour.

Noise from temporary construction activities is exempt from all limits, except for those that apply to noise received at residential properties at night (10 p.m. to 7 a.m.) (WAC 173-60).

Whatcom County Noise Ordinance

The Whatcom County Zoning Code (Title 20) includes general prohibitions against noise as a nuisance or annoyance. It also defines some acts that are declared unnecessary noises, although none apply to the normal operation of a power generation facility. There are no numerical noise limits in the Whatcom County Code, and all references are to the state code. Therefore, the limits in WAC 173-60 were used to evaluate the estimated noise effects resulting from the operation of the proposed project.

Impact Criteria for Low Frequency Noise

Although the state of Washington regulates low frequency noise through noise regulations using the A-weighted decibel scale, the American National Standards Institute (ANSI) presents recommendations to provide protection from low frequency noise disturbance in *Gas Turbine Installation Sound Emissions* (ANSI 1989). ANSI recommends limiting noise levels at residences near new gas turbine facilities to 75 to 80 dBC.

3.9.2 Existing Conditions

Golder Associates, Inc. (BP 2002) performed a noise monitoring study to assess the existing noise levels at 15 locations within the project vicinity. Noise levels were monitored on May 31 and June 7, 2001. The noise monitoring program was performed at the property boundaries of the refinery, at the proposed cogeneration facility site, and at the nearest residences located from 1 to 2 miles away. Monitoring also was performed at the entrance to Birch Bay State Park. The locations are described in Table 3.9-2 and shown in Figure 3.9-1.

Table 3.9-2: Noise Monitoring Locations

Location Number	Type of Receiver	Description
1	I	On Grandview Road in front of the Chemco Plant, 0.69 mile northeast of the proposed project site
2	R	Northwest corner of the four-way stop at Aldergrove Road and Kickerville Road intersection, 1.26 miles southeast of the project site
3	I	Aldergrove Road at the entrance to the PraxAir facility, 0.82 mile south of the proposed project site
4	I	Southeast corner of two-way stop at the Aldergrove Road and Jackson Road intersection, 1.37 miles southwest of proposed project site
5	I	At Cascade Natural Gas regulator station on the west side of Jackson Road, 1.11 miles southwest of proposed project site. (The regulator was not operating.)
6	I	Southeast corner of four-way stop at the Grandview Road and Jackson Road intersection, 1.10 miles west of proposed project site
7	R	West side of Jackson Road at the Birch Bay Community Church, 1.22 miles northwest of proposed project site
8	R	Southwest corner of the three-way stop at Grandview Road at Point Whitehorn, 2.08 miles west of the proposed project site
9	R	Northwest corner of Jackson Road and Helweg, 1.44 miles northwest of the proposed project site
10	R	In front of the residence at 4570 Bay Road, 1.20 miles north of the proposed project site
11	R	Northwest corner of the four-way stop at Kickerville Road and Bay Road, 1.48 miles northeast of the proposed project site
12	I	Intersection of Grandview Road and Blaine Road on the south side of the street, 300 feet north of the proposed project site
13	I	West side of Blaine Road north of Grandview Road at the turnout, 0.51 mile north of the proposed project site
14	R	Northwest corner of Kickerville Road and Brown Road, 1 mile east-southeast of the proposed project site near the residence closest to the site
15	R	Birch Bay State Park near the park entrance, 1.92 miles northwest of the proposed project site
Project Site		Open field on Applicant property south of Grandview and east of the refinery.

I Industrial Receiver

R Residential Receiver

For the Golder study, locations 1 through 15 were monitored for two periods of 15 minutes, once in the hours defined as day (7 a.m. through 10 p.m.) and once in the hours defined as night (10 p.m. through 7 a.m.). The project site location described in the table above was monitored for a period of 24 hours. No unusual natural environmental circumstances were present such as heavy wind or rain that would have influenced the field measurements.

In a second, more recent study, Hessler Associates (2003) conducted a noise monitoring program that included more extensive background sound level measurements at four locations representative of the nearest sensitive receptors in the Golder study (Receptors 7, 10, 11, and 14). The same environmental conditions were measured for each study, however the time duration for the measurements spanned three nights and two days. These measurements began on April 8, 2003 and concluded on April 11, 2003.

Figure 3.9-1: Noise Monitoring Locations

Two types of ambient noise were monitored during data collection. The first type of noise is steady noise or background noise. Background noise in the project vicinity includes the steady sound of wind, creeks, wave action, and nearby industrial sources. The second type of noise monitored during data collection is transient noise, with sources that include vehicular traffic, wind gusts, airplanes, animals, trains, and other human-caused disturbances.

The results of the noise measurements indicated that the existing noise levels, which are made up of background sound levels including transient noise, in the areas surrounding the proposed project range from a low of 47 dBA to a high of 68 dBA during the day (7 a.m. to 10 p.m.) and from a low of 39 dBA to a maximum of 65 dBA during the night (10 p.m. to 7 a.m.). Differences in existing noise levels depended mainly on the proximity of transient noise sources. The average contribution of transient noise is 4 to 12 dBA. The results of existing conditions for day and night periods are presented in Table 3.9-5.

To avoid private property access issues, noise monitoring was performed on public property along public roads near transient noise generated by vehicular traffic. The results of this noise monitoring indicate that the background levels are low, and are significantly influenced by transient sources, especially vehicular traffic. If sampling had been performed on the private property farther away from the road, at particular homes for example, the influence of passing vehicles would be reduced and a stronger assessment of existing backgrounds conditions could be established.

As shown in Table 3.9-5, some of the residential receptors' existing noise levels are shown to exceed the regulatory limit outlined in the WAC 170-60. Without knowing the distance of the property from the measurement location, it is difficult to determine the exact noise levels at the property. However, as stated above, transient noise from passing traffic contributed significantly to the overall L_{eq} level reported in the table.

3.9.3 Impacts of the Proposed Action

Construction

Construction activities of the proposed project are expected to be typical of other industrial plant construction projects. Construction activities include mobilization, site preparation, utility development, heavy equipment movement, clearing/grading of roadways and right-of-ways, and installation of the new facility components. General construction equipment to be used includes but is not limited to: heavy, medium, and light equipment such as excavators; roller compactors; front-end loaders; bulldozers; graders; backhoes; dump trucks; water trucks; concrete trucks; pump trucks; utility trucks; cranes; pile drivers; man lifts; forklifts; and lube, oil, and fuel trucks. The levels of noise produced during these activities are anticipated to vary depending on the construction phase. Table 3.9-3 outlines typical construction noise levels at a distance of 50 feet.

In addition to noise produced from onsite construction equipment, traffic volumes would increase as construction employees commute to and from work at the site. Additional transient noise would occur as a result of increased volumes of delivery and service vehicles (including trucks of various sizes) doing business at the site. Truck and delivery traffic is further discussed

in Section 3.15, Traffic and Transportation. The construction traffic is temporary and expected to occur during the daytime hours of 7 a.m. and 6 p.m. Under these conditions, the transient construction traffic is exempt from state regulations.

Table 3.9-3: Construction Equipment Noise Ranges

Equipment	Examples	Noise Level (dBA) at 50 feet
Earth Moving	Compactors, loaders, backhoes, tractors, graders, pavers	73-96
Materials Handling	Concrete mixers and pumps, cranes, derricks	74-88
Stationary	Pumps, compressors, generators	69-87
Hauling	Trucks	83-94
Impact Equipment	Pile drivers	95-106
Impact Tools	Jackhammers, rock drills, pneumatic wrenches	81-98

Source: EPA 1971

Noise associated with construction activities is highly variable and is exempt from Washington State noise standards, as stated in WAC 173-60-050, with the exception of residential locations between the hours of 10 p.m. and 7 a.m.

Because construction noise is exempt from Washington State standards, no construction-phase noise modeling was conducted. Other impacts from construction noise may include effects on wildlife. Disturbances caused by construction on the project site may affect wildlife in adjacent habitats by disrupting feeding and nesting activities. Habitats on and surrounding the site may be used for breeding by migrant and resident songbirds. Increased noise levels created by operation of heavy machinery could cause birds to abandon their nests and may temporarily displace wildlife during construction. Once construction activities are complete, wildlife may resume use of the area. Construction and operational impacts on wildlife are addressed in Section 3.7 of this EIS.

Operation

Both the Golder and Hessler noise studies predicted operational noise levels at the chosen 15 receptors. Each study estimated noise levels at the selected offsite receptors, based on the anticipated noise levels produced by the proposed cogeneration facility without inclusion of the background or transient sounds. The baseline analysis assumed standard power-generating equipment would be used throughout the facility without any special or unusual improvements specifically intended to reduce far-field noise. This calculation indicated that the noise levels of the proposed project would be below the regulatory daytime and nighttime allowable levels as shown in Table 3.9-4.

After initial modeling, the Hessler study found that a moderate reduction in HRSG stack noise would significantly lower the overall noise levels facility-wide. Consequently, the Applicant recommended the addition of stack silencers with a nominal reduction of 10 dBA in stack sound; it was accepted and incorporated into the project design. With this improvement, total noise levels at some of the more critical locations will be reduced by 3 to 4 dBA. The stack silencers

also carry an additional benefit that stack noise is less likely to adversely affect levels at receptors situated downwind from the facility. The high elevation of the stacks makes their noise more susceptible to wind effects.

Each study assumed the primary noise-generating equipment would consist of three CTGs, one STG, three HRSGs, and an air/water cooling tower. Modeling assumed that the CTGs and STG would be housed within standard, acoustically treated enclosures (but not within buildings). The Golder study did not assume any stack silencers on the HRSGs, however the Hessler study did incorporate this new design feature into the final model. Besides the main components, other equipment that could generate potentially significant noise levels, such as boiler feedwater pumps, circulating water pumps, main transformers, and various steam lines, were included in the model. To ensure the modeling results are conservative, the noise impact modeling predicted the maximum noise levels to be produced by the proposed project. To achieve these conditions, no attenuation factors, such as vegetation or topography, were included in the modeling for existing or future noise results.

Table 3.9-4 presents the projected noise levels of the proposed project at the 15 receptors as originally modeled by Golder and then by Hessler following the design inclusion of stack silencers.

Table 3.9-4: Estimated Noise Levels without Background Ambient Sound Levels (L_{eq} dBA)

Receptor Location	Golder's Predicted Noise Level	Hessler's Predicted Noise Level (with stack silencers)	Most Stringent State Regulatory Limit (nighttime)
1 (I)	52	47	70
2 (R)	45	41	50
3 (I)	50	46	70
4 (I)	43	39	70
5 (I)	46	40	70
6 (I)	46	41	70
7 (R)	44	40	50
8 (R)	38	34	50
9 (R)	42	38	50
10 (R)	45	40	50
11 (R)	42	40	50
12 (I)	65	60	70
13 (I)	54	48	70
14 (R)	48	44	50
15 (R)	39	35	50

I=industrial, R=residential

As shown above, all of the modeled noise levels produced solely by the cogeneration facility would be below the state regulatory thresholds. Because stack silencers were added to the project design, Hessler's modeled results were used to calculate the noise levels at the 15 receptor locations to include the background noise conditions combined with the noise produced from the cogeneration facility. Table 3.9-5 outlines the existing background conditions measured by

Golder, the estimated combined noise levels as predicted by Hessler (existing conditions plus the predicted cogeneration noise levels with stack silencers), and the regulatory limits for daytime and nighttime.

Table 3.9-5: Estimated Noise Levels Combining Modeled and Background Sources (L_{eq} dBA)

Receptor	Daytime Noise Level				Nighttime Noise Level			
	Existing Condition	Existing Condition plus Modeled Level with Stack Silencers	Regulatory Limit	Increase above Existing Condition	Existing Condition	Existing Condition plus Modeled Level with Stack Silencers	Regulatory Limit	Increase above Existing Condition
1 (I)	68	68	70	0	65	65	70	0
2 (R)	58	59	60	1	63	63	50	0
3 (I)	61	61	70	0	60	61	70	1
4 (I)	50	51	70	1	52	53	70	1
5 (I)	63	63	70	0	58	58	70	0
6 (I)	61	61	70	0	59	59	70	0
7 (R)	63	63	60	0	56	56	50	0
8 (R)	55	55	60	0	52	52	50	0
9 (R)	57	57	60	0	50	50	50	0
10 (R)	62	62	60	0	54	54	50	0
11 (R)	61	61	60	0	53	53	50	0
12 (I)	64	65	70	1	61	63	70	2
13 (I)	62	62	70	0	57	57	70	0
14 (R)	60	60	60	0	51	52	50	1
15 (R)	47	48	60	1	39	40	50	1

I=industrial, R=residential

The modeling results presented in Table 3.9-5 indicate that none of the 15 receptors would experience a perceptible increase (above 3 dBA) in noise during the daytime or evening. Only one receptor would experience a noise increase over 1 dBA. Receptor 12 is estimated to increase 2 dBA at night over existing noise conditions. This location is located 0.1 mile north of the cogeneration project on industrially zoned BP property across from Grandview Road. A 2 dBA increase is not expected to be perceivable and would not exceed state regulatory limits.

The changes in noise levels would also not be perceptible to residences situated farther away in the communities of Birch Bay and Cottonwood.

Low Frequency Noise Results

Localized disturbance from low frequency noise has sometimes been associated with simple-cycle combustion turbine installations. Combustion turbines are capable of producing high levels of low frequency (40 Hz or less) noise when the exhaust gas exits the equipment. In simple-cycle

configurations, the exhaust gas passes through an exhaust silencer that is effective at reducing mid- and high frequency noise but is less effective at reducing low frequency noise emissions.

Low frequency noise, however, has not typically been a reported concern when combustion turbines are placed in combined-cycle configurations. In combined-cycle configurations, the exhaust gas passes through the HRSG equipment, which is effective at reducing the low frequency combustion noise associated with turbine operation. The cooling of the exhaust gasses in combined-cycle facilities also reduced the low frequency noise emissions.

As with the original Golder modeling study, the newer Hessler modeling also evaluated low frequency noise levels at the receptors. In general, the new modeling results indicate that low frequency noise from the cogeneration facility (C-weighted sound levels and the lower frequency levels) would be similar to or less than the levels reported by Golder for the original project configuration. Consequently, both studies conclude that low frequency noise would not reach perceptibility thresholds at any of the residential receptors. The normal threshold of perceptibility for low frequency noise and vibration is 75 to 78 dBC (ANSI 1989). The ANSI recommends C-weighted plant levels should be significantly below 75 dBC at residential receptors.

Table 3.9-6 shows the lowest frequency bands and the overall C-weighted sound level at each receptor location. All receptors, with the exception of the industrial property at Receptor 12, are predicted to experience low frequency noise well below the 75 dBC residential recommendation.

Table 3.9-6: Summary of Low Frequency Receptor Levels due to the Cogeneration Base Load Plant Operation

Receptor	Total Level (dBC)
1 (I)	63.8
2 (R)	59.4
3 (I)	62.8
4 (I)	58.4
5 (I)	58.7
6 (I)	58.9
7 (R)	58.7
8 (R)	54.3
9 (R)	57.3
10 (R)	58.6
11 (R)	58.2
12 (I)	73.3
13 (I)	64.8
14 (R)	61.0
15 (R)	55.4

I=industrial, R=residential

Other low frequency noise to be considered is “corona” discharge. When water droplets stand on the transmission line’s conductor surface, small-radius irregularities increase the electrical stresses that can lead to audible, low frequency humming and crackling. Corona discharge is

often weather-dependent. Because the new 230-kV transmission system would be located more than 0.5 mile from the nearest residence and a new transmission line in the Custer/Intalco transmission corridor (if Option 2 is selected) would be within the existing 125-foot utility ROW, disruptive corona effects on local residences are not anticipated.

3.9.4 Impacts of No Action

Under the No Action Alternative, the proposed project would not be constructed and noise would remain at levels documented in the existing conditions section.

3.9.5 Secondary and Cumulative Impacts

Georgia Strait Crossing Pipeline LP is proposing to construct a pipeline and compressor station to deliver gas from Sumas to Vancouver Island. The compressor station is proposed at Cherry Point west of the refinery. The noise study for the compressor station project evaluated expected noise levels at the north, south, east, and west property boundaries of the compressor station (Williams Gas Pipeline West 2001), where the maximum noise level would occur. The levels ranged between 46 and 54 dBA. The nearest receptor to the Georgia Strait Pipeline project is Receptor 5, the industrial power plant. The expected 54 dBA from the north boundary of the compressor station falls below the predicted 63 dBA of the cogeneration facility. Given the additional distance from the northern property boundary of the Georgia Strait Crossing compressor station and the location of the power plant, cumulative operation noise impacts are not expected to occur.

Impacts on various receptors identified in this study may occur during the construction phase of the Georgia Strait Crossing project. These impacts may occur at receptors located near the proposed compressor station or near where the pipeline is placed in the ground. As with the proposed project, construction noise is considered temporary and is exempt from Washington State noise standards. However, site-specific construction plans for areas where there are residences or structures within 50 feet of the construction right-of-way would address noise minimization.

3.9.6 Mitigation Measures

Construction

The Golder noise study indicated that construction noise could be reduced by providing mufflers on engines, using quieter equipment or construction practices, and turning off equipment when not in use. To reduce construction noise at nearby receptors, the construction industry's best management practices would be incorporated into construction plans and contractor specifications. The proposed project would include the following noise mitigation measures during construction:

- Limiting noisier construction activities to between 7 a.m. and 10 p.m. would reduce construction noise during sensitive nighttime hours. If construction were to occur outside this period, measures to minimize noise would be implemented to the maximum extent possible.

- Equipping engines of construction equipment with adequate mufflers, intake silencers, or engine enclosures would reduce their noise by 5 to 10 dBA (EPA 1971).
- Specifying the quietest equipment available would reduce noise by 5 to 10 dBA.
- Turning off construction equipment when not in use for prolonged periods would eliminate noise from the equipment during those periods.
- Requiring contractors to maintain all equipment and train their equipment operators would reduce noise levels and increase efficiency of operation.
- Locating stationary equipment away from receiving properties would decrease noise from that equipment in relation to the increased distance.

Operation

Although no noise impacts requiring mitigation would result from operation of the proposed cogeneration facility, the design and siting of the facility have integrated many noise mitigation measures.

When considering the location and orientation of the proposed project, many factors including noise were evaluated. The project site was set back approximately 340 feet from the centerline of the nearest public road, Grandview Road, and this resulted in a reduction of noise levels at the road and beyond. The configuration of the project equipment, which includes the three gas turbine generators perpendicular to Grandview Road, is an orientation that allows for optimal sound reduction through physical barriers. The equipment noise from the two most southern generators would be blocked by the presence of the generator closest to Grandview Road.

The three gas turbine generators and the steam turbine generators would be located within enclosures, which would attenuate sound. The HRSG exhaust stacks have also been designed with silencers to provide additional noise mitigation. This operation mitigation is demonstrated in the modeling completed by Hessler and outlined in Table 3.9-4.

3.9.7 Significant Unavoidable Adverse Impacts

None of the receptors in the modeling program would experience significant increases in noise levels. Implementing BMPs during the construction of the project will reduce the temporary construction noise impacts at nearby receptors. Thus, no significant unavoidable adverse impacts are associated with construction or operation of the project.

3.10 LAND USE

This section discusses land use and the consistency of the proposal with adopted land use plans and policies for the project site and surrounding area. The analysis in this section is based on information provided by the Applicant in the ASC (BP 2002). Where additional information has been used to evaluate the potential impacts associated with the proposal, that information has been referenced.

3.10.1 Existing Conditions

The project site consists of approximately 195 acres of Applicant-owned property in the western portion of unincorporated Whatcom County, approximately 2 miles inland from Birch Bay along the Strait of Georgia. In addition, the portion of the Custer/Intalco Transmission Line No. 2 that would be affected by the project is located within approximately 70 acres of existing Bonneville transmission system right-of-way.

A number of U.S. and Canadian jurisdictions are located within 25 miles of the project site. A list of these, along with their distances from the project site and recent population estimates, is provided in Table 3.10-1.

Table 3.10-1: Population Estimates and Distance to Project Site

Location	Population (2000 estimate)	Distance (direct)
U.S. Jurisdictions		
British Columbia/Washington State Boundary	NA	8 miles
Lummi Indian Reservation	4,193	5 miles
Nooksack Indian Reservation	740 (1999 est.)	23 miles
Skagit County	102,979	19 miles
San Juan County	14,077	9 miles
Whatcom County	166,814	N/A
Bellingham, Wash.	67,171	15 miles
Blaine, Wash.	3,770	7 miles
Everson, Wash.	2,035	17 miles
Ferndale, Wash.	8,758	6 miles
Lynden, Wash.	9,020	12 miles
Nooksack, Wash.	851	18 miles
Sumas, Wash.	960	22 miles
Canadian Jurisdictions		
Abbotsford, BC	115,126	21 miles
Delta, BC	101,433	21 miles
Langley, BC	24,287	15 miles
Surrey, BC	340,094	21 miles
White Rock, BC	17,371	11 miles

Source: BP 2002

Existing Land Use

Whatcom County

The Whatcom County land base consists of 1,377,645 acres of land, the majority of which (874,045 acres) is managed as federal national forest or national park lands by the U.S. Forest Service and National Park Service, respectively. Of the 475,044 acres of non-federal lands in the unincorporated portion of the county, 79% (374,730 acres) is used for forestry and agriculture. An additional 9% (43,070 acres) is used for residential, and approximately 7% (32,915 acres) is vacant/undeveloped. The 3,060 acres of industrial uses in Whatcom County account for less than 1% of the land within the unincorporated county (Whatcom County 1997, as amended).

Project Site and Surrounding Area

Land uses in the project vicinity include a variety of recreational, industrial, commercial, residential, and agricultural uses. Low-density residential uses occur to the north and east of the site, and west of the BP Cherry Point Refinery at Point Whitehorn. These residential uses are primarily single-family houses on large lots. Northwest of the refinery, seasonal residential properties occur in the bayfront community of Birch Bay. Approximately 2 miles northwest of the refinery, the 194-acre Birch Bay State Park extends along the shoreline of the Strait of Georgia. The Birch Bay Wastewater Treatment Plant also is located in this area.

South of the proposed cogeneration facility site, the Praxair liquid carbon dioxide production plant is located on Applicant-owned land near the intersection of Blaine Road and Aldergrove Road. Farther south, other existing industrial uses include the Conoco-Phillips Refinery and the Alcoa Intalco Works primary aluminum smelter. Approximately 2 miles southeast of the project site is Lake Terrell and the publicly managed 1,500-acre Lake Terrell Wildlife Area, which provides for a variety of active and passive recreational uses including hunting, fishing, and wildlife viewing. An operating farm at the Lake Terrell Wildlife Area uses between 80 and 100 acres annually to produce winter food for waterfowl and upland game. Just over 4 miles to the south is the Lummi Reservation.

To the east, a Burlington Northern Santa Fe (BNSF) rail line runs north-south approximately 0.5 miles east of the cogeneration facility site. An existing 230-kV Bonneville transmission corridor is located approximately 0.8 mile east of the site and connects Bonneville's Custer substation with the substation at the Alcoa Intalco Works. The Chemco wood treatment plant is also located in this area. Applicant land ownership extends to the east across the BNSF railroad track to the edge of the Bonneville transmission corridor. The City of Ferndale is approximately 5 miles east of the project site. Land uses between the Bonneville transmission line and the City of Ferndale generally include rural residential, agriculture, and livestock farming.

West of the BP Cherry Point Refinery, Puget Sound Energy's Whitehorn power generation plant is located west of Jackson Road. Approximately 3 miles west of the cogeneration facility site is the Strait of Georgia, which supports multiple uses including recreation, navigation, and commercial fishing industries. The land between the refinery and Strait of Georgia is predominantly agricultural.

Cogeneration Facility

The proposed cogeneration facility site consists of approximately 33 acres of land previously used for agriculture but has not been cultivated for several decades. A stand of hybrid poplar trees, planted for production of pulp for paper manufacturing, separates the proposed cogeneration facility from Grandview Road. No active management of the hybrid poplar trees has occurred since planting was stopped in 1991 (BP 2002, Section 3.10).

Refinery Interface

Immediately west of the cogeneration facility site is the BP Cherry Point Refinery. The refinery, which began operation in 1971, covers an area of approximately 450 acres and is bounded by Grandview Road and Aldergrove Road to the north and south, respectively, and Blaine Road and Jackson Road to the east and west, respectively.

Access Road 2 would be located on undeveloped Applicant-owned property adjacent to the BP Cherry Point Refinery, and would intersect with Blaine Road.

Transmission System

The proposed cogeneration facility/Bonneville transmission system corridor would be 150 feet wide and extend for approximately 0.8 mile, connecting the 230-kV switchyard at the southeast corner of the cogeneration facility with Bonneville's 230-kV Custer/Intalco Transmission Line No. 2. This corridor consists primarily of undeveloped lands used historically for agriculture. The north-south running BNSF railroad tracks would be crossed by the proposed transmission line at the east end of the corridor.

Custer/Intalco Transmission Line No. 2

Custer/Intalco Transmission Line No. 2 is located within an existing Bonneville utility easement from the transmission facility interconnection to the Custer substation. Existing land uses along the approximately 5-mile corridor are predominantly agricultural, agricultural/open space, and rural residential. The transmission line crosses the following rural roads: Grandview Road, Kickerville Road, Ham Road, Valley View Road, Elk Road, Olson Road, Fox Road, and Vista Drive.

Other Project Components

North of Grandview Road, the area proposed for compensatory wetland mitigation sites CMA 1 and CMA 2 encompasses approximately 110 acres and consists predominantly of undeveloped grasslands once cultivated for hay. A portion of this area is now leased to local farmers for grazing cattle.

Immediately northeast and south of the cogeneration facility site, the approximately 5-acre Laydown Area 4 and the site for extension of Access Road 3 consist of vacant land previously used for agriculture.

Freshwater supply piping modifications to allow for the use of recycled industrial water when the Alcoa Intalco Works facility is operating would be located within the existing industrial environment of the Alcoa Intalco Works facility.

Tribal Lands

Other land uses near the project site include the Lummi Reservation located in the northwest corner of Washington State approximately 12 miles south of the U.S.-Canada border and 5 miles from the project site. The Lummi Reservation occupies land on two peninsulas and consists of approximately 12,000 acres of mixed-use lands used for commercial, residential, farming, and marine activities. The reservation also includes approximately 8,000 acres of tidelands. Associated resources include forestry and agricultural land, salmon and shellfish hatcheries, a seafood processing plant, a convenience store, a casino, and a marina.

Existing Zoning

Existing zoning for the project site and surrounding area is shown in Figure 3.10-1.

Cogeneration Facility

The cogeneration facility site is zoned Heavy Impact Industrial (HII) and is entirely contained within the Cherry Point Major Industrial UGA/Port Industrial as defined within the Whatcom County Comprehensive Plan (Whatcom County 1997). This designated area comprises approximately 6,500 acres, of which approximately 2,500 acres are currently used for heavy impact industry. Land to the east of the proposed site is zoned HII for approximately 0.25 mile, and Rural (R5A) for an additional 2 miles east of Kickerville Road. Land south of the cogeneration facility site is zoned HII for approximately 4 miles extending to the Strait of Georgia. To the west, HII zoning extends for approximately 1 mile to the Birch Bay unincorporated residential/recreational UGA and the residential area at Point Whitehorn, both of which are zoned Urban Residential 4 (UR4). North of the proposed site, zoning is Rural and Rural Residential for approximately 0.25 mile (EFSEC 2001; BP 2002, Section 3.10).

Refinery Interface

All project components that interface with the refinery would be constructed within the refinery. Land within the refinery is zoned HII and is entirely contained within the Cherry Point Major Industrial UGA/Port Industrial area.

Figure 3.10-1

Transmission System

The corridor for the proposed new transmission line between the cogeneration facility and Bonneville's Custer/Intalco Transmission Line No. 2 is zoned HII and is entirely contained within the Cherry Point Major Industrial UGA/Port Industrial area.

Custer/Intalco Transmission Line No. 2

The existing Custer/Intalco Transmission Line No. 2 corridor between the interconnection with the proposed new transmission line and Bonneville's Custer substation traverses three different zoning districts. The segment of the corridor that runs north-south between the interconnection with the new transmission line and Grandview Road is zoned HII. The short segment of the corridor that extends north of Grandview Road is zoned Light Impact Industrial (LII). These two segments of the existing transmission line corridor are located within the Cherry Point Major Industrial UGA/Port Industrial area. The remaining portion of this corridor that extends east of Kickerville Road and north of and parallel to Grandview Road before connecting into the Custer substation is zoned R5A. The portion of this segment between Kickerville Road and Vista Road is designated Rural in the Whatcom County Comprehensive Plan. The portion of this segment between Vista Road and the Custer substation is located within the Ferndale UGA.

Other Project Components

The proposed site of wetland mitigation areas CMA 1 and CMA 2 is zoned LII and is entirely contained within the Cherry Point Major Industrial UGA/Port Industrial area.

The proposed sites of Laydown Area 4 and Access Road 3 are zoned Heavy Impact Industrial, and are entirely contained within the Cherry Point Major Industrial UGA/Port Industrial area.

The site of industrial water supply piping modifications at the Alcoa Intalco Works facility is zoned HII and is entirely contained within the Cherry Point Major Industrial UGA/Port Industrial area.

Applicable Land Use Plans and Regulations

The proposed project lies entirely within Whatcom County. The following land use plans and regulations would be applicable to the project. Each is discussed further in Table 3.10-2 at the end of this section.

- Whatcom County Comprehensive Plan (1997);
- Whatcom County Zoning Regulations (Title 20);
- Whatcom County Critical Areas Regulations (Title 16);
- Whatcom County Shoreline Management Program (1998);
- Whatcom County Park and Open Space Plan (1991); and
- Energy Facility Site Locations (Chapter 80.50 RCW and Title 463 WAC).

3.10.2 Impacts of the Proposed Action

Construction

Cogeneration Facility

The cogeneration facility would be constructed on land that Whatcom County has zoned for Heavy Impact Industrial use. Construction of the proposed facility would result in the permanent conversion of approximately 33 acres of predominantly undeveloped, vacant land to developed industrial uses. Project development would generally be compatible with existing industrial uses in the area, including the BP Cherry Point Refinery, the Chemco wood treatment facility, and the Praxair carbon dioxide facility.

Refinery Interface

Construction of the natural gas connections and piping, raw water supply line, steam and condensate system piping, elevated piperack, and other cogeneration facilities that interface with the refinery would occur on Applicant-owned property within the BP Cherry Point Refinery. The refinery is located within the Cherry Point UGA, and would result in the conversion of approximately 31 acres of predominantly undeveloped, vacant land for use as construction Laydown Areas 1, 2, and 3. Approximately 4.7 acres within Laydown Area 2 would be restored as wetland mitigation area after the project is constructed.

Transmission System

A 150-foot-wide utility right-of-way would be required for construction and operation of the cogeneration facility/Bonneville 230 kV transmission system. The right-of-way would extend for approximately 0.8 mile between the cogeneration facility and Bonneville's Custer/Intalco Transmission Line No. 2, and would result in the permanent conversion of approximately 15 acres of predominantly undeveloped, vacant land. At this time, it is not known if additional temporary construction laydown areas would be required for construction of this element of the project. If additional temporary laydown and staging areas were required outside of the existing right-of-way, these would not be located within wetlands, required buffers, or other sensitive areas.

Custer/Intalco Transmission Line No. 2

Option 1 – Remedial Action Scheme

Under Option 1, a new transmission line between the Custer substation and the cogeneration facility interconnect would not be installed, and existing towers for Custer/Intalco Transmission Line No. 2 would not be replaced. This option would not result in any work within the existing Custer/Intalco transmission corridor, and would therefor not result in any land use impacts.

Option 2a – New Transmission Line with Lattice Towers

Under Option 2a, a second transmission line would be constructed and existing transmission towers would be replaced within the existing 125-foot right-of-way of Custer/Intalco Transmission Line No. 2. At this time, it is not known if additional temporary construction laydown areas would be required for construction of this element of the project. If additional temporary laydown and staging areas were required outside of the existing right-of-way, these would not be located within wetlands, required buffers, or other sensitive areas.

Option 2b – New Transmission Line with Monopole Towers

Under Option 2b, double circuit steel monopole towers would be used to replace the existing single circuit steel lattice towers for Custer/Intalco Transmission Line No. 2. As with Option 2a, it is anticipated that all work would be performed within the existing Bonneville right-of-way. Potential construction-related land use impacts under Option 2b would be the same as those discussed under Option 2a.

Other Project Components

North of Grandview Road, approximately 110 acres of undeveloped and agricultural land would be permanently altered to provide wetland mitigation for the proposed project.

Immediately northeast of and adjacent to the cogeneration facility site, approximately 0.2 acre of Laydown Area 4 would be restored as wetland mitigation upon completion of construction.

Widening and extending Access Road 3 south of the cogeneration facility would convert approximately 0.6 acre of vacant, undeveloped land to industrial transportation uses.

Construction of the freshwater supply piping modifications proposed for the Alcoa Intalco Works facility would be consistent with current industrial use of the Alcoa Intalco site and would not result in any impacts on land use.

Operation

The cogeneration facility, refinery interface, and cogeneration facility/Bonneville transmission system would be located within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone as defined in the Whatcom County Comprehensive Plan. The project, including all ancillary facilities, would be consistent and compatible with existing zoning, land uses, and land use plans and regulations. Although the project site and surrounding lands were historically used for agricultural purposes, much of the area has been used for industrial purposes for the past 30 years.

Cogeneration Facility

The cogeneration facility and Access Road 1 would occupy approximately 33 acres of vacant and undeveloped agricultural lands, and would represent the permanent conversion of this land to industrial uses.

Refinery Interface

The natural gas connections, compressor station and piping, water supply piping, steam and condensate system piping, elevated piperack, and other elements of the project that interface with the refinery would be installed in the existing industrial setting within the refinery. Operation of these facilities would not result in any impacts on land use.

Transmission System

The cogeneration facility/Bonneville transmission system corridor would occupy approximately 15 acres of vacant and undeveloped agricultural lands, and would represent the permanent conversion of this land to utility right-of-way uses.

Custer/Intalco Transmission Line No. 2

Option 1 – Remedial Action Scheme

Under this option, modifications to the existing Bonneville transmission lines would not be required. New electrical equipment and cabling to support operation of the RAS would be installed within the existing Custer and Intalco substations. Operation of the transmission line would not result in any impacts on land use.

Option 2a – New Transmission Line with Lattice Towers

Under this option, all new equipment and cabling to upgrade the Custer/Intalco Transmission Line No. 2 would be installed within the existing Bonneville right-of-way. Operation of the transmission line would not result in any impacts on land use.

Option 2b – New Transmission Line with Monopole Towers

Land use impacts under Option 2b would be the same as those described under Option 2a.

Other Project Components

Wetland mitigation areas CMA 1 and CMA 2 would occupy approximately 110 acres of vacant and undeveloped agricultural lands. This would preclude the future use of this land for agricultural or other uses.

Upon completion of construction, Laydown Area 4 would be restored as a wetland mitigation area. This would preclude the future use of this land for agricultural or other uses.

Access Road 3 would permanently occupy approximately 0.6 acre of previously undeveloped vacant land.

Operation of the freshwater supply piping modifications proposed for the Alcoa Intalco Works facility would be consistent with current industrial use of the Alcoa Intalco site and would not result in any impacts on land use.

3.10.3 Impacts of No Action

Under the No Action Alternative, the proposed project, including the proposed wetland mitigation sites, would not be constructed. Therefore, there would be no impacts on land use.

3.10.4 Secondary and Cumulative Impacts

Secondary Impacts

During preparation of the Potential Site Study (PSS) in 2001 (EFSEC 2001), two concerns related to potential secondary land use effects were identified by agencies and the public. The first related to the potential for growth-inducing impacts to occur from the additional work force that would be required to operate the cogeneration facility. The Applicant estimates that approximately 30 additional jobs would be created to operate the facility. The number of these new employees from outside of the region would most likely be extremely small in comparison to the existing housing stock available in the region; therefore, significant growth-inducing impacts associated with operation of the project are unlikely. Section 3.12 provides additional discussion of the project's work force requirements and associated impacts.

A second issue that was raised during the PSS public involvement process related to concerns about the existing and future proximity of residences to the existing alignment of natural gas pipeline connections, particularly in portions of the pipeline where increases in pipeline operating pressure would be required to meet the needs of the proposed project. The natural gas compression station proposed as part of the project would be located west of Blaine Road within the BP Cherry Point Refinery. All natural gas pipes and components between the new compression station, the existing metering station, and the cogeneration facility would be new, and would be located within the refinery and the cogeneration facility. Because the nearest residence is approximately 0.75 mile from the project site, land use impacts on residential uses associated with the construction and operation of the project's natural gas components are not anticipated.

Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations implementing NEPA define cumulative effects as "the impact on the environment which results from the incremental impact of the action (the proposal) when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7).

Whatcom County's planning processes, comprehensive plan, and zoning all contemplate that the area surrounding the proposed project site would be developed for heavy industrial uses. The fundamental purpose of the Cherry Point UGA is to recognize the unique characteristics that make the area locally and regionally important for the siting of industrial development. In designating the project site for industrial uses, the planning process has taken cumulative impacts into consideration.

Other major industrial development that is proposed or planned to occur within the Cherry Point UGA includes the following:

"Clean Fuels" Project

A major planned project within the BP Cherry Point Refinery is the Isomerization Project, also known as the Clean Fuels project. The Clean Fuels project, which consists of a new isomerization unit and a new boiler within the refinery, is currently under construction. The purpose of the project is to process light naptha feedstocks to produce a gasoline blend component that will allow the Applicant to meet the 2005 federal standard for sulfur in gasoline and to decrease benzene in all gasoline produced at the refinery. Construction of the project is planned to take 14 to 18 months, and require approximately 250 construction workers at the peak construction phase. Operation of the new facility is expected to result in 8 permanent employment positions (MFG 2002).

Georgia Strait Crossing Natural Gas Transmission Pipeline

GSX-US, a subsidiary of the Williams Pipeline Company, is currently proposing to construct and operate a natural gas transmission pipeline that would transport natural gas from an existing pipeline system at the U.S./Canada border near Sumas, Washington, to an interconnect with a pipeline proposed by GSX-Canada at Boundary Pass in the Strait of Georgia. The proposed facilities would include new interconnect piping between the proposed system and the west coast and northwest pipeline systems in Sumas, approximately 47 miles of 16- and 20-inch mainline pipeline in Whatcom County and the Strait of Georgia, a new compressor station near Cherry Point, and six mainline valves.

The proposed corridor for the GSX project would route the new pipeline through the cogeneration project site through a new utility ROW along the north side of Grandview Road. During construction, the GSX project would require a 100-foot construction ROW. After construction of the project is completed, the project would require a 50-foot operation ROW along the pipeline. The project, currently undergoing SEPA environmental review, is tentatively scheduled to begin construction in summer 2004 and operation in 2006. See Section 3.8, Energy and Natural Resources, for additional discussion of this proposed project.

Gateway Pacific Marine Terminal

Gateway Pacific Partners has proposed the construction and operation of the Gateway Pacific Terminal (GPT), a new multi-user import/export facility that would be located on the Strait of Georgia shoreline between the existing BP Cherry Point Refinery and the Alcoa Intalco Works

aluminum plant approximately 0.5 mile south of the refinery's marine terminal. When completed, the GPT would be the only site north of California capable of accepting vessels with a draft weight of up to 250,000 tons.

The GPT is being designed to handle bulk commodities, principally feed grains (Midwestern corn), coke, ores, petroleum, potash, sulfur, and alumina for multiple users. The GPT would be a three-berth facility with a total berth length of 2,820 feet accessible by a 1,100-foot trestle that would accommodate trucks, conveyor systems, and piping. In addition to the pier itself, a 100-acre onshore industrial complex would be developed to provide support facilities for terminal operations and provide the opportunity to integrate heavy industrial developments directly with the port. Infrastructure within the terminal complex would include a 24-inch water main, a high-pressure natural gas mainline, and a 115-kV transmission line. A BNSF rail line would provide rail shipping and switching services on the site.

Considered together, the proposed project and the other projects described above (if they go forward) would result in the conversion of lands to industrial uses in this area of Whatcom County. However, because the projects would be consistent with established zoning regulations and comprehensive plan goals, no significant cumulative impacts are anticipated.

3.10.5 Mitigation Measures

There are no additional mitigation measures required for potential impacts on land use for the project beyond those committed to in the project design and project description.

3.10.6 Significant Unavoidable Adverse Impacts

The project's conversion of Applicant-owned undeveloped vacant and agricultural land on the project site to industrial and utility right-of-way uses would be an unavoidable impact that cannot be mitigated. Because the required conversion would be consistent with the Whatcom County Comprehensive Plan and the Cherry Point Major Industrial Area UGA designation and existing industrial zoning of the site, these impacts are not considered significant.

Conversion of vacant and agricultural land within the project site to industrial and utility right-of-way uses would permanently change the use of those lands. However, the proposed uses of the project site would be consistent with adopted land use plans and zoning regulations. Therefore, no significant unavoidable adverse impacts are expected for land use as a result of the proposed project.

Table 3.10-2: Summary of Plans, Policies, and Regulations and their Relationship to the Proposed Project

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
Cogeneration Facility, Refinery Interface, and Other Project Components Whatcom County Comprehensive Plan (1997)	<u>Cherry Point Urban Growth Area</u> The Whatcom County Comprehensive Plan (Whatcom County 1997, as amended) designates the cogeneration facility site and surrounding area as a Major Industrial Urban Growth Area/Port Industrial area referred to as the Cherry Point UGA. The Cherry Point UGA contains nearly 6,500 acres of industrial land, including the BP Cherry Point Refinery, the Conoco-Phillips Refinery, and the Alcoa Intalco Works aluminum smelter. A peaking electrical generation plant owned by Puget Sound Energy also is located in the UGA. BP's Cherry Point Refinery has nearly 2,500 acres within its ownership. The County's comprehensive plan states that the remaining undeveloped acreage at Cherry Point will likely become fully developed during the 20-year planning period. The stated goal in the comprehensive plan for the Cherry Point UGA is as follows: “Goal 2AA: Maintain Cherry Point as an unincorporated urban growth area based on its unique location and characteristics and its significant contribution to the overall industrial land supply and Whatcom County's tax base.” Specific policies to achieve the stated goal include the following: • Policy 2AA-1: Designating Cherry Point as a major industrial UGA to accommodate major users that need to be located away from concentrated urban residential areas. • Policy 2AA-2: Ensuring that Cherry Point's unique features of large parcels, port access, and transportation availability are maintained and protected from incompatible development. • Policy 2AA-3: Requiring the master planning of each large parcel in advance of any development or subdivision at Cherry Point. • Policy 2AA-4: Requiring the designation and site plan for a major user (generally 40 acres or more) before the development of accessory or supporting uses to ensure that accessory or supporting uses are compatible with the major industrial user.	The proposed project would be consistent with the Whatcom County Comprehensive Plan. The project site is located within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone as defined in the Whatcom County Comprehensive Plan. The comprehensive plan designates this area for industrial uses, finds that such industries are economically significant to Whatcom County, and states that these uses therefore constitute a beneficial use of the designated area.

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
	• Policy 2AA-5: Specifying 160 acres as a minimum area for planning before a parcel can be committed by a major user (40 acres or more, singularly or as a cluster or group). • Policy 2AA-6: Permitting support activities, warehousing, shipping, machine repair and service, educational services, food service, and conveniences to locate on a parcel only after the completion of a master plan and the identification and site plan approval for the major user. • Policy 2AA-7: Working with other agencies and industrial owners at Cherry Point to add additional docks, as necessary, that also can serve upland users, provided that the use is consistent with sound environmental practices. • Policy 2AA-8: Resisting inclusion of Cherry Point as part of any future incorporation of Birch Bay to protect interests of the property owner in terms of taxation and urban regulations, to preclude urbanism near "smokestack" industries, and to preserve the county's tax base. • Policy 2AA-9: Continuing to work with service providers that serve Cherry Point to ensure the delivery of services and to allow it to develop to its fullest potential. <u>Birch Bay Urban Growth Area</u> The Birch Bay UGA borders the Cherry Point UGA at its northwest corner along Koehn and Grandview roads (see Figure 3.10-1). There are about 3,000 acres of undeveloped land in Birch Bay with urban zoning, more than 1,000 acres of which are used for parks and other public uses or are undeveloped because of wetlands and other environmentally sensitive areas. A Draft Birch Bay Subarea Plan has been developed for the Birch Bay UGA and surrounding area (Whatcom County 2003a). When adopted by Whatcom County, the plan will be incorporated as part of the County's comprehensive plan. The draft plan proposes to designate the portion of the project site north of Grandview Road for private recreational/open space uses. North of Terrell Creek, the plan proposes a mix of residential uses with a minimum density of four dwelling units (du) per acre, including an area centered on Blaine and Alderson roads that is proposed for multifamily residential (minimum of 16 du per acre) surrounding a designated commercial center. West of Jackson Road, the draft plan proposes a mix of light industrial, open space (parks and recreation), open space buffer (bike and pedestrian trails), residential,	

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
	neighborhood commercial, and government. The plan states that the exact boundaries of each land use and land area would be determined at some future date. Other designated zoning in the vicinity of the Cherry Point UGA is Rural to the north and east, and Public Recreation (Lake Terrell) and Suburban Enclave to the south.	
Whatcom County Zoning Regulations (Title 20, Whatcom County Code)	According to Whatcom County Zoning Regulations, the site of the cogeneration facility and the 230 kV transmission facility is zoned HII. Land north of Grandview Road, both east and west of Blaine Road, is zoned LII. The land farther to the east and north is designated as Rural, and the area to the west and northwest along the shores of Birch Bay, historically a resort community, is a UGA. Other nearby zoning includes Urban Reserve land near the City of Ferndale, Parks/Recreation land to the southeast, and both Rural and Residential-Rural property to the north (see Figure 3.10-1)	The proposed project would be consistent with the Whatcom County Zoning Regulations. The cogeneration facility site is zoned for industrial uses. The Whatcom County Code identifies power generating facilities below the EFSEC jurisdictional threshold as permitted uses within the Heavy Impact Industrial zone (see Whatcom County Code, section 20.68.060). The zoning code currently references the previous 250-MW EFSEC jurisdictional threshold, but this is expected to be revised to reflect the current 350-MW threshold (Middleton, pers. comm., 2001). Facilities with a greater power output require EFSEC approval. The Whatcom County Planning Department indicates that larger facilities are consistent with the County zoning code provided that EFSEC approval is obtained (BP 2002, Section 3.10).
Whatcom County Critical Area Regulations (Title 16, Whatcom County Code)	The Whatcom County Critical Areas Regulations include within their objectives the identification and management of environmentally critical areas and ecosystems to balance human activity and the natural environment. The regulations require that an applicant must: (1) demonstrate that the proposal submitted is generally consistent with the purposes and standards of this ordinance, (2) assess impacts on the critical area from activities and uses proposed, and (3) identify protective mechanisms adequate to meet the requirements of this ordinance. Specific goals of the Critical Areas Ordinance include the following: • Reduce potential losses to property and human life. • Protect the public from harm from landslide, subsidence, erosion, seismic, flooding, and other natural hazards. • Minimize adverse impacts on the quality and quantity of water resources.	The proposed project, with mitigation measures in place, would comply with the Whatcom County Critical Areas Regulations. The regulation requirements applicable to disturbed wetland areas would be addressed through required wetland mitigation, which is proposed as part of the project. (See Sections 2 and 3.5 for further discussion and analysis of proposed wetland mitigation.)

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
	- Prevent destruction to the natural resources necessary to maintain the viability of natural ecosystems. - Protect unique, fragile, and valuable elements of the environment, including fish, shellfish, and wildlife habitat. - Protect the beneficial functions of wetlands, rivers, and streams and avoid, minimize, or mitigate for damage to wetlands, rivers, or streams whenever practicable. Designated critical area categories are geologic hazard areas including landslide, seismic, mine, and alluvial fan hazard areas; frequently flooded areas; critical aquifer recharge areas; wetlands; and fish and wildlife habitat conservation areas. A limited range of activities is authorized within critical areas and their associated buffers. These activities cannot result in increased risk or hazard, and adverse impacts must be minimized and the disturbed area restored immediately after construction. Mitigation may be determined necessary to restore or enhance disturbed sensitive resources.	
Whatcom County Shoreline Management Program (1998)	The Whatcom County Shoreline Management Program (SMP) implements the Washington Shoreline Management Act (SMA) in Whatcom County. The SMP establishes a policy framework for regulating shoreline development and protecting coastal resources in Whatcom County. The SMP has jurisdiction over all designated shorelines of the state and associated upland areas within 200 feet the shoreline, which may include the entirety of an associated wetland and/or floodplain. The project is not within a shoreline zone.	Because the project is not located within a designated shoreline zone, the requirements of Whatcom County Shoreline Management Program are not applicable.
Whatcom County Park and Open Space Plan and the Natural Heritage Plan (1991)	When it was published in 1991, the Whatcom County Park and Open Space Plan and the Natural Heritage Plan for Whatcom County recommended that identified priority lands be addressed in, or recognized by, existing policies and plans. The recreation element of the Whatcom County Comprehensive Plan includes policies that reflect these recommendations. See the preceding paragraphs for additional discussion of the comprehensive plan. Open space includes lands designated under the provisions of the Open Space Taxation Act (RCW 84.34). The Applicant has enrolled approximately 1,000 acres of lands within the project vicinity as open space timberland.	The proposed project would generally be consistent with the Whatcom County Park and Open Space Plan. Any portion of the proposed cogeneration facility site that is currently enrolled as open space timberland would be redesignated for industrial uses; however, this amount would be minor compared to the 1,000 acres of Applicant-owned land currently enrolled as open space timberland. See Section 3.13 for a discussion of existing park and recreation facilities and potential impacts associated with the project.
Washington State Energy Facility Site Evaluation Council	The siting of energy facilities, such as the BP Cherry Point Cogeneration Project, is regulated by EFSEC under Chapter 80.50 RCW (Energy Facilities—Site Locations) and Chapter 463-42 WAC. The Applicant requesting certification from EFSEC is required to submit detailed information on the proposed project and impacts the project may have on the	The proposed project is under EFSEC jurisdiction, and the Applicant has submitted an ASC in June 2002 and an amended ASC in April 2003.

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
	natural and built environments. The Applicant is also required to describe the means to be used to minimize or mitigate possible adverse impacts on the physical or human environment (Chapter 463-42-085 WAC). Further, the Applicant is required to set forth insurance, bonding, or other arrangements proposed to mitigate damage or loss to the environment (Chapter 463-42-075 WAC). Chapter 80.50 RCW preempts state and local jurisdiction relating to energy facility sites that are under the purview of EFSEC. Certification pursuant to Chapter 80.50 RCW is given in lieu of any permit, certificate, or similar document that might otherwise be required. Chapter 463-28 WAC Procedure – Initial Public Hearings and Informational Meeting, requires EFSEC to make a determination as to whether the proposed facility is consistent and in compliance with County or Regional land use plans or zoning ordinances. Should EFSEC find that land use is not consistent, Chapter 463-28 WAC EFSEC Procedure—State Preemption provides procedures to be followed by EFSEC in determining whether to recommend that the state preempt local land use plans or zoning ordinances for a site or portions of a site for an energy facility. An Applicant unable to resolve specific noncompliance issues may file a written request for state preemption as authorized in Chapter 463-28-020 WAC.	At the time of preparation of this Draft EIS, EFSEC has not yet made a determination of compliance with regards to the Whatcom County Comprehensive Plan and Whatcom County Zoning Code.
Transmission Facility and Custer/Intalco Transmission Line No. 2 Whatcom County Comprehensive Plan (1997)	The proposed transmission facility and the north-south segment of the existing transmission corridor that crosses Grandview Road are located within the Cherry Point UGA. Details on the Cherry Point UGA are summarized in this table under the Cogeneration Facility, Refinery Interface, and Other Project Components section above. The segment of the existing transmission line corridor for Custer/Intalco Transmission Line No. 2 between Vista Road and the Custer substation is located in the northern portion of an area designated as the Ferndale UGA. The stated goal in the comprehensive plan for the Ferndale UGA (Goal 2V) is to "Provide a sufficient Urban Growth Area for Ferndale to retain existing character and attain Growth Management Act and county land use goals." The portion of Custer/Intalco Transmission Line No. 2 between Kickerville Road and Vista Road is designated Rural in the Whatcom County Comprehensive Plan. An applicable County goal as it relates to rural lands is	The transmission line elements of the proposed project would be consistent with the Whatcom County Comprehensive Plan. The proposed transmission facility and a portion of Custer/Intalco Transmission Line No. 2 would be located within the Cherry Point UGA. The comprehensive plan designates the Cherry Point UGA for industrial uses, finds that such industries are economically significant to Whatcom County, and states that these uses therefore constitute a beneficial use of the designated area. Reconstructing the portion of Custer/Intalco Transmission Line No. 2 located within the Ferndale UGA would also be consistent with the Comprehensive Plan because it would not change the existing character of this portion of the County.

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
	"Retain the rural character and lifestyle of Whatcom County" (Goal 2CC). In support of this goal, Policy 2CC-1 states "Concentrate growth in urban areas. In areas where existing development patterns do not already prohibit it, draw a distinction between urban/rural uses to prevent urban sprawl." The stated goals and corresponding policies in the comprehensive plan that would be applicable to the transmission line elements of the proposed project are as follows: "Goal 5C: Facilitate accessibility of utilities." Specific policies to achieve the stated goal include the following: • Policy 5C-7: Public facilities and utilities will be designed and located in a manner which protects the integrity of planned land uses, existing land forms, drainage ways, natural systems, critical areas, and resource lands. • Policy 5C-8: Extension of urban utility services will be carefully staged to discourage new development in areas that are premature in terms of planning, timing, and funding. • Policy 5C-9: Extension of urban governmental services and utilities will be confined to areas planned for urban development and be consistent with the optimal land use and urban growth area plan. • "Goal 5H: Facilitate maintenance and rehabilitation of existing utility systems and facilities and encourage use of existing transmission/distribution corridors." Specific policies to achieve the stated goal include the following: • Policy 5H-1: Encourage utility providers to explore expanded and/or joint use of existing utility corridors before seeking sites for new rights-of-way. • Policy 5H-2: Promote, when reasonable and feasible, the co-location of new public and private utility distribution facilities in shared trenches/corridors, as well as coordination of construction timing.	Reconstructing Custer/Intalco Transmission Line No. 2 would involve replacing existing towers within this transmission line corridor; therefore this project element would not result in a change in land use or development patterns and would ensure that this portion of the County retains its existing rural character. The proposed transmission line elements would be consistent with Whatcom County Comprehensive Plan goals and policies concerning public utilities. The new transmission facility would be located in, and consistent with, the Cherry Point UGA. The proposed replacement of Custer/Intalco Transmission Line No. 2 would be consistent with the County's goal to encourage use of existing transmission/distribution corridors because construction would occur within Bonneville's existing right-of-way.

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
Whatcom County Zoning Regulations (Title 20, Whatcom County Code)	According to Whatcom County Zoning Regulations, the corridor for the proposed new transmission line between the cogeneration facility and Bonneville's Custer/Intalco Transmission Line No. 2 is zoned HII. The existing transmission line corridor for the Custer/Intalco Transmission Line No. 2 between the interconnection with the proposed new transmission line and Bonneville's Custer substation traverses three different zoning districts: HII, LII, and R5A. Public utilities, including electrical transmission lines, are regulated under Chapter 20.82, Public Utilities, of the Whatcom County Code. Uses that require a conditional use permit or major project permit and shall be subject to a threshold determination in accordance with the Whatcom County SEPA Ordinance include: (8) Electrical substations and electrical power lines carrying voltages in excess of 55 kV (55,000 volts); provided that no conditional use permit shall be granted for electrical transmission lines carrying more than 115 kV (115,000 volts) except on land where such permits have already been granted or in industrial districts.	The transmission line elements of the proposed project would be consistent with the Whatcom County Zoning Regulations, but would be subject to a conditional use and major development permit. Both the new proposed transmission facility and proposed replacement line inside the existing Custer/Intalco Transmission Line No. 2 right-of-way are planned as 230 kV lines, above the County's 115 kV threshold for granting a conditional use permit (Whatcom County Code Section 20.82.030(8)). However, the proposed transmission facility would be located in an industrial zoning district (HII) and the replacement transmission line would be located within the right-of-way of an existing transmission line that had been previously approved by the County for construction. Therefore, these two proposed project elements would be consistent with local zoning regulations subject to County approval of conditional use and major development permits.
Whatcom County Critical Area Regulations (Title 16, Whatcom County Code)	See details under Cogeneration Facility, Refinery Interface, and Other Project Components above.	Construction activity associated with the new transmission facility would result in the permanent fill or disturbance of approximately 0.15 acre of PEM Category III wetlands, and a Section 404(b) (wetland) permit has already been issued by the U. S. Army Corps of Engineers for work in this corridor. Wetland delineations would need to be performed in areas to be disturbed for reconstructing the Custer/Intalco Transmission Line No. 2 before wetland impacts can be quantified and wetland permits can be issued. However, the regulation requirements applicable to disturbed wetland areas would be addressed through required wetland mitigation, which is proposed as part of the project (see Sections 2 and 3.5 for further discussion and analysis of proposed wetland mitigation.)
Whatcom County Shoreline Management Program (1998)	See details under Cogeneration Facility, Refinery Interface, and Other Project Components above.	Because the transmission line elements of the project are not located within a designated shoreline zone, the requirements of Whatcom County Shoreline Master Program are not applicable.

Table 3.10-2: Continued

Plan, Policy, or Regulation	Description	Relationship to Proposed Project
Whatcom County Park and Open Space Plan and the Natural Heritage Plan (1991)	See details under Cogeneration Facility, Refinery Interface, and Other Project Components above.	The transmission line elements of the project would be consistent with the Whatcom County Park and Open Space Plan. The Transmission facility would be constructed on Applicant-owned, industrial-zoned land within the Cherry Point Major Industrial UGA. Work associated with the reconstruction of Custer/Intalco Transmission Line No. 2 would occur within Bonneville's existing utility right-of-way for the corridor. See Section 3.13 for a discussion of existing park and recreation facilities and potential impacts associated with the project.

3.11 VISUAL RESOURCES, LIGHT, AND GLARE

3.11.1 Introduction

The visual resource analysis evaluates potential impacts from construction and operation of the proposed project, including the cogeneration facility and refinery interface, the 230-kV transmission facility, and modifications to Custer/Intalco Transmission Line No. 2. The analysis was based on the visual resource inventory and analyses reported in the ASC (BP 2002, Section 3.11) and a visual resources study for the Custer/Intalco transmission line prepared by URS (Appendix C). The evaluation of potential impacts on visual resources included the following activities:

- Compiling an inventory of existing visual quality,
- Identifying sensitive viewers and estimating their potential view of the proposed facilities (general visibility and distance zone),
- Describing visual changes introduced by the construction and operation of the facilities,
- Preparing visual simulations of the proposed facility from representative viewpoints,
- Assessing visual impacts from sensitive viewpoints, and
- Recommending mitigation measures for possible visual impacts.

The visual impact assessment considers the impacts to visual resources for the Proposed Action and No Action alternatives. Explanations of the methods used in the visual analyses are as follows:

Visual Quality Inventory

Topography, vegetation (size and shape), and developed land uses were reviewed using USGS quadrangle and project maps. Field reconnaissance was conducted to determine the general visibility of the project facilities and the reconstructed Bonneville transmission lines from the identified sensitive viewpoints (e.g., residences, travel routes, or other sensitive viewpoints). Visual impacts were assessed based on the visibility of change to the existing environment resulting from construction and operation of the project from sensitive viewpoints in relationship to the viewer type. Levels of visual impact are documented as high, moderate, or low.

Visual quality is the visual pattern created by the combination of natural character landscapes and industrial and man-made features. Visual quality was evaluated using the following descriptions:

- Urban/Industrial. Landscape is primarily human-made and affected by elements common to the built environment of urban/industrial areas. Human elements are prevalent or landscape modifications exist, which do not compatibly blend with the natural surroundings (low visual intactness and unity).
- Rural. The landscape consists of natural and human-made features/patterns, often the result of altering the landscape for farming, mineral extraction, or forestry. These areas may not be visually distinctive or unusual within the region. The landscape integrity of the area,

however, may provide positive visual experiences such as natural areas with some existing agricultural areas (farm fields, etc.), or well-maintained and landscaped residential areas.

- Natural. The landscape exhibits distinctive and memorable natural visual features (landforms, rock outcrops, etc.) and patterns (vegetation/open space) that are largely undisturbed, usually a rural or open space setting. Few human-made developments or disturbances are present.

Viewer Sensitivity

Viewer sensitivity is a component of the visual experience that estimates the importance to a viewer of features, conditions that affect visual perception, and social factors that contribute to viewer perceptions. Three types of viewers were considered: residents, workers, and travelers. Viewer sensitivity depends on viewer types and exposure (number of viewers and view frequency), view orientation and duration, and viewer awareness/sensitivity to visual changes. Levels of viewer sensitivity were evaluated using the following criteria:

- Low. Viewers in this group are focused on a work activity and not on the surrounding views. This category might include those who work in agriculture or industrial/warehouse settings. Compared with other viewer types, the number of low sensitivity viewers is generally considered small. Viewer activities typically limit awareness/sensitivity to the visual setting immediately outside the workplace.
- Moderate. Viewers in the moderate visual sensitivity group consist of highway and local travelers. The number of viewers varies depending on location; however, on average they tend to be moderately large based on overall densities of surrounding areas and highway commuters. Viewer awareness and sensitivity also are considered moderate because destination travelers often have a focused orientation.
- High. Residential, recreational, and other viewers congregating in public gathering places (churches, schools, etc.) are considered to have comparatively high visual sensitivity. Views may be of long duration and high frequency. In some cases, views may be perceived to affect property value.

Visual Simulations

Preparation of visual simulations included the following steps:

- Viewpoints were identified from which the projects might be visible. This was undertaken using professional judgment based on accepted methods of visual impact determination and evaluation and nearby public viewpoints.
- Photographs were taken of the existing topographic, vegetative, and human-made features.

Using the preliminary plans, building elevations, and photographs from various viewpoints, project features were illustrated using visual modeling within individual photographs to demonstrate how a particular view is likely to change following project construction, both for the cogeneration facility and the Bonneville transmission lines.

Visual Impact Assessment

Visual impacts relate to changes in available views of the landscape, and the effects of those changes on people. They arise from the changes in land use, the development or construction of buildings and structures, changes in land management, and less commonly, the changes in production processes and emissions. In addition, over the life of a project, different sources of impact occur at various stages during construction, operation, decommissioning, and restoration.

Potential impacts were subjectively evaluated based on a combination of contrasts between natural, rural, and urban/industrial levels of visual quality and the levels of viewer sensitivity. These guidelines show that high sensitivity and moderate visual quality change or moderate sensitivity and a high degree of visual quality change could be considered potentially significant. Where sensitivity and visual change are judged to be moderate or low, potential impacts are considered adverse, but not significant. If there is no change in visual quality or sensitivity, there is little or no assumed impact.

Distance from the proposed project was also considered. Table 3.11.1 summarizes how the visual impact is related to distance from the project site.

Table 3.11-1: Visual Impact Rating

Distance	0 – 0.5 mile		0.5 mile – 3 miles		3 miles or more	
Project	Project Site	Power Line	Project Site	Power Line	Project Site	Power Line
Visual Change	Moderate	Moderate	Moderate	Low	Low	Low
Viewer Sensitivity	Moderate	Moderate	Low	Low	Low	Low

3.11.2 Existing Conditions

Cogeneration Facility, Refinery Interface, and Transmission System

Landscape Setting

The proposed project is located on land formerly used for agriculture. Since the construction of the BP Cherry Point Refinery, the land has been left fallow except for the planting of hybrid poplar trees (see Section 3.6). The proposed project site is adjacent to and east of the refinery. The nearest community is Birch Bay, Washington, about 2 miles northwest of the site.

Grandview Road, a two-lane state highway, is located to the north of the proposed cogeneration facility. An approximately 340-foot vegetated buffer lies between the centerline of Grandview Road and the north fence line of the cogeneration facility site. The proposed project site would be entirely within the refinery property.

The refinery, other industrial uses, and agricultural activities characterize the built environment in the immediate project site. Large stands of evergreen and deciduous trees dominate the landscape to the east of the project site, screening views of the site from the east. To the north

across Grandview Road, a variety of habitat areas have been created and managed by the refinery. Some of these areas are intermittently used for cattle grazing and hay production. To the north beyond the fields, a narrow band of mixed deciduous and evergreen forest screens views of the site from residences to the north. To the northwest, the views are across fields that have constructed ponds, wetlands, and small stands of trees and shrubs. Jackson Road intersects Grandview Road about 1 mile west of the project site. About 0.25 mile north of this intersection along Jackson Road are a church and some residences. An existing Bonneville transmission line extends southwest from the Custer substation near I-5 to a point due east of the project site, then south toward the Alcoa Intalco Works.

Industrial operations of the refinery and Praxair are to the west and south. Forested areas and open fields are south of Aldergrove Road. These forested areas and other forested areas west of the refinery block views of the project site from the south and southwest outside of the Applicant's property.

The Strait of Georgia is located more than 2 miles from the proposed project site to the southwest. The entrance to Birch Bay State Park is located 1.9 miles to the northwest of the site. This park includes forests, wetlands, and a portion of the shoreline of Birch Bay. An important feature of the park is Terrell Creek marsh, a saltwater/freshwater estuary.

Southeast of the project site, stands of deciduous and coniferous trees block views of the project site from locations outside the Applicant's property. Lake Terrell and the 1,500-acre wildlife area managed by the Washington Department of Fish and Wildlife are almost 2 miles beyond this area to the southeast. The Lake Terrell area is popular for fishing and hunting. The Lake Terrell area is also an operating farm, with between 80 and 100 acres in use annually to produce winter food for waterfowl and upland game.

Visual Quality

The project site would be located in an industrial zone characterized by existing industrial development. The BP Cherry Point Refinery dominates the view from the project site looking west. Of the two other nearby industrial operations, Praxair can be seen to the south of the project site. Hybrid poplar trees screen the view of Chemco to the east (see Figure 3.11-1). The surrounding undeveloped land is relatively flat with some hybrid poplar tree stands, wetlands, and grasslands. The project site is bordered by existing roads and utility corridors on the north, west, and south.

Overall, the visual quality of the landscape setting would be classified as a mixture of urban/industrial and rural in character. The natural landscape features and patterns are not visually distinctive or unusual within the region, and industrial development is intermixed with this rural landscape. Visual integrity of the landscape is low in the project vicinity, due to the disturbed nature of the site, a mixture of vegetation types, and surrounding industrial developments, residences, and open space. The landscape does provide some positive visual experiences, however, such as adjacent natural areas and existing agricultural areas, primarily north of Grandview Road and east of Kickerville Road.

Custer/Intalco Transmission Line No. 2

Landscape Setting

The Bonneville transmission line lies between approximately 1/2 mile and 4 miles east of the project site. As such, it has similar relationships to local and regional features, but is set in a mosaic of farmland and mixed deciduous and evergreen forest. Several rural residences are scattered throughout the area. The existing Bonneville transmission line extends southwest from the Custer substation near I-5 through this area to a point due east of the project site, then south toward the Alcoa Intalco Works.

Visual Quality

In contrast to the project site, the Bonneville transmission line to be modified under Options 2a and 2b is located within a largely rural setting characterized by grazing, hay production, scattered farm buildings and residences, and forested areas.

Overall, the visual quality of the landscape setting would be classified as a mixture of urban/industrial, rural, and natural in character. The landscape features and patterns are not visually distinctive or unusual. Visual integrity of the landscape is slightly greater than the cogeneration facility area due to fewer industrial sites.

3.11.3 Impacts of the Proposed Action

Cogeneration Facility, Refinery Interface, and Transmission System

Construction

In general, visual impacts on the overall landscape setting resulting from construction at the cogeneration facility are expected to be low to moderate. The size of the facility (33 acres) is relatively small compared to existing and ongoing land disturbances created by the refinery. Prior to construction, some of the trees in the buffer zone on the south side of Grandview Road would be removed, leaving a partially unobstructed view of the facility for travelers along that road. Construction activities would be visible from this corridor on Grandview Road, but not visible from residential locations. The temporary visual impacts from construction of the transmission link to the Bonneville lines would likely be low to moderate. Farm buildings and a residence are located along Kickerville Road 500 feet east of the connection point between the transmission link and the Bonneville lines. Clearing of the corridor and installation of several towers could be viewed temporarily while the transmission link is under construction.

Operation

When construction is complete, the area along the south side of Grandview Road would be replanted with trees to help screen the site from the road. South of the replanted area would be a forested wetlands mitigation area. Once constructed, the cogeneration facility is expected to introduce low to moderate visual impacts, depending on the viewer type and viewing distance.

The facility would be visually compatible with the industrial development already existing at the refinery, Chemco, and Praxair. The form, color, and scale of buildings would be similar to nearby industrial/warehouse development.

Occasionally, a water droplet plume related to operation of the cooling tower at the facility may be visible. The visibility of the plume would depend on the ambient temperature and relative humidity. The cooling tower's location would partially mitigate the visibility of the plume. On a very cold day, it may be possible to see water vapor from the HRSG exhaust stacks because of the moisture in the flue gas condensing as it contacts and mixes with the cold air outside the stacks. Similar water vapor is produced by the refinery's existing boilers and heaters on cold days. Plumes would be seen from several locations as noted in the descriptions of the viewpoints.

Visual impacts related to the transmission towers and lines linking the cogeneration facility would likely be low. Only several towers would be visible within the context of forest and existing Bonneville towers.

Viewpoints

To analyze potential visual impacts, 15 locations were selected as viewpoints that might affect all three types of viewers. Figure 3.11-1 shows the location of the viewpoints. The following sections summarize the existing visual conditions and potential viewer sensitivity at each of the selected viewpoints. For the purposes of this subsection, the project includes the cogeneration facility and the refinery interface unless otherwise noted. The transmission systems, both the Bonneville lines and the connector from the Bonneville lines to the project, are treated as separate entities and only discussed where towers and lines would be visible from a particular viewpoint.

- Viewpoint 1 (Intersection of Brown and Kickerville Roads). This viewpoint was selected because it is near the closest residences and the Whitehorn Fire Hall. Views at this intersection currently include a pasture to the northwest, beyond which is a deeply forested area, a dairy to the northeast, and residences to the southeast and southwest. From this location, residents currently have no view of the refinery or location of the proposed project because of the forested area to the west of the viewpoint. The residents would be considered to have moderate sensitivity. However, there would be no visual impacts from this intersection.
- Viewpoint 2 (Intersection of Hewleg and Jackson Roads). This viewpoint was selected because it is the entrance to Birch Bay State Park and is near Beachwood Park. Currently, it is possible to see a portion of the stacks associated with the refinery (see Figure 3.11-2). Depending on the time of the year and the presence of vegetation, it may be possible to see upper portions of the proposed cogeneration facility and the water droplet plume from the cooling tower. The sensitivity of travelers at this location is moderate. Because the view of the proposed project site may be obscured by vegetation for much of the year from this location, it is considered to have low impacts. Construction impacts would also be low.
- Viewpoint 3 (Jackson Road and Birch Bay Community Church). The Birch Bay Community Church is located on Jackson Road. From the parking lot of the church, it is possible to see the higher elevation equipment at the refinery, and portions of the water droplet plume from

Figure 3.11-1

Figure 3.11-2: Existing and Simulated Views Viewpoint 2

the cooling tower may also be visible depending on meteorological conditions. The intervening vegetation is low grass up to Grandview Road, beyond which tall forested areas are present (see Figure 3.11-3). Based on the viewer type, traffic volume, and viewing range, visual sensitivity for visitors to the church or southbound travelers along this section of Jackson Road is considered moderate. Potential visual impacts are considered to be low. Construction impacts would also be low.

- Viewpoint 4 (Blaine Road North of the Project Site). This viewpoint is on Blaine Road, which is primarily used by local residents and people conducting business in the surrounding area. No residential development is present in this location. A viewer traveling south on Blaine Road would see the proposed project and transmission system at this location and would observe it for approximately 0.5 mile before stopping at the corner of Blaine Road and Grandview Road. At this intersection, the viewer would either turn east or west. If turning east, the viewer would continue to observe the proposed project and transmission system for approximately another 0.25 mile. This view would have the longest duration of all views of the project site, but since it is in an existing industrial setting and most viewers are traveling by automobile, the visual sensitivity is considered low. See Figure 3.11-4 for a visual representation from the corner of Blaine Road and Grandview Road.
- Viewpoint 5 (Intersection of Kickerville and Aldergrove Roads). This intersection was evaluated because from this viewpoint a traveler on both roads would see tall trees, power lines, various signs, and drainage features for the streets. No residential or industrial features are visible from this location. There would be no visual impacts, either from construction or operation, on travelers or residents in this location.
- Viewpoint 6 (Praxair Facility on Aldergrove Road). The primary view at this location is the Praxair operation next to Aldergrove Road. The dominant existing view from this location is of the refinery. The visual sensitivity for viewers, including travelers and employees of the industrial facilities, at this location is low. No significant visual impact from this location would occur during construction or operation.
- Viewpoint 7 (Intersection of Aldergrove and Jackson Roads). This location is approximately 8,000 feet from the proposed project at the southwest corner of the refinery's industrial boundary. The view from this location was evaluated because it is a public intersection where a traveler would stop; however, neither the refinery nor the proposed project site is visible at this location. The visual sensitivity of these travelers is low. No visual impact from this location would occur, either during construction or operation.
- Viewpoint 8 (Puget Sound Energy Peaking Station on the West Side of Jackson Road). Because of the extensive, tall vegetation on this portion of the refinery property, very few views of the refinery are possible from this viewpoint. Travelers on this road would primarily be involved with local industrial commerce. Therefore, the visual sensitivity of these travelers is low. Because the proposed project would not be visible from this location, no visual impact will occur either during construction or operation.
- Viewpoint 9 (Intersection of Grandview Road and Jackson Roads). This viewpoint was selected because it is a major intersection for travelers. Viewers at this location would be classified as moderately sensitive. From this location, the exhaust stacks of the refinery are not visible because of extensive, tall vegetation. Because the proposed project would not be visible from this location, no visual impact is anticipated during construction or operation.
- Viewpoint 10 (Intersection of Point Whitehorn and Grandview Roads). This viewpoint was selected because residences are present on the north side of Grandview Road at this location.

Viewers at this location would have a high sensitivity to visual impacts. Neither the refinery nor the proposed project site is visible from this viewpoint. Therefore, no visual impacts on travelers or residents are anticipated at this viewpoint, either during construction and operation.

- Viewpoint 11 (Main Entrance to Birch Bay State Park). Viewers at this location would have a high sensitivity to visual impacts. However, because of the trees present in the park, no structure outside the park, including structural features at the refinery and proposed project site, are discernible. Therefore, no visual impacts are anticipated at this location during construction or operation.
- Viewpoint 12 (Residential Development on Bay Road). This viewpoint is located at the residential development approximately 1 mile north of the proposed project site. Viewers at this location are of moderate sensitivity. The view from this location includes tall vegetation to the south and other features associated with residential development. No features of the refinery or of the proposed project site are visible at this location. Therefore, no visual impacts are anticipated at this location during construction and operation.
- Viewpoint 13 (Intersection of Bay and Kickerville Roads). This viewpoint is located approximately 1 mile northwest of the project site and was selected because of its proximity to residential areas. Travelers at this intersection may be recreational visitors, residents, and/or employees of the local industrial facilities. Because of the viewpoint location, viewers would have moderate sensitivity. Based on its distance from the site and the tall vegetation to the south and southwest, no features of the proposed project would be discernible. Therefore, no visual impacts are anticipated at this location during construction and operation.
- Viewpoint 14 (Intersection of Grandview Road and the Railroad Tracks). At this viewpoint, westbound travelers on Grandview Road slow down because of the railroad tracks and are close to the industrial operation of Chemco. Accordingly, viewers at this location are of moderate sensitivity. The refinery is not visible. However, with the construction of the proposed project, some of the tree line along the south side of Grandview Road may be removed. This tree removal would not likely make the refinery or the proposed project visible to viewers at this location. Therefore, no visual impacts are anticipated at this location during construction and operation.
- Viewpoint 15 (Kickerville Road between Brown and Grandview Roads). This viewpoint was selected because of its proximity to the proposed 230-kV transmission lines that would connect the cogeneration facility to Custer/Intalco Transmission Line No. 2. Viewers at this location are of moderate sensitivity. Travelers at this viewpoint can see barns to the south and the Chemco industrial plant to the north. Travelers would be able to see a tall transmission tower constructed to the east of the existing tree line (see Figure 3.11-5). The corridor would be partially obstructed by other trees and vegetation, depending on the location of the traveler. The refinery could be visible for very short durations. However, the proposed project would not be visible. During operation, the visual impact of the transmission system lines and towers at this location is considered to be low based on viewer sensitivity, distance, and the presence of pre-existing farm buildings and industrial structures. During construction, however, the visual impact may be considered moderate because of an increase in activity near the viewpoint. This increase would be related to construction and would likely consist of material stockpiles, construction-related traffic, and installation of new towers and lines. Construction-related impacts, however, would be temporary.

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Figure 3.11-3: Existing and Simulated Views Viewpoint 3

Figure 3.11-4: Existing and Simulated Views Viewpoint 4

Potential Impacts at Viewpoints

Table 3.11-2 summarizes visual impacts from each viewpoint where a potential impact was identified. Visual impacts from the development of the proposed project were evaluated at each of the viewpoints. As described in the individual discussions of the viewpoints, a majority of the viewpoints (1, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14), the proposed project would not have a significant impact because of low viewer sensitivity and obstructed views. For Viewpoint 4, a visual simulation of the cogeneration facility after construction is complete is provided. A description of the potential viewer impacts from the locations where the proposed project would be visible is summarized in the following sections.

Table 3.11-2: Summary of Visual Impacts from Representative Viewpoints

Viewpoint	Location	Visual Quality	Visual Sensitivity	Visual Impact
2	Intersection of Hewleg and Jackson Roads	Rural	Moderate	Low
3	Jackson Road at the Birch Bay Community Church	Rural and Urban/Industrial	Moderate	Low
4	Blaine Road north of the cogeneration facility	Urban/Industrial	Low	Moderate
15	Kickerville Road south of Chemco and near residence	Rural and Urban/Industrial	Moderate	Low

Low = Not Significant

Moderate = Minor Adverse, Not Significant

High = Potentially Significant

- **Viewpoint 2.** Several refinery exhaust stacks are currently visible. Views of the proposed project by travelers on Hewleg or Jackson roads at this intersection would be screened by the brush and trees present in the intervening space (see Figure 3.11-2). Given the presence of vegetation between the intersection and the cogeneration facility, the distance (0.5 to 3 miles), the dispersion of the cooling tower's water droplet plume, and the relative height of the HRSG exhaust stacks, the proposed project is not expected to have a significant impact on the moderately sensitive viewer. The overall visual impact of the project, both during construction and operation, would be low.
- **Viewpoint 3.** The view from the Birch Bay Community Church on Jackson Road would be altered by the HRSG exhaust stacks, the cooling tower's water droplet plume, and a portion of the cooling tower equipment visible at a distance of 7,000 feet (see Figure 3.11-3). However, the refinery exhaust stacks and some other facilities are currently visible from this location as can be seen in the existing view. Therefore, visual impacts to visitors at the church from construction and operation of the project would be low.
- **Viewpoint 4.** From the intersection of Blaine and Grandview roads, the proposed cogeneration facility would be visible because of its proximity to the road. Therefore, visual impacts on travelers using Blaine Road are estimated to be moderate or potentially significant both during construction and operation (see Figure 3.11-4) because the viewing distance is close to the road.

- **Viewpoint 15.** The 230-kV transmission line connection from the cogeneration facility to the existing Bonneville power grid would involve the installation of tall steel lattice towers, which would be located in a corridor through the forested area on the east side of the refinery-owned land. These structures would be visible to travelers along Kickerville Road along with the Chemco facility and from various barns and sheds associated with farm animals (see Figure 3.11-5). No other project-related structures would be visible. Based on the viewer type, traffic volume, and viewing range, visual impact related to the transmission towers for travelers along Kickerville Road would be low for operation and moderate for construction

Visual Contrast

During construction of the proposed project, grass and other vegetation would be stripped away as part of grading operations. This activity would be visible to travelers on Grandview or Blaine roads.

The heights of project components following construction are summarized in Table 3.11-3. Visible components would include the gas turbines, the steam turbine enclosure, liquid storage tanks, the electrical switchyard, the cooling tower, and the HRSG exhaust stacks. The components would be painted gray.

Once completed, the proposed project would appear to be similar to the adjacent refinery, thereby presenting little visual contrast. Metal buildings with vertical and horizontal elements, colors, and large proportional sizes would be similar to those constructed at the refinery site.

Table 3.11-3: Heights of Project Components

Structure	Height
Administration building	30 feet
Steam turbine enclosure	50 feet
Combustion turbine equipment	75 feet
Water tank (demineralization)	50 feet
Cooling tower	60 feet
HRSGs	95 feet
HRSG exhaust stacks	150 feet

Light and Glare

The area surrounding the cogeneration facility would be illuminated at night. Lighting would consist of low-level lighting around exit areas (minimum 2-foot candles) and general outside areas (0.2- to 5-foot candles) including ground-level operating areas, stairs and platforms, roadways, storage areas, and parking areas. This lighting would be provided for purposes of general operator access and safety under regular operating conditions. The precise number and placement of light fixtures have not yet been determined. However, outdoor lights would be a

Figure 3.11-5

combination of pole-mounted and structure-mounted lights. Outside lighting on the exterior of buildings and ancillary equipment would likely be placed above doorways. Lighting angles would vary depending on fixture wattage, light patterns, and light levels. No high-mast, wide-area lighting would be used.

Spot lighting would be provided to illuminate operating equipment, where needed. This lighting would be higher in intensity than general outside lighting (up to 10-foot candles), but would be limited to specific areas and occasional usage. This lighting could be adjusted to minimize light spillover or direct glare in response to specific site conditions.

Emergency lighting would be provided for workers to find exits and continue critical activities during power failures or emergency conditions. These instances are anticipated to be infrequent. Incandescent emergency lighting would be provided for the gas turbine, steam turbine, control room, and other operations buildings.

The steel HRSG exhaust stacks would be 150 feet high. This height would be below the aircraft lighting requirements of the Federal Aviation Administration (FAA). The stacks would have platform lighting at emission monitoring locations, which would only be used during equipment inspection and maintenance.

Light and glare impacts on neighboring properties are expected to be minimal. During the day, potential glare impacts would be minimal because of the planned use of non-reflective gray on exterior surfaces. The potential for adjusting light directions and the use of supplemental light shields/vegetation to provide additional screening, if necessary, would minimize light spillover at night. No glare impacts are anticipated for drivers on Grandview or Blaine roads. As an industrial land use, the cogeneration facility is expected to make a slight contribution to overall ambient light levels in the immediate vicinity. Because of the flat topography of the site, some lights may be seen by distant or elevated viewers. Overall, potential impacts from lighting would be negligible.

Custer/Intalco Transmission Line No. 2

A component of the cogeneration project is the interconnection with the existing Bonneville transmission system. One option known as the Remedial Action Scheme would involve installation of new electrical equipment at nearby substations. No visual impacts would occur as a result of this action. The other option would be to reconstruct Custer/Intalco Transmission Line No. 2 to safely handle the additional power generated by the cogeneration facility. Options 2a and 2b have been identified as part of the second option, and involve two types of towers. Under Option 2a, 120-foot-high, double-circuit steel lattice towers would be spaced 1,150 feet apart. Option 2b would involve the use of 120-foot-high, double-circuit steel poles spaced 900 feet apart. Either option would replace existing single-circuit steel lattice towers 85 feet high and 1,150 feet apart (Figure 1-2).

Viewer sensitivity along the route varies from low to high. Sensitivity of viewers is low in the area of the Custer substation at the east end of the project site. Low to moderate viewer

sensitivity occurs along Grandview Road south of the transmission lines. Viewer sensitivity is high at residences along the route where the transmission lines interrupt many of the views.

Construction

Impacts to visual quality would vary depending on viewer sensitivity. While temporary, impacts are likely to occur as a result of tower replacement, and would consist of construction equipment, material stockpiles, and temporary buildings on or adjacent to the site.

Operation

Option 2a

Under Option 2a, the use of larger double-circuit steel lattice towers may result in a slight increase in effects over the existing towers near residences because of their greater height.

Option 2b

The closer spacing of the double-circuit steel poles that would be used under this option may reduce the visual effects of individual towers, but the decreased spacing would result in a greater number of towers and may offer a slightly greater interruption of views than would the steel lattice towers.

Under either option, operational effects of tower and line replacement over most of the route would have little effect. Near residences, however, the visual effects of the new towers may increase slightly. Overall, the visual effects would be low.

Viewpoints

To analyze potential visual impacts of the transmission line modifications, four locations were selected as viewpoints that might affect all three types of viewers. Figure 3.11-1 shows the location of the viewpoints.

The following sections summarize the existing visual conditions and potential viewer sensitivity at each of the selected viewpoints. Photographs showing existing visual conditions and simulations of potential visual changes associated with the project are included in Appendix C.

- Viewpoint 16. This viewpoint is located where the transmission line crosses Blaine-Ferndale Road and was selected to represent low viewer sensitivity. The Custer substation and existing transmission lines are a prominent feature in the viewshed. Based on the viewer type, traffic volume, and viewing range and small viewsheds, visual impact related to the replacement of transmission towers for travelers along Blaine-Ferndale Road would be low for operation and moderate for construction (Appendix C, Figure A-2, top).
- Viewpoint 17. Although existing transmission lines interrupt north and east viewsheds, views are primarily of rural and natural features, pastoral landscapes with mountains in the distance. Based on viewer type, viewing range, and quality of the view, the visual effects

from the project could be high. Because transmission lines are already visible from this viewpoint, the project would have a low visual impact (Appendix C, Figure A-2, bottom).

- **Viewpoint 18.** Existing transmission lines also interrupt the view west from the Bannerman property, and views are primarily of rural pastoral landscapes. Based on viewer type, viewing range, and quality of the view, the visual effects from the project, as with Viewpoint 17, could be high. Because transmission lines are already visible from this viewpoint, the project would have a low visual impact (Appendix C, Figure A-3, top).
- **Viewpoint 19.** Viewer sensitivity along Grandview Road is low to moderate as a result of the transmission lines being intermittently visible only from about 60% of the road. Views from the road encompass rural and urban industrial features. As a result, low visual impacts on travelers from the project would be expected (Appendix C, Figure A-3, bottom).

Potential Impacts at Viewpoints

Visual impacts from the implementation of the proposed tower replacement were evaluated at each of the viewpoints. Slight increases in effects above existing conditions could occur. See Appendix C for simulated views of potential visual changes along the corridor.

Visual Contrast

During construction of the proposed project, removal of grass and other vegetation may occur as part of gaining vehicle access to towers. This activity may be visible to travelers on Grandview Road, Kickerville Road, Blaine-Ferndale Road, and several minor roads in the area. Stockpiles of construction materials may be placed in areas where none now exist. It is unknown if helicopters would be used as part of the tower and line replacement effort.

Once completed, the proposed towers would appear to be similar to conditions existing prior to tower replacement, thus presenting little visual contrast.

Light and Glare

Because the new towers would not be lighted, no effects from light and glare would occur.

3.11.4 Impacts of No Action

Under the No Action Alternative, the proposed project would not be constructed and existing views of the project site would be maintained. However, at some time in the future, views to the site could be altered when the hybrid poplar trees are harvested. Light and glare levels would remain the same as existing conditions. Because the land is zoned for industrial uses, future industrial development on the project site would likely occur.

3.11.5 Secondary and Cumulative Impacts

When completed, the proposed project will be visually similar to the refinery that has been present on the site for over 30 years. This development will appear as an extension of the existing refinery with an additional water droplet plume, fencing, signs, roadwork, and

landscaping. Because the area surrounding the project site is also zoned for industrial uses, additional development could be anticipated in the future.

In designating the land for industrial uses, Whatcom County considered the visual impact of future industrial development. In its zoning ordinance, the County requires all new development be set back from public roads. By complying with the zoning regulations, future industrial development will minimize cumulative visual impacts on workers, travelers, and residents in the area.

The Applicant has considered cumulative visual impacts by limiting its industrial development to the area south of Grandview Road near the existing refinery complex. The refinery-owned land north of Grandview Road has retained its rural character. The Applicant intends to use this area for wetlands and other environmental mitigation.

3.11.6 Mitigation Measures

To avoid visual impacts at the closest public viewpoints along Grandview and Blaine roads, the Applicant would undertake the following:

- Prepare and implement a site management plan to minimize overall visual impacts associated with construction of the proposed project.
- Cogeneration project elements would be painted gray. This color is intended to reduce surface glare from direct sunlight.
- The cogeneration facility would be located approximately 340 feet south of the centerline of Grandview Road, creating opportunities to plant screening trees, shrubs, and vines consistent with final approved landscape designs. In addition, existing trees between the road and the site would remain, based on the project description.
- Project site lighting would be designed to minimize light spillover and glare.

3.11.7 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on visual resources are identified.

3.12 POPULATION, HOUSING, AND ECONOMICS

This section discusses potential impacts and mitigation measures associated with changes in population, the availability of housing, and state and local economic conditions. The analysis in this section is primarily based on information provided by the Applicant in the ASC (BP 2002, Section 3.12 and Appendix L). Where additional sources of information were used to evaluate the potential impacts associated with the proposal, those sources have been cited.

3.12.1 Existing Conditions

Study Area

For the purposes of this section, the study area is defined as Whatcom County and Skagit County, Washington. The primary focus is on those communities within a 50-mile radius of the proposed cogeneration facility site at Cherry Point. The majority of project construction and operation workers are expected to commute from within this 50-mile radius.

Communities within the study area include the Lummi Reservation, which lies 5 miles south of the project site, and the Nooksack Reservation, 23 miles to the east. The incorporated cities of Blaine, Ferndale, Bellingham, Everson, and Lynden are within a 25-mile radius, as are the two smaller cities of Sumas and Nooksack. A number of other unincorporated small communities are found within commuting distance of the project site. Farther south in Skagit County, a 50-mile radius of the project site includes the cities of Anacortes, Burlington, Mount Vernon, and Sedro-Woolley, as well as a number of smaller incorporated and unincorporated communities.

A number of Canadian jurisdictions also lie within the 50-mile radius of the project site, including the urban centers of Vancouver and Victoria, British Columbia. However, most of the potential economic and social impacts would likely be experienced in Whatcom and Skagit counties, rather than in Canadian communities.

Population

Much of the population of Whatcom and Skagit counties is found in the western one-third of each county along the Interstate 5 corridor. The eastern two-thirds of both counties is largely dedicated to National Park and National Forest lands and have relatively few permanent residents. Whatcom County contains 2.8% of Washington State's population and Skagit County contains 1.7%. Table 3.12-1 presents population data for Whatcom and Skagit counties, with Washington State data provided for comparison purposes.

Washington State's population increased approximately 21.1% from 1990 to 2000, with faster growth occurring early in the decade. In Whatcom County, the population growth rate was higher than that of the state at approximately 30.5% during this period with steady annual growth. More than 75% of this growth was the result of in-migration, a response to the booming economy of the early 1990s. Skagit County also followed the pattern of high steady growth with net in-migration accounting for almost 80% of population growth.

Table 3.12-1: Population Data

Jurisdiction	Population 1990	Population 2000	% Change 1990-2000 Actual	% Change 2000-2010 Forecast	% Change 2010-2020 Forecast
Washington State	4,866,663	5,894,121	21.1	12.8	13.5
Whatcom County	127,780	166,814	30.5	17.2	17.8
Unincorporated	59,187	76,060	28.5	-	-
Incorporated	68,593	90,754	32.3	-	-
Skagit County	79,545	102,979	29.5	20.2	21.5
Unincorporated	37,841	44,506	17.6	-	-
Incorporated	41,704	58,473	40.2	-	-

Source: BP 2002, Appendix L; OFM 2002

Population growth forecasts were last published in 2002. As shown in Table 3.12-1, growth in Whatcom and Skagit counties is expected to continue to outpace that of Washington State although the future rates of growth in the counties and the state are expected to be lower than in the 1990s. Assuming a construction start date of early 2004, peak construction employment would occur in early 2005. At that time the population of Whatcom County is estimated to be 180,463. This estimate represents an increase of 13,649 people or 8.2% over the 2000 population (OFM 2002). The cogeneration facility would become fully operational approximately 12 months later, early in 2006. At a constant rate of annual growth in Whatcom County of 1.6%, the population is calculated to grow by approximately 2,900 people between 2005 and 2006.

The data on race show that in 2000, whites made up approximately 88.4% and 86.5% of the populations in Whatcom and Skagit counties, respectively, as compared to 81.8% for Washington State overall. Representation of other races is generally low across both counties, although Mount Vernon and nearby Burlington are more diverse with a relatively higher proportion of Hispanics compared to other parts of Whatcom and Skagit counties and the rest of Washington State (BP 2002, Appendix L).

Housing

In 2000, Whatcom County had a total of 73,893 housing units and Skagit County had 42,681. Both counties saw growth in housing stock comparable to population growth over the decade 1990-2000, although to a lesser degree for Skagit County compared to Whatcom County. Housing is more likely to be privately owned in both counties and vacancy rates are higher for rental properties than for owned properties. Housing data are presented in Table 3.12-2.

Based on calculations using the above vacancy rates, the total number of vacant units in Whatcom County is 2,572, of which about 1,400 (55%) are in the incorporated communities, including more than 1,000 vacant units in Bellingham. Skagit County has 1,173 vacant units with 750 (64%) in incorporated areas.

Over the past decade, housing construction in the study area has kept pace with population growth. Vacancy rates are in excess of the 4% threshold, which represents a balanced condition (BP 2002, Appendix L). Forecasts of slower population growth over the 2001-2020 time frame may somewhat constrain new construction.

Table 3.12-2: Housing

Jurisdiction	Total Housing Units 1990	Total Housing Units 2000	% Change 1990-2000	Vacancy Rate - Owners	Vacancy Rate - Renters	Total Vacant Units	Owner-Occupied	Renter-Occupied
Washington State	2,032,306	2,451,075	20.6	1.8	5.9	79,694	64.6	35.4
Whatcom County	55,742	73,893	32.6	2.2	5.7	2,572	63.4	36.6
Skagit County	33,580	42,681	27.1	1.9	4.7	1,173	69.7	30.3

Source: BP 2002, Appendix L

In 2000, the average rent in Whatcom County for a two-bedroom unfurnished apartment was \$588. Skagit County average rents are not available. The median sales price for existing homes is \$151,800 in Whatcom County and \$162,000 in Skagit County.

A number of temporary housing options are available in Whatcom County. More than 120 facilities are within a 25-mile radius of the project, including at least 21 bed and breakfasts, 15 RV parks, and 15 campgrounds. More than 30 hotels and motels are members of the Bellingham/Whatcom County Convention and Visitors Bureau; collectively, they have approximately 1,700 rooms. About 30 non-member hotels are located in the area as well. Most of these facilities offer long-term rates.

Economics

Major Industries and Top Employers

Table 3.12-3 provides employment data by sector for Whatcom and Skagit counties as compiled by the Washington State Employment Security Department. For both counties, the services sector is the largest based on number of people employed, followed by retail trade, government, and manufacturing. The manufacturing sector experienced large job losses in 2001, particularly in Whatcom County.

Washington State Economic Security Department projections on employment growth for Whatcom County indicate that the services and government sectors will grow the fastest at rates of more than 16% over the five-year period, 1998-2003. Because these sectors employ large numbers of people, they will grow the most in absolute terms as well. Construction and retail, two sectors closely aligned with population growth, are forecast to grow approximately 10% for this five-year period, more or less equal to expected population growth. Other economic sectors will likely see growth rates of less than 5%.

The BP Cherry Point Refinery is one of the top employers in Whatcom County with 400 proprietary employees and an average of 400 contract employees. The refinery's use of contract maintenance employees peaks at approximately 2,400 during major refinery maintenance activities every few years. Other significant employers in Whatcom County are St. Joseph Hospital (1,700), Western Washington University (1,292), Bellingham School District (1,200),

Alcoa Intalco Works (925), and Whatcom County government (700). The employment figures in parentheses include both full- and part-time employees.

Significant full- and part-time employers in Skagit County include Affiliated Health Services (1,039), Skagit Valley College (790), Mount Vernon School District (638), Sedro-Woolley School District (590), Draper Valley Farms (500), Island Health Northwest (466), Brown and Cole, Inc, retail food (410), Skagit County government (408), Anacortes School District (374), and Skagit Valley Medical Center (354). These largest employers employ approximately 5,500 people, a third of whom work part time. The above employers account for about 10% of Skagit County employment.

Table 3.12-3: Employment by Sector, 1999

Sector	Employment		% of Total Employment		
	Whatcom	Skagit	Whatcom	Skagit	Washington
Total Private	77,308	45,425	87.0	84.3	84.3
Agriculture, Forestry, and Fishing	2,486	1,999	2.8	3.7	1.8
Construction	8,457	4,519	9.5	8.4	6.3
Manufacturing	10,135	5,838	11.4	10.8	11.3
Transportation and Public Utilities	3,408	2,154	3.8	4.0	4.7
Wholesale Trade	4,035	1,836	4.5	3.4	4.9
Retail Trade	17,402	11,162	19.6	20.7	17.1
Finance, Insurance, and Real Estate	6,179	3,445	7.0	6.4	7.8
Services	25,206	14,472	28.4	26.9	30.4
Government	11,505	8,470	13.0	15.7	15.7
Total Employment	88,813	53,895	100.0	100.0	100.0

Source: BP 2002, Appendix L

Employment and Wages

Selected employment and income data compiled by the Washington State Employment Security Department are presented in Table 3.12-4. Unemployment rates fluctuated in Whatcom and Skagit counties during the 1990s. Fluctuations arise because almost half of private sector workers are in businesses that are seasonal, cyclical, or suffering from long-term decreases in employment.

Whatcom County experienced an unemployment rate of 5.7% in 2000, which represents approximately 4,500 unemployed people. More recently, unemployment has risen in 2001, surpassing 6% in Whatcom County. Skagit County has an unemployment rate of 6.9%, which represents approximately 3,500 unemployed people. In both counties, although the unemployment rate has generally fallen over the past decade, rapid population growth has meant that the fall was not sufficient enough to reduce the number of unemployed people. In comparison, the statewide rate for Washington was 5.2% in 2000, and the total number of unemployed has fallen.

Table 3.12-4: Employment and Income, 1990-2000

	Population	Unemployment Rate	Number of Unemployed	Average Annual Wage	Median Annual Household Income
Washington State					
1991	5,021,335	6.4	162,290	23,936	34,374
2000	5,894,121	5.2	158,458	37,038	50,152
% Growth	17.4	-	-2.4	54.7	45.4
Whatcom County					
1991	132,576	6.5	4,472	19,866	32,001
2000	166,814	5.7	4,650	26,295	41,300
% Growth	25.8	-	4.0	32.4	29.1
Skagit County					
1991	82,882	8.3	3,336	19,481	30,748
2000	102,979	6.9	3,560	26,634	41,585
% Growth	24.2	-	6.7	36.7	35.2

Source: BP 2002, Appendix L

The average annual wage (mean earnings per job per capita) in 2000 was \$26,295 in Whatcom County and \$26,634 in Skagit County, both lower than the average of \$37,038 for Washington State. The pattern is repeated for median household income (the income at which half of the households have a higher income and half have a lower income). Both average wages and median household income increased steadily over the decade for both counties, although at a somewhat slower rate than they did for Washington State as a whole.

3.12.2 Impacts of the Proposed Action

In the following analyses of construction and operational impacts, the components of the proposed action are considered together. The nature of potential population, housing, and economic impacts are such that the overall effect on these elements of the environment needs to be considered together to adequately evaluate their significance.

Construction

Population

To estimate the number of workers that would relocate to the study area, the availability of local labor was examined. This approach compares the number of people currently employed by trade within the local labor pool with the number required during construction of the project. Where the construction requirements for a specific trade approach or exceed the number currently employed locally, some relocation to offset potential labor shortages can be assumed. Table 3.12-5 provides estimated labor requirements by trade for construction of the project relative to the total number employed within each trade in the study area in 2000.

Table 3.12-5: Labor Requirements and Employment

Trades	Construction Workforce Requirement (Jobs)	Total Employment ¹
Boilermakers	53	53
Carpenters	70	2,696
Electricians	120	1,297
Laborers	43	2,241
Pipefitters	154	100
Painters/Insulators	13	1,036
Bricklayers	10	149
Millwrights	56	217
Operating Engineers	45	117
Truck Drivers	20	1,859

Source: BP 2002, Appendix L

1 The total employment by trade figures are for the four counties of Whatcom, Skagit, San Juan, and Island. Whatcom and Skagit make up 75% of the four county populations.

A comparison of the numbers in Table 3.12-5 suggests a requirement to relocate some employees, particularly boilermakers and pipefitters, because the construction requirements exceed the number currently employed. Relocation of operating engineers and millwrights could also be required depending on employment levels for those trades at the time of construction. On the assumption that workers from these trades may have to relocate, the relocation requirement could be as high as 150 workers. Including relocated employees from indirect labor, which is the number of jobs created in local companies that would provide goods and services in support of project construction, relocation could be as high as 180 workers (see Section 3.12.4).

Depending on the type of employment offered to workers and their individual family situation, the choice of whether or not to commute on a weekly basis or relocate as a resident in the project area will vary. Because few jobs will extend throughout the school year (in fact 90% of the construction jobs will last less than one year), it is expected that most relocating workers will prefer to commute on a weekly basis, leaving family behind. No more than 20 direct or indirect employees would be expected to have family members with them. On the basis of average household size figures for Washington State, these 20 workers could bring 26 family members with them, which would be insignificant relative to the population of the counties.

Housing

Given the low number of potential relocations, including those for a duration long enough to warrant bringing family members, housing availability and prices would not be significantly affected. In 2000, Whatcom County had more than 2,572 vacant rental and owned housing units, and Skagit County had over 1,173 vacant rental and owned housing units. Temporary construction workers would likely seek rental housing over owner housing. Calculating from the vacancy rates in Table 3.12-2, approximately 1,500 (60%) units of vacant housing are rental property in Whatcom County and 600 (52%) in Skagit County. Because the expected number of relocating workers is relatively low, no significant impact on rental housing is anticipated.

The majority of relocating workers will likely seek temporary housing. Temporary housing is widely available in Whatcom County, where most of the commuting or temporarily relocated

workers are expected to seek accommodation. As described in Section 3.12.1, more than 120 facilities are located within a 25-mile radius of the project site. With an estimated total of 4,000 rooms or other types of short-term accommodation in the project area, 180 relocating workers seeking temporary housing would represent about 5% of supply. This figure is well within typical vacancy rates for temporary housing facilities in Whatcom County of more than 10% (BP 2002, Appendix L), even in the peak summer months. The supply of temporary housing is, therefore, unlikely to be significantly affected.

Economics

Construction Workforce

The Applicant has developed an estimate of preliminary staffing requirements for the construction phase of the project. During construction, which would last about 25 months, monthly employment on the site would average 372 people, with peak employment of 706 individuals. The project would have a total labor requirement of 8,566 person-months, equivalent to 714 jobs of one-year duration.

The labor force would vary from month to month, rising fairly slowly from an initial core construction team of 45 people. The workforce numbers would then rise as increasing numbers of craft workers are needed. Over a 12-month period, workforce numbers are expected to peak at 706, and then fall over the remaining 11 months until the last month of construction when only 23 people would be employed on the site. Table 3.12-6 provides information on labor force requirements by trade. The highest craft demand will be for pipefitters, electricians, carpenters, millwrights, and boilermakers, in that order.

Table 3.12-6: Total Workforce Demand by Trade

Trade	Project Workforce (Person-Months)	Project Workforce (Number of Jobs)
Boilermakers	632	53
Carpenters	845	70
Electricians	1,441	120
Ironworkers	329	27
Laborers	512	43
Pipefitters	1,851	154
Painters/Insulators	159	13
Bricklayers/Masons	117	10
Millwrights	671	56
Operating Engineers	534	45
Truck Drivers	236	20
Mechanical	110	9
Civil	146	12
Field Staff	983	82
Total	8,566	714

Source: BP 2002, Appendix L

In 2000, 8,457 construction workers were employed in Whatcom County and 4,519 were employed in Skagit County, for a total of almost 13,000. The average construction workforce for the project at 372 workers is equal to 2.9% of employed construction workers in the two counties. The peak workforce during construction of the proposed project would be 706 workers, which is equal to 5.5% of employed construction workers in the two counties. Given the seasonal nature of the construction work, the locally available construction workforce in Whatcom and Skagit counties would be sufficient, pending the availability of specific skills.

Wages

Although actual wage costs would not be known until the Applicant selects its contractor, it is expected that wage rates would approximate typical wages paid for various construction trades in Whatcom County. Table 3.12-7 presents data on average wages in Whatcom County for those trades that would be required for construction of the project. Average wages for Washington State are also presented for comparison purposes.

Table 3.12-7: Mean Hourly and Annual Wages by Trade

Trade	Whatcom		Washington		Project Jobs	Total Wages
	Mean (hr)	Mean (yr)	Mean (hr)	Mean (yr)		
Boilermakers	23.66	49,200	24.16	50,260	53	2,591,200
Carpenters	18.11	37,670	19.50	40,560	70	2,652,596
Electricians	20.61	42,880	21.99	45,740	120	5,149,173
Ironworkers	-	42,646	21.58	44,890	27	1,169,197
Laborers	16.95	35,250	16.71	34,750	43	1,504,000
Pipefitters	21.14	43,970	22.91	47,650	154	6,782,373
Painters/Insulation Workers	17.12	35,610	16.08	33,440	13	471,833
Bricklayers/Masons	-	46,712	23.64	49,170	10	455,437
Millwrights	-	42,190	21.35	44,410	56	2,359,096
Operating Engineers	17.82	37,080	21.85	45,440	45	1,650,060
Teamsters	15.59	32,420	16.63	34,600	20	637,593
Mechanical	19.84	41,261	21.45	44,609	9	378,226
Civil	19.84	41,261	21.45	44,609	12	502,009
Field Staff	23.66	49,200	27.44	57,080	82	4,030,300
Total					714	30,333,093
Average Wage	18.19	37,830	20.15	41,920		42,493

Source: BP 2002, Appendix L

Local Fiscal Effects

Of the \$465 million in estimated direct construction costs, approximately \$30 million would be paid as wages. The percentage of the \$30 million wage that would be spent in Whatcom and Skagit counties would be strongly related to the percentage of the workforce that resides in the two counties. Because most of the construction workers would be recruited from within the study area, approximately \$19 to \$20 million of wages would be spent locally by construction workers.

Sources of equipment, materials, and services for the project would be determined when the contractor is selected and materials contracts are awarded. However, given the nature of the project, some broad conservative estimates can be provided.

The equipment costs for the project, estimated to be approximately \$300 million, would likely be spent outside of the study area because the vendors of electrical generation and associated equipment are located elsewhere in the U.S.

The balance of direct construction costs, approximately \$135 million, would be spent on services and materials related to architectural design, engineering, construction of civil works, building materials, and construction management. Possibly 10%, or \$13 million, would be spent within the project area and throughout Washington State.

Tax Revenue

Tax revenue from construction of the project would accrue to Whatcom County and Washington State. The state imposes a 6.5% sales or use tax on products sold or used within the state, and Whatcom County imposes an additional 1.1% tax. Because the project is in an unincorporated area, the full amount of this 1.1% tax would go to county revenue. This total of 7.6% tax on the \$300 million in equipment costs is equivalent to \$22.8 million, of which \$3.3 million would flow to Whatcom County and the balance to Washington State.

Of the \$165 million estimated costs for services and materials associated with construction, approximately \$65 million would be used to pay for materials. At the combined 7.6% sales tax rate, \$4.9 million in revenue would be generated, of which \$700,000 would accrue to Whatcom County and the balance would flow to the state.

The fiscal benefit to Whatcom County would be slightly higher than the \$4 million from the above calculations. State revenue, which includes the taxes paid on this project, is in part distributed to counties according to annual plans at the state level. Also, part of the expenditures by construction workers as well as by individuals benefiting from indirect employment creation, whether resident or commuting, would be subject to sales tax. The state also would benefit from taxes that are embedded in the price of consumer items purchased with increased incomes resulting from the project.

Sales and use tax revenue from the purchase of project construction materials and from the expenditures of construction workers are a significant one-time benefit to Whatcom County and the state. Total sales and use taxes in Whatcom County are expected to be \$8.2 million in 2002. Sales and use tax revenue generated from the project would represent an almost 25% increase in this tax revenue at the county level.

In addition, property taxes are applied to construction sites on the basis of an evaluation of work completed to date in each year. The actual amount paid would depend not only on levy rates at the time the construction is under way, but also on the construction schedule relative to the timing of evaluation. However, overall it would increase the total tax revenue to Whatcom County and the state by several million dollars.

Operation

Population

During operation of the cogeneration facility, the Applicant anticipates employing approximately 30 staff on a permanent basis, which is a very small number relative to the local population size. This staff will likely be recruited from the study area, with the possible exception of some specialized management staff. Assuming that some specialized management staff may be recruited from outside the area, it is possible that up to 10 people may be direct hires and another 5 as indirect hires, for a total potential relocated labor force of 15 during operation of the project. Indirect hires would be new employment in local companies that would provide goods and services in support of project operation.

During operation of the cogeneration facility, direct and indirect personnel from out of the area would likely move to Whatcom County permanently and distribute themselves between owned and rental accommodation according to prevailing housing patterns. Using Washington State family size figures for owners and renters, the relocation of a maximum of 15 workers is likely to result in an increase in the county population by approximately 38 people, which represents an insignificant increase.

Housing

Given the low number of potential relocations, housing availability and prices would not be significantly affected. In 2000, Whatcom County had more than 2,572 vacant rental and owned properties, and Skagit County had more than 1,173 vacant rental and owned properties.

Economics

Operation Workforce

During operation of the cogeneration facility, the Applicant anticipates employing approximately 30 staff on a permanent basis. Plant management and technical staff constitute about one-third of the prospective workforce; two-thirds of employees would be operation and maintenance technicians. The workforce breakdown by skill is shown in Table 3.12-8. Staff would work in shifts to run the facility 24 hours per day, seven days per week.

In addition to the permanent workforce, maintenance periods varying from two weeks per year to 18 weeks every six years would increase the workforce on a temporary basis. The maintenance schedule would repeat on a six-year cycle, and over the cycle a total of 50 person-months or four jobs of one-year duration of maintenance work would be required.

Table 3.12-8: Expected Operation Workforce

Position	Workforce
Plant Manager	1
Business Manager	1
Business Analyst	1
Scheduler	1
Plant Engineer	1
Operations Supervisor	1
Operations Foremen	4
Operations Technicians	11
Maintenance Supervisor	1
Maintenance Technicians	6
Health and Safety Specialist	1
Controls Engineer	1
Total	30

Source: BP 2002, Appendix L

Local Fiscal Effects

Salaries, wages, and benefits for cogeneration facility employees are expected to total about \$1.8 million per year. The average project wage would be significantly higher than the average Whatcom County wage of \$26,295. It is likely that all personnel would be residents of Whatcom County, and these employees would spend a large part of their annual wages locally.

In addition, temporary labor would likely be contracted from within the study area. The annual estimated cost of wages and benefits paid for these services would be about \$200,000, which brings the annual cogeneration facility labor cost to approximately \$2 million.

Annual operation and maintenance costs for the cogeneration facility, excluding the cost of natural gas, are estimated at \$18.2 million. Of this, \$2 million is for wages and benefits and \$6 million is for maintenance and repair of materials, and water and chemical costs. The potential for purchase of materials in the study area is limited and would not likely exceed 5% of the total. A further \$3 million would be spent on contractors hired to complete specialized maintenance activities that cannot be undertaken by permanent staff. Annual property tax to Whatcom County could be up to \$6 million. The balance of \$1.2 million would be spent on insurance and other costs.

Tax Revenue

Tax revenue during operation would be derived from brokerage tax imposed on natural gas purchases, property taxes on the cogeneration facility, sales and use taxes on materials purchased in the course of operating and maintaining the facility, and sales tax on expenditures by the 30 employees who would fill new jobs created by the project.

Washington State applies a brokerage tax of 3.852% on purchases of natural gas. The Applicant has estimated gas consumption at between 39,240,000 and 46,110,000 million Btu/yr Higher Heat Value (HHV) on the assumption of a facility capacity utilization of 80-94%. Assuming a natural gas price of \$3.00 per million Btu HHV, brokerage tax revenue accruing to the state would be between \$4.5 and \$5.3 million annually. This figure would vary with fluctuations in the price of natural gas, and with the volume of gas purchased on an annual basis by the cogeneration facility.

In 2001, Whatcom County levied total property taxes of \$149.7 million for property with a cumulative assessed value of \$11,547 million. Assuming an assessed value for the cogeneration facility equal to its \$465 million construction cost, total assessed value of taxable property in the county would increase by approximately 4%. At the time of project completion, total property taxes could be up to \$6 million annually using the 2001 average tax rate. Of this, approximately \$0.7 million would accrue directly to Whatcom County, \$1.5 million to Washington State, and the balance of \$3.8 million to the county's school, fire, hospital, water, recreation, and port districts and to its incorporated cities.

During operation, the cogeneration facility would also pay business and occupation (B&O) and public utility tax to the state of Washington. The B&O tax is levied on product revenues at a rate of 0.484%. The public utility tax is levied on the basis of gross operating revenue at a rate of 3.873%. The total tax paid would depend not only on the tax rate, but also on the tax classification of the cogeneration facility; available exemptions, deductions, and credits associated with project operation; the volume of production; the location of sale of the energy; and the price of energy. Nevertheless, taken together these taxes are likely to be several million dollars per year.

Because of the relatively few number of relocating employees created by the cogeneration facility, the project is not expected to place significant additional demands on local public services. No impacts on government service costs either from project construction or operation have been identified, and the net fiscal balance would remain positive throughout the project lifecycle because of the additional tax revenue collected.

Environmental Justice

In 1997, Whatcom County had a poverty rate of approximately 11.4%, equal to 17,650 people (BP 2002, Appendix L). The Lummi Reservation has been identified as a "low income" census tract area, which means that more than 20% of the population has an income less than national poverty rates. The U.S. government has identified the Nooksack Reservation as a "distressed community," which means that more than 30% of the population has an income below the national poverty rate, and the unemployment rate is greater than the national average of 1.5%. The only other area in Whatcom County identified as either low income or distressed is the sparsely populated rural southwest corner. The reservations are therefore disadvantaged relative to the rest of county jurisdictions with poverty rates two to three times higher and significantly more unemployment.

Construction and operation of the cogeneration facility would not displace any people, including any low-income or minority people, or those living on the reservations. It also would not have any disproportionately negative impacts on these people.

3.12.3 Impacts of No Action

Under the No Action Alternative, the cogeneration facility would not be constructed. No additional employment or tax revenues would be created, and no workers would relocate to the project area. No construction or operational impacts related to population, housing, or economics would occur.

3.12.4 Secondary and Cumulative Impacts

The indirect workforce associated with the construction stage of the project is estimated at 210 people (BP 2002, Appendix L). Indirect employment includes jobs created in local companies that would provide goods and services in support of the project. Unlike construction labor, which may be recruited from outside the study area because of trade-specific shortages, indirect labor is more likely to be locally recruited with local businesses benefiting from increased expenditures by the construction workforce. If 15% of indirect labor were recruited from outside the study area, this is equivalent to approximately 30 people. The recruitment outside the study area would total about 180 direct or indirect workers, who could choose to relocate to the study area. Labor availability for indirect employment would be unconstrained given local unemployment rates.

The project would also be a source of induced employment, which is employment that results from the increased economic activity that occurs when workers and local suppliers and their employees have increased disposable income as a result of project construction. In an economy such as Whatcom County's, which is characterized by much seasonal employment (related not only to a strong construction industry, but also to tourism and to a lesser extent agriculture and fisheries), induced employment tends to be absorbed. That is, rather than mobilizing and demobilizing to service particular projects or seasonal events, the local economy and infrastructure can absorb and respond to temporary economic events. Swings in revenue are experienced by local businesses, for example, but do not necessarily result in constant hiring and firing. On this assumption, impacts from induced employment expected from construction of the cogeneration facility are not considered to be significant, although local businesses are likely to experience increases in income.

With the current unemployment rate, the construction and operation of the cogeneration facility would reverse recent losses of jobs and revenue in the county. No significant cumulative impact on population growth or the availability of housing would occur.

3.12.5 Mitigation Measures

Because no significant adverse impacts related to population, housing, or economics would occur, mitigation measures would not be necessary.

3.12.6 Significant Unavoidable Adverse Impacts

Increases in population and housing demand created by construction and operation of the cogeneration facility would be relatively low compared to the population and housing market in Whatcom and Skagit counties. Also, because of the relatively small number of relocating employees created by the cogeneration facility, the project is not expected to place significant additional demands on local public services; therefore, no significant unavoidable adverse impacts on population, housing, or economics are identified.

3.13 PUBLIC SERVICES AND UTILITIES

This section discusses existing conditions, impacts, and mitigation measures for public services and utilities within the vicinity of the project site. The analysis in this section is primarily based on information provided by the Applicant in the ASC (BP 2002, Section 3.13 and Appendix L). Where additional sources of information were used to evaluate the potential impacts associated with the proposal, those sources have been cited.

3.13.1 Existing Conditions

Recreation

Recreational opportunities for both residents and tourists range from the national parks and forests found in the eastern two-thirds of Whatcom County, to the opportunities offered by Puget Sound in the west, to the urban attractions of the historic village of Fairhaven. Table 3.13-1 presents a listing of major public recreational areas in Whatcom County. With the exception of the smaller, specific-purpose areas such as the Hovender Homestead Park, most of the recreational areas listed in Table 3.13-1 offer multiple-use opportunities for sport, education, and accommodation.

Table 3.13-1: Major Public Recreational Areas

Recreational Area	Location	Approximate distance from project site	Facilities
Federal			
Mt. Baker-Snoqualmie National Forest	Whatcom and south, 1,709,700 acres	100 miles	Water sports, winter sports, Wild and Scenic River, Mt. Baker Wilderness Area, trails, 30 US Forest Service campgrounds
North Cascades National Park	Whatcom and south, 505,000 acres	100 miles	Water sports, winter sports, trails, rafting, camping, lodging
State			
Birch Bay State Park	Birch Bay, 194 acres	2 miles	Boat launch, picnic sites, fishing, swimming, water sports, Audubon Sanctuary, camping
Larrabee State Park	Bellingham, 2,683 acres	15 miles	Boat launch, picnic sites, fishing, swimming, water sports, camping
Lake Terrell Wildlife Area	Lake Terrell, 1,500 acres	2 miles	Hunting, fishing, hiking, boating, wildlife viewing, and birdwatching
Peace Arch	Blaine, 20 acres	8 miles	Picnic sites
County			
Hovender Homestead Park	Ferndale	4 miles	Historic Place, picnic sites, trails, fishing
Lighthouse Marine Park	Point Roberts, 22 acres	15 miles	Boat launch, picnic sites, camping
Samish Park	Bellingham, 39 acres,	15 miles	Boat rentals, picnic sites, swimming
Semiahmoo Park	Blaine, 300 acres of tideland	8 miles	Paths
Silver Lake Park	Sumas, 411 acres	20 miles	Boat launch, picnic sites, trails, horseback riding, camping, cabins

Table 3.13-1: Continued

Recreational Area	Location	Approximate distance from project site	Facilities
City of Bellingham			
Lake Padden Park	Bellingham, 900 acres	15 miles	Boat launch, picnic sites, fishing, swimming, trails, sports facilities
Whatcom Falls	Bellingham, 209 acres	15 miles	Picnic sites, fishing, trails, sports facilities
Sehome Arboretum	Bellingham, 175 acres	15 miles	Trails

Source: BP 2002, Section 3.13

The cogeneration facility would be built within Applicant-owned property, adjacent to the BP Cherry Point Refinery, in an area of Whatcom County zoned for heavy industry and populated with a number of other heavy industry facilities. There are no recreational facilities within this Heavy Impact Industrial zone of Whatcom County. The nearest public recreational facilities to the proposed cogeneration facility site are Birch Bay State Park, approximately 2 miles northwest of the project site, and the Lake Terrell Wildlife Area, approximately 2 miles southeast of the project site. Beachwood Resort, an 80-acre private membership recreational vehicle resort, is also approximately 2 miles northwest of the site.

Schools

Whatcom County has 34 elementary schools, 11 middle schools, 9 high schools, and 10 alternative education facilities. It has four colleges and universities: Bellingham Technical College, Whatcom Community College, Western Washington University, and the Northwest Indian College. Total enrollment in Whatcom County's public education system from elementary to high school is more than 23,000. The colleges have a total enrollment of more than 14,000 and the university has more than 12,000 students. In addition to schools in the public system, there are 21 private schools, 4 in Lynden and the remainder in Bellingham.

Table 3.13-2 provides capacity and enrollment information for Whatcom County public school districts. The proposed site for the cogeneration facility, refinery interface, and cogeneration facility/Bonneville transmission system is located within the Blaine School District. The existing Bonneville transmission corridor for Custer/Intalco Transmission Line No. 2 is located within the Ferndale School District.

As Table 3.13-2 indicates, the Blaine School District comprises three elementary schools, one middle school, and one high school, and is currently operating at 100% capacity. The Ferndale School District consists of seven elementary schools, two middle schools, and one high school, and is operating at approximately 84% capacity.

Table 3.13-2: Public Schools

School District	Level			Capacity	Students	% use
	Elementary	Middle	High			
Bellingham	13	4	3	12,550	9,986	79.6
Blaine	3	1	1	<2,043	2,043	100.0
Ferndale	7	2	1	5,860	4,941	84.3
Lynden	3	1	1	3,125	2,431	77.8
Nooksack Valley	2	1	1	--	--	--
Meridian	2	1	1	1,756	1,572	89.5
Mt. Baker	4	1	1	2,505	2,321	92.7
Total	34	11	9	27,839	23,294	83.7

Source: BP 2002, Section 3.13

Fire Response Services

Firefighting resources in Whatcom County are provided through 17 fire protection districts and 2 municipal city fire departments, with a total of 175 paid firefighters and 645 volunteer firefighters. The project site is within Whatcom County Fire District No. 7, which has jurisdictional responsibility for coverage of a 73-square-mile area of the county, from Bay Road south to Slater Road and from the Strait of Georgia east to Aldrich/Guide Meridian Road. The jurisdiction includes the City of Ferndale, all the major industrial complexes, and a population of approximately 17,500.

Fire District No. 7 consists of six fire stations. Two of these stations are near the project site at 4047 Brown Road (1.5 miles from the project site) and 5419 Grandview Road (2.5 miles from the project site). District 7 is a combination department consisting of 16 career and 70 volunteer firefighters. District 7 maintains and staffs seven engines, (three 1,750 gpm and four 500 gpm) out of the six stations, along with five licensed aid units, (three rescue and two transport-capable ambulances). District 7 is currently purchasing a 100-foot aerial ladder truck designed for refinery and power plant firefighting needs.

The Applicant has proposed that the existing onsite fire protection services of the BP Cherry Point Refinery would be expanded to provide fire protection services for the cogeneration facility. Fire protection services associated with the refinery typically include 100 fire responders on call during the week, at least 12 of whom are specifically assigned to locations around the refinery property. During the weekend, 20 fire responders are on call, at least 12 of whom are assigned to specific locations around the property. Given the specialized nature of refinery operations, refinery firefighting personnel are specifically trained to respond to these types of fires. Several of these firefighters are fire response instructors who routinely provide training courses at other industrial installations around the state and nation. In addition, all refinery employees are required to attend annual safety courses and pass written exams to educate them on required procedures, protocols, and emergency response expectations at the refinery. These efforts are focused on preventing fires and, in the event of a fire or other emergency, limiting their potential impact (BP 2002, Section 3.13).

Refinery equipment available for firefighting includes three pumper trucks (1,250 gpm, 1,500 gpm, and 2,000 gpm capacity); an extensive system for the supply of water for firefighting based on pipelines, pumps, and fire hydrants distributed around the site; a stock of 10,000 gallons of foam; a 6,000 gpm, trailer-mounted pump; and a Hazardous Materials Management truck.

Historically, the refinery has averaged one fire incident per year, and with one exception, these have been minor and immediately extinguished by refinery personnel. The infrequency of events suggests that there may be no discernible pattern in terms of seasonal or operational peaks.

Only one fire (in 1977) has occurred during the life of the BP Cherry Point Refinery that required outside assistance to control. That fire occurred on the Hydrocracking Unit when a fin fan tube developed a leak and high pressure oil and gas leaked from the tube and ignited. The fire was extinguished by the onsite Refinery Emergency Response team, and outside fire department equipment and personnel were used to help cool surrounding equipment and structures. Following the incident, a number of modifications were made to equipment and procedures to prevent a reoccurrence (Torpey, pers. comm., 2003).

Police and Security Services

The Whatcom County Sheriff's Office provides police services within unincorporated Whatcom County. In the event of a criminal incident at the refinery, the Whatcom County Sheriff's Office would normally be called to the site by the Applicant's security personnel. During the 30 years the refinery has been in operation, such an event has never occurred.

Whatcom County statistics for 2000 show a total of 256 incidents of violent crime, broken down as aggravated assaults (44), assaults (161), rapes (50), and homicides (1) (BP 2002, Section 3.13). This represents a decrease in violent crimes of approximately 9.5% over the previous year. As a ratio of incidents to population using the 2000 population figures, this represents 1 incident for every 650 people.

The Applicant has proposed that the existing onsite security services of the refinery would be expanded to provide security services for the cogeneration facility. The refinery maintains the services of a professional contract security force, which patrols the property 24 hours a day, 365 days a year. During the week, 12 security staff are onsite, while 8 security staff are present during the weekend. Volunteers are not used. Security staff are provided with training both general to security work, and specific to refinery operations at Cherry Point. They are trained, for example, in bomb threats, safety, emergency medical care, oil spill response, terrorist awareness, radio, locks and keys, threatening call diffusion, and pipeline inspection. In addition, they undergo monthly refresher sessions and weekly exams. Three four-wheel-drive vehicles are stationed onsite at all times so that security personnel are able to quickly reach all areas of the Applicant's property at Cherry Point.

Incidents at the site have been limited to the occasional theft of small equipment, on average about once a year. Security personnel also respond to incidents around the site perimeter of the refinery. There has never been a case of such an incident leading to personal injury or physical damage to refinery facilities or equipment.

Emergency Medical Services

The Applicant has proposed that the existing onsite emergency medical services of the BP Cherry Point Refinery would be expanded to provide emergency medical services for the cogeneration facility. The existing emergency medical services resources, including facilities, personnel, and training programs at the refinery, include the following (BP 2002, Section 3.13):

- A full-time certified Physician Assistant during the week, with more than 20 years of experience at the refinery;
- A full-time Nurse Practitioner (who is also a Registered Nurse) during the week, with more than five years experience at the refinery;
- Four Emergency Medical Technicians on call as the first to respond to medical emergencies after regular working hours and on weekends;
- Between 100 and 120 First Aid Providers available across the refinery to respond to needs, with at least 25 present per shift; and
- A rotational pool of three doctors, one of whom visits the refinery for one day each week.

Emergency medical facilities at the refinery include a staff clinic with two examining rooms, a major treatment room, and a supply room. The clinic has one ambulance and a helipad for airlifting patients to hospitals in either Bellingham or Seattle. The clinic has an emergency radio system directly connected to the Whatcom County Emergency Center as well as to St. Joseph Hospital in Bellingham, an approximately 20-minute drive from the refinery. The clinic is equipped with automated defibrillators (which can be operated by the emergency medical technicians) as well as a manual defibrillator (operated by medical professionals), and is fully supplied, including intravenous and airway supplies, cardiac medication, and a multi-trauma kit. Medical emergencies occur infrequently at the refinery, typically less than once per year, and most have been within the capability of the refinery's onsite resources to manage.

The only hospital in Whatcom County is St. Joseph Hospital, which is operated as a non-profit, voluntary, private institution, unsupported by tax revenue. The hospital charges for its services, but provides services regardless of ability to pay. The hospital has 253 beds and 24 newborn bassinets. It has 300 doctors, employs a total of 1,700 full and part-time employees, of whom 515 are nurses, and has an average of 250 volunteers. The hospital provides a full range of nursing services, as well as advanced cardiovascular, cancer, mental health, radiological, respiratory, rehabilitation, and surgery services.

The hospital is a Level II Certified Trauma Center. In Washington State, only Seattle has a higher Certified Level I Center that is open 24 hours a day, 365 days a year. St. Joseph Hospital is an integral part of the Whatcom County Emergency Medical Services network, connected by radio to the paramedics and emergency medical technicians from fire departments (which provide local ambulance service), and other organizations such as the refinery. The hospital operates with Airlift Northwest to bring assistance to scenes of emergencies throughout Whatcom County, Skagit County, Island County, and San Juan County.

The hospital currently has a \$70 million expansion program underway, which would add approximately 170,000 square feet of space for major services, inpatient beds, and parking. The expansion is part of a 20-year Master Facility Plan, developed with the City of Bellingham and the hospital board of community leaders. The primary drivers for expanding the hospital facilities include anticipated strong growth in the population of the area and an aging population. Funds have been raised from the hospital's cash reserves and from a private bond issue (BP 2002, Section 3.13)

Local medical facilities would also respond to the requirements of the anticipated weekly commuting and relocating workers and their families, who are estimated to be no more than 414 people at a maximum during the peak of construction. This represents a relatively low number of people coming into the area as a result of the cogeneration facility, relative to the local population of Whatcom County and of the Bellingham, Blaine, and Ferndale areas. There are also no reports of over-extended medical facilities locally.

Communications

Whatcom County is served by two daily newspapers, both published in Bellingham. These are the Bellingham Herald and the Northwest Citizen. Bellingham, Birch Bay, Blaine, Ferndale, and Lynden each have one or more smaller community newspapers, usually published weekly. The Business Pulse is a Whatcom County magazine.

Cable and satellite service companies, including AT&T, DIRECTV, and TCI Cablevision of Washington, provide the full range of television stations, as well as a local community access television station. Bellingham, Blaine, Ferndale, and Lynden all have broadcast radio stations. The telephone infrastructure is provided by Qwest, while AT&T and Sprint also offer the full range of long distance, internet access, and other telephone services.

Water Supply and Wastewater Discharge Infrastructure

Sections 3.3 and 3.4 characterize the existing surface water and groundwater regimes within the project site and surrounding area, and describe the stormwater management, water supply, and wastewater treatment processes to be implemented during construction and operation of the project.

Solid Waste

There are currently no operating landfills in Whatcom County. Three transfer stations operate at Birch Bay, Cedarville, and Point Roberts on sites leased out by the county. A fourth site located on private property in Lynden is also open to the public. Disposal of solid waste is carried out by private waste haulers through agreements with the county (Whatcom County 2003b). Currently, the Applicant retains the services of licensed waste haulers to collect and dispose of recyclable and non-recyclable wastes generated at the refinery to approved disposal facilities.

3.13.2 Impacts of the Proposed Action

Construction

Cogeneration Facility, Refinery Interface, and Other Project Components

Recreation

Impacts on recreational facilities as a result of construction activities for the cogeneration facility would primarily be related to potential increases in facility use associated with the project's construction workforce. Any increased use of recreational facilities would likely come from a non-local workforce. This would include both weekly commuters, who are less likely to access recreational facilities because they are not present in the area on weekends, and temporarily relocated workers and their families. Temporary relocations associated with project construction are estimated to not exceed 180 individuals at any one time (BP 2002, Appendix L). This relatively small number of construction workers and their families is not expected to impose unmanageable demands on existing recreation infrastructure in Whatcom County. See Section 3.12 for additional discussion of temporary worker relocations associated with construction of the project.

An additional potential impact on recreational facility users during construction would be the effects of construction traffic on access roads to recreational facilities near the cogeneration facility site – specifically Birch Bay State Park and the Lake Terrell Wildlife Area. Such effects, however, would be relatively short term, and would not be likely to significantly impact the public's ability to use these facilities.

Schools

With the exception of the Blaine School District, which only accepts students from within its own district, other schools in the Bellingham, Ferndale, and Birch Bay areas are not filled to capacity, and would have room for an incremental increase in the number of students from families who could move to the area during construction of the cogeneration facility. As described in Section 3.12, very few of the estimated 180 relocating construction workers are expected to bring their families, given that only 27 jobs would last longer than a 10-month period. Given that relatively few families with children would be expected to relocate to the area during project construction, construction of the project is not expected to significantly affect overall school enrollments for the area. Individual family decisions regarding where to reside would determine which schools students in those families would be eligible to attend. It is possible that families choosing to reside within the boundaries of the Blaine School District could add students to that district's enrollment, which is currently at capacity.

Fire Response Services

The probability of a significant fire or explosion at the cogeneration facility site or within the refinery during construction is considered low, and construction of the cogeneration facility is not expected to significantly impact the delivery of firefighting services (see Section 3.16, Health

and Safety, for a discussion of the potential for fire or explosion during construction of the cogeneration facility).

The Applicant is proposing that existing firefighting services and infrastructure currently in place to support the refinery would support fire preparedness and response needs for the cogeneration facility as well. Section 3.16 discusses proposed changes to the refinery's Fire Emergency Response Operations (FERO) plan and Emergency Preparedness Plan (EPP) to address the construction and operation of the cogeneration facility and refinery interface components.

Fire District 7 has Mutual Aid Agreements in place with all Whatcom County Fire Agencies to ensure full support in the event that onsite refinery and District 7 firefighting resources are insufficient to mitigate an emergency. The refinery's onsite resources, personnel, and equipment, with available support from Fire District 7, would be sufficient to respond to most emergencies. Additional resources or agencies are unlikely to be required, except in the event of a large-scale or long-term emergency.

In the unlikely event of an emergency beyond the capability of the refinery's resources, the Whatcom County emergency services would be called upon. Whatcom County's Division of Emergency Management is responsible for developing and maintaining community infrastructure for emergency/disaster mitigation, planning, response, and recovery. It is mandated to maintain a constant state of readiness to respond to events that might exceed the capability of any single jurisdiction or entity, and works closely with local industry (including the Applicant) to exercise that mandate. The division has an Emergency Operations Center that can be activated to gather and disseminate information, make strategic decisions, allocate resources, and coordinate responses to emergencies. This structure is in place, and is funded and staffed to the level required. Construction and operation of the cogeneration facility would not introduce new hazards that would require initiative on the part of the division to incorporate into its work.

Police and Security Services

Access to the project site would be controlled through gates from Grandview Road. During construction, additional security measures would be provided by installing and maintaining fencing around the perimeter of the cogeneration facility construction site and around the perimeter of Laydown Areas 1, 2, and 3, which are currently within existing fenced areas. Site access would be controlled for personnel and vehicles by a contracted security service.

The Applicant would provide for project site security by using contracted security staff. It is unlikely that the addition of approximately 180 relocated construction workers into the Whatcom County area during construction of the cogeneration facility would significantly increase the incidence of violent crimes. Consequently, it is not anticipated that local law enforcement agencies would need to increase their staff or resources as a result of project construction.

There is the remote possibility of an extreme security or emergency incident that would involve local police. Section 3.16 describes the response to such an incident. Should such an event occur, local police would be notified and would likely draw upon other state and federal security

agencies, such as the Division of Emergency Management resources, as described above for a fire emergency.

Emergency Medical Services

During construction of the cogeneration facility, there would be a large number of workers onsite relative to the permanent operational workforce for the project. The Applicant has managed its own emergency medical services at the refinery for the last 30 years, and proposes to provide its own onsite medical services for the cogeneration facility as well.

During construction of the cogeneration facility, the Applicant would implement a safety plan that would include mandatory health and safety orientation for all personnel onsite, periodic additional safety training for the duration of construction, safety audits, and monitoring of work processes by a safety engineer. Because the Applicant would manage its own emergency medical services for construction and operation of the cogeneration facility through existing refinery resources, there would be little or no demand for support from other community emergency medical services during construction.

Communications

Construction of the cogeneration facility would require the establishment of temporary communications. A project construction office with telephone, computer, and facsimile transmission systems would likely be established on the project site. Cell phones, pagers, and portable computers would also be used by some construction personnel. The demand for these communication systems and services associated with the construction of the cogeneration facility is not expected to significantly affect the quality or availability of communication services in the vicinity of the project site.

Public Water Supplies

During construction of the cogeneration facility, water would be supplied from the refinery or the Engineering Procurement and Construction (EPC) contractor to provide dust control. The water service would be contracted out to a local company or supplied by the EPC contractor.

Water for HRSG and export steam line steam-blow tests and hydrostatic tests would be required for commissioning of the power plant facilities, natural gas connections, and water supply/discharge connections. The volume of water needed for HRSG steam-blow testing would be about 15.5 million gallons. Export steam line steam-blow testing would require about 1.2 million gallons, and hydrostatic testing would likely not exceed 4.8 million gallons. Testing would take place near completion of construction over a period of two to three months. The water source would either be industrial water directly from the PUD, or recycled cooling water from Alcoa Intalco Works if it is in operation.

Wastewater

During construction of the cogeneration facility, the EPC contractor would be responsible for the removal and disposal of sanitary wastes associated with the construction workforce. As for other services, sanitary waste removal would be provided by a commercial service provider.

Water used for hydrostatic testing and other startup needs would be discharged to the refinery wastewater treatment system. Should there be contamination of stormwater within the secondary containment berms, that stormwater would also be directed to the refinery wastewater treatment facility. This additional volume is not expected to cause any overload to the existing system. According to the Applicant, water volumes used for hydrostatic testing are not dissimilar from those used for various refinery functions and are not expected to exceed the capacity of the refinery's wastewater treatment system.

Stormwater

During construction of the cogeneration facility, BMPs for sediment and erosion control would be implemented and maintained. These would include the construction of diversion ditches to prevent runoff from entering the site and temporary swales to filter and divert stormwater to the treatment and detention system. After the settling of eroded materials in the detention basins, the water would be discharged to wetlands north of Grandview Road.

The proposed stormwater collection and treatment system would allow infiltration to occur and proper detention of stormwater to minimize peak discharge flows. The final discharge would be to wetlands for enhancement, where the water would be able to infiltrate and recharge the shallow groundwater-bearing zone. Stormwater collection, treatment, and discharge would be within the same hydrologic basin where the stormwater originates, primarily the Terrell Creek watershed. Therefore, no significant changes to the quantity of water would result to the Terrell Creek drainage basin during construction of the cogeneration facility. Additional information about stormwater control during construction may be found in Section 3.4.2.

Solid Waste

Table 3.13-3 summarizes anticipated categories and volumes of wastes to be generated during construction of the cogeneration facility and systems and components that would interface with the refinery.

During construction of the project, the EPC contractor would be required to segregate and dispose of wastes in accordance with applicable federal and state laws, and with local county regulations. This is normally undertaken through contracted local solid waste disposal haulers who are licensed to transport and dispose of construction waste materials in accordance with the Whatcom County comprehensive plan for solid waste. Non-hazardous wastes would be transported to state-permitted solid waste transfer stations, and/or to permitted landfills within Washington and/or Oregon. Hazardous waste disposal facilities are available locally at the Bellingham Disposal of Toxics Facility, although it reportedly has limited capacity. Depending upon the actual types and quantities of hazardous wastes to be generated during construction of

the cogeneration facility, the EPC contractor would be responsible for identifying alternative licensed hazardous waste disposal facilities.

Table 3.13-3: Summary of Anticipated Construction Waste Streams

Waste Stream	Waste Stream Classification	Estimated Amount	Estimated Frequency of Generation	No. Trucks and Frequency	Quantity Shipped
Scrap wood, steel, glass, plastic, paper calcium silicate insulation, mineral wool insulation	Non-hazardous solids	50 cubic yards	Weekly	1 per week	50 cubic yards
Empty hazardous material containers	Hazardous solids	1.5 cubic yard	Weekly	1 per week	1.5 cubic yard
Used and waste lube oil during CT and ST lube oil flushes	Hazardous or non-hazardous liquids	55 gallon drums	200 drums over life of construction	1 per 60 days	22 55-gallon drums
Oil rags, oil absorbent generated during normal construction activities, excluding lube oil flushes	Hazardous liquids	55 gallons	Monthly	1 per month	55 gallons
Solvents, used construction equipment lube oils, paint, adhesives	Hazardous liquids	200 gallons	Monthly	1 per month	200 gallons
Spent lead acid batteries	Hazardous solids	3 batteries	Yearly	1 per year	3 batteries
Spent alkaline batteries	Hazardous solids	80 batteries	Monthly	1 per month	80 batteries
ST and pre-boiler piping cleaning water, chelant	Hazardous or non-hazardous liquids	400,000 gallons	Once before initial startup	34	400,000 gallons
Waste oil from oily waste holding tank	Hazardous or non-hazardous liquids	25 gallons	Monthly	1 per month	25 gallons
Sanitary waste from potable chemical toilets and construction office holding tanks	Non-hazardous liquids	1,500 gallons	Daily	3 per week	1,500 gallons
Stormwater from construction area	Non-hazardous liquids	950,000 gallons	For a once in two years, 24-hour storm event	NA	NA
Fluorescent, mercury vapor lamps	Hazardous solids	40	Yearly	1 per year	40
Hydrotest water	Non-hazardous liquids	4.8 million gallons	Once before initial startup	Discharged to refinery water treatment system	4.8 million gallons

Source: BP 2002

Transmission System and Custer/Intalco Transmission Line No. 2

Fire Response Services

The risk of fire during construction of the transmission lines is considered low. The greatest risk may occur if construction activities occur during periods of moderate to high wildfire conditions.

Police and Security Services

Law enforcement concerns during construction of the transmission lines would be limited primarily to theft of construction equipment and materials, and vandalism. Given the relatively short duration of the proposed transmission line work, the potential for additional demands on law enforcement personnel is expected to be minimal.

Emergency Medical Services

During transmission line construction, the local demand for emergency medical services could increase due to construction accidents that could occur at or near the transmission line corridors. Construction workers would be exposed to hazards typical of major construction projects. If an accident were to occur, local emergency response units would be required to provide initial treatment and transportation to a local medical treatment facility, followed by the need for medical services at the receiving facility.

Communications

Transmission line construction would not adversely affect communications service providers. Existing communications systems, including telephone and wireless communications, would have the capacity to accommodate peak construction demands.

Public Water Supplies

Transmission line construction would not depend upon existing water supply systems to meet project water needs. There would be no significant impacts on water supply during project construction.

Solid Waste

The Applicant has not established solid waste management procedures. Solid waste from construction of the proposed transmission line would likely be managed through a service contract with a local waste management firm.

Existing transmission tower structures that would be removed under Option 2 would be removed from their foundations by crane or helicopter, and disassembled either onsite or at a nearby laydown area. The old wire, steel lattice towers, and other structures could be salvaged or made available for reuse, as appropriate. Other transmission line materials (such as hardware, cross arms, and insulators) would be removed from the ROW and properly disposed of.

Operation

Cogeneration Facility, Refinery Interface, and Other Project Components

Recreation

Potential impacts on recreational facilities associated with project operation are primarily related to potential increases in facility use associated with the project's work force, noise, and air emissions. None of these are expected to be significant.

The operational workforce of the cogeneration facility would not exceed 30 full-time individuals, no more than half of whom are expected to actually relocate, representing additional population to the area. The estimated total increase in population of less than 30 people associated with operation of the cogeneration facility would have an insignificant effect on recreational use within Whatcom and Skagit counties.

Potential increases in noise levels during routine operation of the cogeneration facility are unlikely to be detected at the nearest recreational facility (Birch Bay State Park). Noise analyses conducted for the project projected that sound from the proposed project would increase noise levels at the park entrance by only 1 dBA. Because a 1 dBA increase is barely perceptible by most people in a laboratory setting, people at the park entrance are not expected to perceive any difference in noise levels. Park users are expected to be even less likely to perceive any difference in sound levels because they would be inside the park, farther from the project site. See Section 3.9 for additional discussion of operational noise levels for the project.

Air quality analyses conducted for the project indicate that emissions from the cogeneration facility are not expected to result in any significant impacts on air quality or to visibility in the area. Therefore, operation of the cogeneration facility is not expected to impact recreational opportunities in Whatcom County. Section 3.2 provides additional discussion of air emissions from the project and associated air quality and visibility impacts.

Schools

Operation of the cogeneration facility is projected to create 30 new jobs. Even if a maximum of 15 families relocated from outside of the area and they all had school-age children, the addition of their children to the local school population within Whatcom County would not significantly impact overall local school enrollment levels. As with project construction, individual family decisions regarding where to reside would determine which schools students in those families would be eligible to attend. It is possible that families choosing to reside within the boundaries of the Blaine School District could add students to that district's enrollment, which is currently at capacity.

Fire Protection Services

During operation and maintenance of the cogeneration facility, mechanical failure, malfunctions in the electrical system, acts of terrorism, and human error are potential risks that could result in fire or explosion.

The Applicant is proposing that existing firefighting services and infrastructure currently in place to support the refinery would support fire preparedness and response needs for the cogeneration facility as well. The Applicant has proposed to modify the existing refinery FERO plan to provide detailed guidelines to facilitate effective response actions to emergencies at the cogeneration facility. In the event of fire or other emergency, the FERO plan would be activated. The plan provides detailed guidelines to assist responders and includes a command structure, duties and responsibilities, checklist for responders, equipment lists, instruction guides, and strategic actions for potential or critical incident scenarios that may occur in or around the facility. The FERO plan would be consistent with the Applicant's EPP, which provides preparedness and planning information for emergency conditions. Again, should this ever become necessary, the Applicant would coordinate efforts with local emergency agencies. All facility employees would receive regular training to ensure that effective and safe actions limit the potential occurrence of fire, and to increase the ability to respond effectively in the event of a fire (See Section 3.16, Health and Safety, for additional discussion of the FERO plan and EPP).

During operation of the cogeneration facility, existing staff and equipment at the refinery are considered sufficient to meet all but the most severe of potential fires. The fire protection system would consist of a site perimeter firewater loop with post indicating valves and hydrants, an automatic deluge system for transformers, a sprinkler system for steam turbine lube oil equipment and bearings, and detection and alarm equipment. A carbon dioxide system, provided by the CGT supplier, would protect this equipment. Buildings would have fire protection, including a pre-action system for the Administration Building and Auxiliary Substation Building, and dry stand pipe and Class III hose stations for all other buildings. Portable fire extinguishers of appropriate sizes and types would be located throughout the facility.

One trained employee would be assigned specifically to coordinate fire response actions at the cogeneration facility. Only in the event of an extraordinary incident would assistance be needed from outside of the Applicant's onsite fire response resources and infrastructure. The Applicant would maintain regular communication with the local sheriff, firefighting, and emergency response services in Whatcom County; Whatcom County's Emergency Planning Commission, and the Washington State Department of Ecology. By maintaining full disclosure on capabilities and resources to respond to fires with these other agencies, and by remaining current on legislated and regulatory requirements, the Applicant would ensure a state of readiness and preparedness to respond to potential fires.

The Applicant and refinery's onsite resources, personnel, and equipment, with available support from Fire District 7, would be sufficient to respond to most emergencies. Additional resources or agencies are unlikely to be required except in the event of a large-scale or long-term emergency. Similar to the discussion under project construction, in the event of an emergency beyond the

capability of the Applicant and refinery's own resources, the Whatcom County emergency services would be called upon.

Police and Security Services

The Applicant is proposing that existing security services and infrastructure currently in place to support the refinery would support the security needs for the cogeneration facility as well.

Project operation is not expected to have a significant effect on long-term demands for police and security services. Operation of the cogeneration facility is projected to create approximately 30 positions, which would have a minimal effect on traffic safety in the project vicinity. Cogeneration facility security measures would be incorporated into the project's facility and operation plans. Consequently, there would be no need for additional staff and equipment resources to maintain local law enforcement service levels.

Emergency Medical Services

The Applicant is proposing that existing emergency medical services and infrastructure currently in place to support the BP Cherry Point Refinery would support the cogeneration facility as well. The operational workforce for the cogeneration facility is well within the handling capacity of the existing facilities within the refinery. In addition, all employees of the cogeneration facility would receive training in first aid and cardiopulmonary resuscitation (CPR). Onsite treatment would be provided where the medical requirement is either first aid treatment only and/or patient stabilization until professional medical attention is obtained.

Given the extent and sophistication of the refinery's onsite medical resources, routine support from offsite community medical facilities during construction and operation of the cogeneration facility would most likely not be required. Medical emergencies, which historically have occurred infrequently at the refinery, could require medical assistance from the nearby St. Joseph Hospital in Bellingham. Whatcom County recently reported a population-to-physician ratio of approximately 555/1, which would not be significantly affected by the addition of approximately 30 permanent employees, or the potential addition of up to 15 relocating employees (and their family members), to the local population associated with operation of the cogeneration facility.

In the event of an extreme emergency that might necessitate involving local police, fire, or medical services, these services would be involved as part the coordination with the Division of Emergency Management resources, as previously described.

Communications

Operation of the cogeneration facility would require the use of communication systems and services, which would be most heavily concentrated at the facility's administration building. This demand for communications services would not likely be significant, and services would be provided by a local communications company.

Public Water Supplies

Industrial Water Supply. Fresh water is currently supplied to the refinery by Whatcom County PUD via an existing 24-inch pipeline, which enters the refinery at the southeast corner of the property. Fresh water or recycled industrial water from the Alcoa Intalco Works would be conveyed to the cogeneration facility through a new 16-inch underground pipe to be constructed within the refinery.

No new water rights or changes to existing water rights would be required for operation of the cogeneration facility. Letters of intent have been entered into by the Applicant, Whatcom County PUD, and Alcoa Intalco Works to allow the cogeneration facility to purchase industrial water that is currently allocated to the aluminum smelter. Under this scenario, Alcoa Intalco Works, when operational, would be able to provide approximately 2,770 gpm, and the excess not used by the cogeneration facility could be used by the refinery, resulting in a net reduction of water withdrawal from the Nooksack River. If Alcoa Intalco Works is not in operation, the approximately 2,244-2,316 gpm of process water required by the cogeneration facility would be supplied directly by the PUD. In either case, there would be no net increase in water withdrawal from the Nooksack River. The refinery's water use would also be reduced by about 20 gpm as a result of steam provided by the cogeneration facility. See Section 3.3 for additional discussion of project water supply/water rights issues.

Potable Water Supply. Birch Bay Water and Sewer District currently purchases water from the City of Blaine. The Birch Bay Water and Sewer District provides potable water to the refinery via an existing 6-inch potable water pipeline that enters the refinery in the vicinity of the contractor's gate from a utility right-of-way along Grandview Road. Potable water to the cogeneration facility would be provided by a new potable water pipe routed between the refinery and cogeneration facility.

During operation, the cogeneration facility is expected to require only 1 to 5 gpm on the average of potable water. This nominal amount would not impact available supplies or resources of potable water under current certified rights. See Section 3.3 for additional discussion of project water supply/water rights issues.

Wastewater

The cogeneration facility would generate wastewater from the cooling tower, the water treatment facility, blowdown from the heat recovery steam generators, collection of drainage from equipment and other sources, occasional turbine blade washing, and sanitary waste. Sections 3.3 and 3.4 provide detailed discussion of the expected flows and quality of various wastewaters.

During operation of the cogeneration facility, spent boiler feedwater, blowdown water, and drainage water from various sources would enter the refinery's existing refinery wastewater treatment system, which currently discharges treated wastewater under the terms and conditions of an NPDES Permit, to the Strait of Georgia through Outfall 1 at a depth of approximately 60 feet beneath the refinery's dock. The predicted flow and chemical composition of wastewaters from the cogeneration facility are provided in Sections 3.3 and 3.4.

After treatment in the refinery wastewater treatment system, wastewater from the cogeneration facility would be discharged along with the refinery wastewater to the Strait of Georgia. The cogeneration facility would add approximately 190 gpm on average, assuming 15 cycles of concentration in the cooling tower of non-recyclable process wastewater, to the refinery discharge. EFSEC has developed draft State Waste Discharge Permit conditions for operation of the cogeneration facility. These conditions include discharge limitations, monitoring requirements, reporting and record keeping requirements, an operation and maintenance plan for water quality treatment facilities, development of SPCC and hazardous waste management plans, and a SWPP plan.

Sanitary wastes would be discharged to the Birch Bay Water and Sewer District's treatment system in accordance with the terms and conditions of an Agreement between the refinery and the Birch Bay Water and Sewer District. The District has confirmed that it has the capacity to accommodate the incremental combined sewage loading from the refinery and the proposed cogeneration facility. The estimated volume of sanitary waste discharge from the cogeneration facility, which, when operational, would employ up to 30 people, would be between 1 and 5 gpm.

There would be no incremental cost to the District for connection or provision of sanitary waste services for the cogeneration facility. Under the terms of the negotiated agreement between the Applicant and the District, the Applicant would pay for all costs associated with the connection to the system, would hand over ownership of equipment outside the facility fence line to the District, and would pay connection and monthly service fees for the service. Potential impacts on public wastewater treatment infrastructure associated with operation of the cogeneration facility are considered negligible.

Sanitary waste discharges during operation of the cogeneration facility would account for a very small volume of discharge to the District's sanitary treatment system. Further, the capital costs associated with connection to the District's sanitary sewer treatment system would be funded by the Applicant and would not impose financial constraints or demands on public utilities.

Stormwater

During operation of the cogeneration facility, stormwater from site runoff would be managed through an onsite oil/water separation system and a wetpond for additional treatment and detention. Stormwater that could have come into contact with oils, greases, or other contaminants would be routed through the refinery's wastewater treatment system. EFSEC has developed draft State Waste Discharge Permit conditions for operation of the cogeneration facility. These conditions include discharge limitations, monitoring requirements, reporting and record keeping requirements, and an operation and maintenance plan for water quality treatment facilities.

The Applicant would implement and maintain BMPs to minimize potential impacts of the cogeneration facility on both the volume and quality of stormwater. A SWPP plan for operational procedures, in conjunction with the SPCC plan, would provide structural, operational, and erosion/spill control BMPs for all stormwater operational activities at the plant site. Because potentially contaminated stormwater associated with operation of the cogeneration

facility would be processed through the refinery's existing wastewater treatment system, the project would not impose demands on the public wastewater treatment system. Therefore, potential impacts on community stormwater infrastructure systems associated with the project would not occur.

Solid Waste

Table 3.13-4 summarizes anticipated categories and volumes of wastes to be generated during operation of the cogeneration facility.

The Applicant has not yet developed solid waste handling procedures for the cogeneration facility. It is anticipated that during operation of the cogeneration facility, the Applicant would implement similar protocols and procedures for the handling, segregation, and disposal of waste streams and recyclables as currently managed at the refinery. Typically, the refinery retains the services of licensed waste haulers to collect and dispose of recyclable and non-recyclable wastes at approved disposal facilities.

Table 3.13-4: Summary of Anticipated Operation Waste Streams

Waste Stream	Waste Stream Classification	Estimated Amount	Disposition
Boiler feedwater demineralizer regeneration waste, boiler blowdown, treated wash down, and oily drains	Non-hazardous liquids	50 gpm	Discharged to refinery for treatment per State Waste Discharge Permit
Spent SCR catalyst (heavy metals)	Hazardous solids	Approximately 4,800 cubic feet (once every 3 - 5 years)	Recycle
Spent oxidation catalyst (noble metals, heavy metals)	Hazardous /non-hazardous solids	Approximately 990 cubic feet (once every 3 - 5 years)	Recycle/reclaim
CTG used air filters	Non-hazardous	Approximately 1,500 filters (once every 3 years)	Landfill disposal
CGT off-line wash water	Non-hazardous liquid depending on soap type	< 4,000 gallons/month	Refinery water treatment system
Scrap wood, steel, glass, plastic, paper	Non-hazardous solids	3 cubic yards/week	Landfill disposal or recycle/reuse
Used oil filters, grease, oil rags, oil absorbent	Hazardous solids	1 cubic yard/month	Hazardous waste disposal facility
Spent batteries	Hazardous solids	100 batteries/year	Recycle
Empty hazardous material containers	Hazardous solids	<1 cubic yard/week	Hazardous waste disposal facility
Solvents, paint, adhesives	Hazardous solids	<55 gallons/month	Hazardous waste disposal facility
Used lube oils and hydraulic fluids	Hazardous liquid	25,000 gallons (once every 10 years)	Recycle
Oil-water separator oil	Hazardous liquid	20 gallons/month	Recycle

Source: BP 2002

Public Utilities

The cogeneration facility would generate electricity over and above the immediate requirements of the refinery. The excess power would be transmitted through Bonneville's Custer/Alcoa Intalco Works transmission line to the Northwest grid. A contingency analysis performed by Bonneville determined that upon the loss of one of the 230 kV transmission lines from the Custer substation, the existing 230 kV transmission lines could exceed thermal operating limits established by Bonneville under certain conditions.

Two Bonneville transmission system modification options have been identified to address this potential condition. Under Option 1, a RAS would be installed. A RAS would include installation of additional electrical equipment within the Custer and Alcoa Intalco Works substations, and would provide for an automatic reduction in load at the Alcoa facility in the event of a potential overtemperature condition on the Bonneville transmission lines. This option would not require any changes to the 230 kV lines or towers themselves, but would require the agreement of the Applicant and Alcoa Intalco Works.

Under Option 2, a second transmission line inside the existing westernmost 230 kV line corridor leading from the cogeneration interconnection point to the Custer substation would be installed to increase the transmission capacity along this segment. The existing transmission towers in this approximately 5-mile-long segment would not be strong enough to carry a second line, so the existing towers would be replaced with new towers. Under this option, a RAS would not be required.

Of the two options, the Applicant prefers Option 1 because the implementation requirements of Option 1 would be less than those for Option 2 and the installation of new high voltage transmission lines and associated tower replacement would not be required.

Fiscal Impacts

The refinery's existing security, emergency medical, and fire response infrastructure would be capable of supporting the needs of these services during construction and operation of the cogeneration facility. It is anticipated that only in an extreme emergency, would local community fire, police, medical services, and other government resources be called upon to help respond to an event at the facility. During operation of the cogeneration facility, the number of individuals with their families that would move permanently into the area represents an insignificant percentage of both the existing local population and the forecasted population growth. Therefore, during routine construction and operation phases of the project, there would be no significant staffing or other financial demands placed on external or community resources for fire prevention and response, security and policing, and medical services.

Whatcom County operates on a revenue base that has seen its revenues grow from about \$92 million in 1997 to \$113 million in 2003. Expenditures have grown more quickly from \$84 million in 1997 to \$121 million in 2003 (Whatcom County 2003c). Whatcom County's 2003 budget forecasts a deficit in excess of \$8.5 million. The largest portion of revenue comes from

property, sales, excise, and timber harvest taxes, which based on 2003 projections, are expected to generate 43% of total revenue, equal to approximately \$49 million. The other major revenue categories are intergovernmental transfers at 18%, and charges for goods and services at 16%.

The cogeneration facility would generate additional revenue to Whatcom County through sales taxes on project-related local expenditures, property taxes, and sales taxes attributable to indirect economic impact. These revenues are estimated at \$10 million over the two-year construction period, and another \$4.6 million annually during operation of the cogeneration facility (see Section 3.12). These estimates are conservative; they do not account for fiscal benefits resulting from indirect or induced employment, or the redistribution of increased tax revenue within Whatcom County that would accrue to Washington State as a result of the cogeneration facility.

Relative to the present revenue of Whatcom County, the additional contribution of revenue resulting from expenditure, taxes, and income resulting from construction and operation of the cogeneration facility would be significant.

Transmission Facility and Custer/Intalco Transmission Line No. 2

Communications

Radio Interference (RI). Radio reception in the AM broadcast band (535 to 1605 kilohertz [kHz]) is most often affected by corona-generated electromagnetic interference (EMI). FM radio reception is rarely affected. Generally, RI can affect only residences very near to transmission lines. Because the new 230 kV transmission facility would be located more than 0.5 mile from the nearest residence and a new transmission line in the Custer/Intalco transmission corridor (if Custer/Intalco Transmission Line Option 2 is selected) would be within the existing 125-foot utility right-of-way, disruptive RI effects on local residences are not expected.

Television Interference (TVI). Corona-caused TVI occurs during foul weather and is generally of concern for transmission lines with voltages of 345 kV or above, and only for conventional receivers within about 600 feet of a line. Gap sources on distribution and low-voltage transmission lines are the principal observed sources of TVI, and the use of modern hardware and construction practices for the proposed transmission facility would minimize such sources.

There is a potential for interference with television signals at locations very near the proposed line in fringe reception areas. However, several factors reduce the likelihood of occurrence. Corona-generated TVI occurs only in foul weather; consequently, signals would not be interfered with most of the time. Because television antennas are directional, the impact of TVI is related to the location and orientation of the antenna relative to the transmission line. If the antenna were pointed away from the line, then TVI from the line would affect reception much less than if the antenna were pointed toward the line. Since the level of TVI falls off with distance, the potential for interference becomes minimal at distances greater than several hundred feet from the centerline. Because the new 230 kV transmission facility would be more than 0.5 mile from the nearest residence and a new transmission line in the Custer/Intalco transmission corridor (if Custer/Intalco Transmission Line Option 2 is selected) would be within the existing 125-foot utility right-of-way, disruptive TVI effects on local residences are not expected.

Other forms of TVI from transmission lines are signal reflection (ghosting) and signal blocking caused by the relative locations of the transmission structure and the receiving antenna with respect to the incoming television signal. Television systems that operate at higher frequencies, such as satellite receivers, are not affected by corona-generated TVI, and cable television systems are similarly unaffected.

Interference with television reception can be corrected by any of several approaches: improving the receiving antenna system; installing a remote antenna; installing an antenna for TV stations less vulnerable to interference; connecting to an existing cable system; or installing a translator. Bonneville has an active program to identify, investigate, and mitigate legitimate RI and TVI complaints. It is anticipated that any instances of TVI caused by the proposed line could be effectively mitigated.

Interference with Other Devices. Corona-generated interference can conceivably cause disruption on other communications bands such as the citizens band (CB) and mobile bands. However, mobile-radio communications are not susceptible to transmission-line interference because they are generally frequency modulated (FM). Similarly, cellular telephones operate at a frequency of about 900 MHz, which is above the frequency where corona-generated interference is prevalent. In the unlikely event that interference occurs with these or other communications, mitigation can be achieved with the same techniques used for television and AM radio interference.

3.13.3 Impacts of No Action

Under the No Action Alternative, the cogeneration facility would not be constructed and the potential effects associated with the project would not occur. Tax revenue associated with construction and operation of the project would not be realized by the State of Washington and Whatcom County.

3.13.4 Secondary and Cumulative Impacts

The project would not contribute to any significant cumulative adverse impacts on public services or utilities. Construction and operation of the cogeneration facility would bring a net fiscal benefit to Whatcom County and to the State of Washington in the form of additional tax revenues. There would be tax payments over the life cycle of the project, as well as from other government revenue deriving from local employment and contracting of local services. At the same time, the project would not impose incremental demands on local government spending, public services and utilities, or other community resources.

3.13.5 Mitigation Measures

No mitigation measures would be necessary because there are no significant adverse impacts on public services and utilities expected from the project. The Applicant would extend the fire, security, and emergency medical resources of the refinery to cover all but the most extreme emergencies. The project would develop response protocols with the Jurisdiction Having

Authority, Fire District No. 7, to ensure that additional support and resources are available from the district and other fire jurisdictions through the District Mutual Aid Agreements. The Applicant would provide for treatment of industrial wastewater and stormwater using onsite and refinery treatment systems.

3.13.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on public services or utilities have been identified. The Applicant would extend the fire, security, and emergency medical resources of the refinery to cover all but the most extreme emergencies.

3.14 CULTURAL RESOURCES

Cultural properties or resources may include prehistoric or historic sites, districts, buildings, structures, or objects that are listed in, or eligible for listing in, the National Register of Historic Places. Artifacts, records, and material remains associated with these properties and traditional cultural properties, which include archaeological, traditional procurement, history or landmark, and religious sites, are also important resources. Several federal and state laws protect cultural resources, such as Section 106 of the National Historic Preservation Act (NHPA) and RCW chapters 27.44 and 27.53.

This section describes and summarizes archaeological and cultural resources within the BP Cherry Point Cogeneration Facility study area, identifies potential impacts on these resources, and suggests mitigation measures designed to limit those impacts. Information for this section was summarized from the BP Cherry Point Cogeneration Project Application for Site Certification (BP 2002), three cultural resource reports of surveys that include the project site (Appendix B; Stone 2002; Whiteman and *Sts'aStelQuyd* 2002), historical maps, and other background literature.

3.14.1 Existing Conditions

Introduction

The proposed cogeneration facility, its interface systems with the BP Cherry Point Refinery, electrical transmission system intertie connection, and wetland mitigation areas are located approximately 15 miles northwest of Bellingham, Whatcom County, Washington. The project site lies about 5 miles west of I-5 and 3 miles east of Point Whitehorn and the Strait of Georgia. The proposed upgrade to a section of the Custer/Intalco Transmission Line No. 2 extends east from the project site to the Custer substation adjacent to I-5. The proposed recycled wastewater pipeline would be located in the Alcoa Intalco Works facility about 1 mile south of the project site.

This section of the EIS summarizes the assessments for historic, archaeological, and traditional-use resources that were conducted within the Area of Potential Effect (APE) or the geographic area within which the proposed BP cogeneration project may affect cultural resources. The APE for cultural resources includes the approximate footprint of the cogeneration plant site, the refinery interface, the Bonneville electrical transmission system intertie, the Custer/Intalco Transmission Line No. 2, and other project components. The interface systems area, which is located inside the refinery boundary, comprises Access Road 2; water, natural gas, industrial and sanitary waste pipelines; and a segment of an elevated piperack. A proposed gas compressor station, power substations, steam and condensate piping, the remainder of the piperack assembly, Laydown Area 1-3, and detention pond 2 are additional components of the cogeneration interface with the refinery located within the refinery boundary. Other project components include a water pipeline modification at Alcoa Intalco Works, Access Road 3,

Laydown Area 4, and compensatory wetland mitigation areas. The cogeneration facility will be treated as a footprint, with no detailed discussion of impacts and mitigation of individual project elements or features. However, the remaining components of the project will be described in detail with a discussion of impacts and mitigation measures for each feature.

The Applicant contracted with the Lummi Nation for cultural investigations of the cogeneration facility footprint, refinery interface area including Access Road 2, Access Road 3, Laydown Areas 1-4, and a portion of the transmission system intertie line between transmission pads 1 and 2. The Lummi Nation subcontracted the work to BOAS, Inc., but provided tribal members as archaeological trainees. The Applicant also contracted with URS Corporation to conduct a cultural resources assessment of the approximately 5-mile-long section of the Custer/Intalco Transmission Line No. 2 located between the project site and the Custer substation. Native plant and archaeological surveys of the wetland mitigation areas will be conducted by BOAS, Inc. and the Lummi Nation, but have not yet been completed. Archaeological native plant surveys have not been conducted for Access Road 1, detention pond 2 and its discharge apron, the power substation located inside the refinery, the piperack assembly, the Alcoa water pipeline, and the remainder of the 0.8-mile-long transmission system intertie.

The archaeological survey associated with BOAS, Inc.'s study of the cogeneration facility and laydown areas recorded one previously unknown archaeological site (Whiteman and *Sts'aStelQuyd* 2002).

Applicable Historic Preservation Regulations

This section provides a list of pertinent federal and state statutes that require consideration of impacts on historic properties for projects with federal or state involvement. Collectively, these regulations and guidelines establish a comprehensive program for the identification, evaluation, and treatment of cultural resources.

The National Register of Historic Places was authorized by the NHPA of 1966 and is the nation's official list of historic properties worthy of preservation. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture, at a local, state, or national level of significance. Within the state of Washington, the Office of Archaeology and Historic Preservation (OAHP), under the direction of the State Historic Preservation Officer, administers the National Register program.

The following criteria are used in evaluating cultural properties that are more than 50 years old or that have achieved significance in the last 50 years for listing in the National Register (36 CFR 60.4):

- properties that are associated with events that have made a significant contribution to the broad patterns of our history; or

- properties that are associated with the lives of people significant in our past; or
- properties that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- properties that have yielded, or may be likely to yield, information important to prehistory or history.

As mandated by Section 106 of the NHPA, agencies are required to take into account the effects of their actions on historic properties and to allow the Advisory Council on Historic Preservation an opportunity to comment. Properties eligible for inclusion in the National Register are identified, and the effect of the undertaking on each historic property must be determined, either no effect or effect. If an effect is determined, measures to mitigate or reduce the effect are developed, agreed upon, and implemented.

The Archaeological and Historic Preservation Act (AHPA) of 1974, also known as the Archaeological Data Preservation or Moss-Bennett Act, directs agencies to report to the Secretary of the Interior if a project will cause the loss of significant scientific, prehistoric, historic, or archaeological data. The agency may request that the Department of the Interior conduct or assist with the salvage of these data. The AHPA is largely redundant to the NHPA, however, this act is used as the authority if an archaeological site is discovered after the completion of Section 106 of the NHPA review.

The American Indian Religious Freedom Act of 1978, as amended in 1996, requires agencies to consult with Indian tribes to determine if an undertaking may affect the practice of traditional religions and the places and physical paraphernalia needed for those practices.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 requires that federal agencies repatriate Indian ancestral human remains to tribes with cultural or genetic affiliation with such remains and funerary items.

Executive Orders (EOs) 13084 and 13175 establishes government-to-government relationships between Indian tribes and the federal government and its agencies. EO 13175, signed in 2000 and revoking the earlier EO 13084, requires that agencies have an accountable process for tribal officials to provide comment and input on regulatory policies that have tribal implications.

RCW Chapter 27.44 protects Indian burial sites, cairns, petroglyph (incised in stone) and pictograph (painted) markings, and historic graves on public and private land. The chapter further stipulates that persons knowingly removing, destroying, or defacing these resources will be charged with a Class C felony.

RCW Chapter 27.53 protects sites, objects, structures, artifacts, and locations of prehistoric or archaeological interest located in, on, or under the surface of any lands or waters owned or under

the control of the state of Washington or its counties, cities, or political subdivisions. Disturbing archaeological resources without an archaeological excavation permit is punishable as a Class C felony.

3.14.2 Cultural Context

Methods

Background archival research for the proposed project assisted in the evaluation of the National Register eligibility of resources that are 50 years or older located within the APE. URS conducted a record search and literature review at OAHP in Olympia, Washington. URS staff reviewed maps, site files, and Whatcom County survey report files to determine the presence or absence of previously recorded archaeological sites in the Custer/Intalco Transmission Line No. 2 corridor as well as the extent of previous archaeological survey coverage in the project vicinity. URS also reviewed General Land Office plats and patent records to assess historic land use patterns and the potential for early historic period sites or features in the project area.

The field survey for this portion of the proposed project occurred on January 23-24, 2003, and consisted of a pedestrian survey conducted at approximately 49-foot transect intervals within the 131-foot-wide corridor. URS field staff examined exposed cuts and banks, rodent spoil piles, and other soil exposures. To increase the amount of subsurface examined, URS also excavated 6-inch-diameter soil probes at periodic intervals along the corridor's length. Additional soil probes were placed at anticipated tower locations. The probes averaged approximately 16 to 23 inches below the ground surface, reaching groundwater as little as 4 to 6 inches below the ground surface in many of the probes. URS identified no historic or archaeological resources in the Custer/Intalco Transmission Line No. 2 survey corridor.

BOAS, Inc. conducted two studies for components of the project. A May 2002 assessment included an archaeological and native plant survey of most of Access Road 3 located south of the proposed cogeneration facility site. BOAS also surveyed a second access road located approximately 0.5 mile east of Access Road 3. The December 2002 BOAS study examined the proposed cogeneration facility site, the refinery interface area extending from Grandview Road south to the existing Ferndale natural gas metering station, the remainder of Access Road 3, and a transmission pad to be located at the junction of the transmission intertie line and Custer/Intalco Transmission Line No. 2. BOAS performed background research at OAHP, the University of Washington Library, Whatcom County Auditor's office, Western Washington University Library, Whatcom County Museum of History and Art, Bellingham Public Library, BP Cherry Point Refinery, and the BOAS, Inc. office library.

BOAS' two sets of archaeological field work began on July 18, 2001, and October 14, 2002. The pedestrian survey of the access roads used three transects spaced at approximately 3- to 5-foot intervals. BOAS excavated a single line of subsurface 20-by-20-inch shovel probes in the road corridor spaced at approximately 66 feet. Additional probes were placed beyond the corridor

centerline in areas of potential turns in the route. The shovel probes averaged approximately 20-23 inches below the ground surface. Bucket augers were used to extract sediments from greater depths than could be reached by a shovel in each probe, averaging approximately 27 inches below the ground surface. An approximately 0.6 inch³ sample from every 12th probe was screened through 1/8-inch wire mesh. The pedestrian survey of the remainder of BOAS' assessment area used an approximately 98-foot transect interval for the laydown areas and an approximately 33-foot interval for the access roads and transmission line segment. Subsurface probing in the second BOAS survey followed the same protocols as the first, except that probes were placed at an approximately 98-foot interval and all sediments were screened through 1/4-inch wire mesh. The average depth of the probes was approximately 19 inches below the ground surface in Laydown Areas 1-3, approximately 16 inches in Laydown Area 4, approximately 17 inches in the northern portion of Access Road 3, approximately 19 inches at the cogeneration site, and approximately 21 inches in the transmission pad areas.

The Lummi Nation and BOAS conducted a native plant study during the first survey, but postponed the study for the second survey area until plants could be more readily identified in the spring and summer. During the first survey, the survey corridor was mowed and traditionally used plants were identified at 3.3-inch intervals on the periphery of the mowed areas between shovel probe locations. The Lummi plant surveyors identified several sensitive areas that were avoided during road construction under the supervision of archaeological and tribal monitoring staff.

Ground visibility in the URS study area was low due to the majority of the route crossing through pasture. Dense grass and blackberry thickets obscured ground visibility along the access road routes during BOAS' first assessment. Similar conditions existed prior to the second survey, but the cogeneration area was mowed prior to the pedestrian survey to increase visibility.

Prehistory

Descriptions of cultural change in Northwest Coast prehistory is based on changes in archaeological artifact assemblages, food and resource procurement, and settlement patterns over time within a regional environmental framework. The prehistoric record for Puget Sound is divided into three broad chronological periods: the Early Period (15,000–5,000 Before Present), the Middle Period (5,000-1,000 Before Present), and the Late Period (1,000-250 Before Present).

The Early Period is characterized by chipped stone assemblages attributable to fluted projectile point, leaf-shaped projectile point, and cobble tool traditions. Subsistence patterns exhibit a reliance upon inland hunting, supplemented with fishing and marine invertebrate procurement in riverine and coastal areas. Settlements were typically located on upland plateaus or river terraces, although coastal occupations may have been flooded because of seismic activity or changes in sea level related to glaciation (Carlson 1990; Kidd 1964; Nelson 1990).

The Middle Period represents a proliferation in tool diversity within regional assemblages. Notched stone projectile points were characterized by a decrease in size, and toolkits were supplemented with groundstone, bone, and antler industries. Subsistence practices showed an increased orientation toward marine and riverine habitats; shellfish, salmon, and sea mammals became more important resources; and shell middens appeared in the archaeological record. Occupation areas expanded to include modern shorelines and islands and the earliest evidence of seasonal village sites dates to this period (Carlson 1990; Kidd 1964; Nelson 1990).

The Late Period is characterized by assemblages containing exotic trade goods imported from indigenous populations in the Columbia Plateau as well as metal arrowheads and trade beads from Euro-American groups. Small side-notched and triangular stone projectile points persisted but were superseded by an emphasis on bone and antler tools. Salmon became a major staple as evidenced by elaborate fish traps; subsistence practices were supplemented by terrestrial hunting and plant procurement. Permanent, village sites described by Euro-American settlers and ethnographers were established and persisted into the historic period (Carlson 1990; Kidd 1964; Nelson 1990).

Ethnohistory

During late historic times, Central Coast Salish Indians occupied the northern Puget Sound area. Three linguistic subdivisions of Central Salish occur in the vicinity of Cherry Point. Halkomelem speakers lived north of Birch Point and along the lower Fraser River valley. Nooksack speakers lived in inland sections of the Nooksack River drainage, and North Straits' speakers occupied the coastal areas north of Anacortes as well as the San Juan and other islands in the southern section of the Strait of Georgia. The BP Cherry Point Cogeneration project is situated in an area ceded by the Lummi, Nooksack, and Samish Indians; these groups now comprise the Lummi Indian Nation (Ruby and Brown 1986; Suttles 1990; Thompson and Kinkade 1990).

The Lummi are thought to have derived their name from *Lkungen*, the name that the North Straits-speaking Songish of Vancouver Island called themselves. The Lummi occupied coastal areas surrounding the mouth of the Nooksack River as well as several islands in Puget Sound. The Nooksack, meaning "mountain men," lived in the Nooksack River drainage. The Samish occupied additional islands in Puget Sound, including one that now bears their name as well as Guemes and Fidalgo islands (Ruby and Brown 1986; Suttles 1990; Swanton 1978).

The focus of the Central Coast Salish yearly cycle was the permanent winter village, which consisted of one or more cedar plank longhouses in which several families resided. The Central Coast Salish traded resources with other groups during the fall, and tool maintenance, basket and blanket weaving, woodcarving, and storytelling occurred during the winter in the villages. The houses measured between 20 and 60 feet in width and 40 and 120 feet in length and were built parallel to the shore. Each house featured wall and shed roof planks that were removable in fair weather. Principal villages near the project vicinity include *Sce'wex* on Birch Bay, *S'ilec* and *Ta'telew* on Semiahmoo Bay, and *Elek* and *Sxwelisen* on Bellingham Bay. The name for Cherry

Point, *Xwechi'exen*, derives from the word for “weasel” in the Lummi language. Lake Terrell is also known as *Xwhal le man* and refers to twined-rope reef net materials gathered in its vicinity (Stone 2002; Suttles 1990; Swanton 1978).

Subsistence revolved around seasonal harvests of marine and terrestrial foods that were eaten fresh or dried and stored for winter use. Salmon, halibut, herring, lingcod, and flounder were caught with reef nets, hook-and-line, and spears. The Central Coast Salish men used pitfalls, snares, bow and arrow, and nets to hunt deer, elk, bear, and over 30 species of waterfowl. Women gathered clams, mussels, herring eggs, crabs, sea urchins, and barnacles along the coast. Indian people also harvested many varieties of roots, berries, and other fruits (BP 2002; Suttles 1990). The Central Coast Salish used western yarrow, creambush oceanspray, western red cedar, swordfern, salal, skunk cabbage, and vine maple for pharmaceutical, technological, and ceremonial use (Moerman 1999; Suttles 1990). In the project vicinity, people mined the Cherry Point shoreline for stone to use as anchors, sinkers, other weights, and for hammers and mauls. The Lummi people continue to maintain their usual and accustomed use of the resources in the project vicinity for traditional purposes (BP 2002).

The arrival of Euro-Americans was presaged by outbreaks of epidemics that decimated native populations. Euro-American fur traders were followed by incursions of missionaries and settlers who dislocated native groups. Alcohol, disease, and relocation disrupted social and political organization (Suttles 1990).

Between 1854 and 1855, Isaac Stevens, the first governor of Washington Territory, compelled the Lummi and other Puget Sound Indians to relocate to reservations. Under the Point Elliot Treaty of 1855, the Lummi were sent to the Lummi Reservation that included one of their principal village locations. However, the territorial government expected them to share it with the Nooksack and Samish. Most tribal members found work in local Euro-American mills, canneries, and mines. A court decision in 1897 awarded Euro-Americans rights to the Lummi Indian Nation’s ancestral fishing grounds that were not reversed until 1974 (Ruby and Brown 1986; Suttles 1990).

History

Although Russian, Spanish, and British naval expeditions are thought to have penetrated the coastal waters off Washington as early as the middle 1700s, British Captain George Vancouver’s arrival in 1792 marks the earliest undisputed record of Euro-American contact in the Puget Sound region (Cole and Darling 1990; Kirk and Alexander 1990; Marino 1990).

Exploration was followed by incursions of Euro-American fur traders under the aegis of the Hudson’s Bay Company during the 1830s. Early contacts between Euro-American traders and native populations proved disastrous to the latter as they fell victim to waves of malaria, tuberculosis, and smallpox epidemics in the late 1700s and middle 1800s (Cole and Darling 1990; Marino 1990; Suttles 1990).

In 1818, the Oregon Country, which included Washington State, was subject to both United States and British rule. By 1846, disputes over the area drew to a close when a treaty confirmed the international boundary line between Washington Territory and British Columbia (Kirk and Alexander 1990; Marino 1990).

A General Land Office (GLO) survey map made in 1859 shows no Euro-American development such as houses or roads in the project site (GLO 1859).

Agency and Tribal Consultation

Bonneville has contacted the Lummi Nation and consultation is ongoing. Documentation of the Section 106 consultation process will be included in a future version of this EIS once discussions have been completed.

Previous Cultural Investigations in the Project Vicinity

The University of Washington and Western Washington University conducted some of the earliest archaeological investigations in the Birch Bay area, beginning in the 1960s. Archaeologists recorded a shell midden site, three prehistoric sites that included fire-cracked rock and flaked stone artifacts, and two possible earth ovens all within one mile of the project site. These site locations ranged from coastal areas 25 to 100 feet above the beach to inland areas, including the Terrell Creek drainage (Bailey 1970; Grabert and Hall 1978; King 1990; Larsen 1969; Larsen and Osier 1969).

Investigations in the Cherry Point Industrial Park noted sparse deposits of flaked stone tools, stone tool manufacture debris, fire-cracked rock, and the remains of a historic house. Although these materials were determined not to be significant, the researchers recommended archaeological monitoring of construction activities in the area (Miss 1992; Rice 1992). A survey of the Ferndale pipeline, which included a segment along Grandview Road, did not uncover any cultural resources in the project site (Kusmer and Blukis Onat 1989). A second pipeline survey for a proposed Cascade Natural Gas line, which was located approximately 1,000 feet east of the project site, also did not record any cultural resources (Woodman and Mighetto 1992).

Eastern Washington University conducted a survey in 1995 within the BP Cherry Point Refinery for a substation and associated transmission corridor that cross the current project site. The survey noted poor ground visibility because of heavy vegetation cover and high groundwater levels that prevented subsurface investigations. Although their survey did not uncover cultural resources, the researchers concluded that the area had the potential to contain archaeological sites because of the number of recorded artifacts in the surrounding area (Luttrell 1995).

Results of Cultural Resource Studies for the Proposed Project

BOAS, Inc. conducted two archaeological surveys and the first of two native plant studies for the current project (Stone 2002; Whiteman and *Sts'aStelQuyd* 2002). The May 2002 work consisted of a pedestrian survey, subsurface probing, archaeological construction monitoring, and the native plant survey for the east and west access road areas. No cultural resources or buried archaeological deposits were recorded by the survey. Lummi Indian Nation elders identified several culturally important plants in the native plant survey, including horsetail, reed canarygrass, bracken fern, plantain, wild carrot, nettle, various berries, red willow, oceanspray, vine maple, alder, and several types of coniferous trees. BOAS and the Lummi Indian Nation anticipate finding similar plant resources in a subsequent plant survey of the project's wetland mitigation area and propose that the data be used in conjunction with restoration of native plant habitat in the wetland mitigation area. Wetland mitigation area plants will be studied before September 2003. The wetland mitigation area will be disced to reduce reed canarygrass cover and BOAS will survey the area for archaeological materials at that time (BP 2002; Stone 2002; Whiteman and *Sts'aStelQuyd* 2002).

The second BOAS survey covered the construction Laydown Areas, main cogeneration facility location, an additional access road, transmission tower pad location, and wetland mitigation area. Pedestrian survey and shovel probing of these areas identified one scatter of stone tools and stone flake debris. The materials were discovered between 4 and 12 inches below the ground surface. The site was recommended as insignificant (BP 2002; Whiteman and *Sts'aStelQuyd* 2002).

3.14.3 Impacts of the Proposed Action

Construction

Cogeneration Site

BOAS, Inc. recorded no cultural resources in this area. However, the Lummi Indian Nation's second native plant survey has not been completed. The results of this study may identify traditional resources in this area. An archaeological survey has not been conducted for the Access Road 1 area. Impacts on cultural resources in this area cannot be assessed until an evaluation has been made.

Refinery Interface

A BOAS, Inc. survey in 2002 recorded one archaeological site in Laydown Area 3 that appears to be insignificant and therefore ineligible for listing in the National Register. Because the site is not considered significant, the proposed project would not have any impacts on cultural resources. However, the Lummi Indian Nation's second native plant survey has not been completed. The results of this study may identify traditional resources in this area.

In addition, archaeological surveys have not been conducted for detention pond 2 and its discharge apron, the power substation located inside the refinery, industrial or sanitary wastewater pipelines, or the piperack assembly. Impacts on cultural resources in this area cannot be assessed until an evaluation has been made.

Transmission System

BOAS, Inc. recorded no cultural resources in the segment of this area that was surveyed. However, the Lummi Indian Nation's second native plant survey has not been completed. In addition, an archaeological survey has not been conducted for the remaining portion of the 0.8-mile-long transmission system intertie. The results of these studies may identify traditional resources or sites in this area.

Custer/Intalco Transmission Line No. 2

URS recorded no cultural resources in this area that would be affected by the lattice tower or monopole options. However, a native plant survey has not been conducted for this area. The results of this study may identify traditional resources in this area.

Other Components

Alcoa Water Pipeline

An archaeological survey has not been conducted for this area. Impacts on cultural resources in this area cannot be assessed until an evaluation has been made.

Access Road 3

BOAS, Inc. recorded no cultural resources in the Access Road 3 area. No impacts on cultural resources would result in this area.

Laydown Area 4

BOAS, Inc. recorded no cultural resources in this area. However, the Lummi Indian Nation's second native plant survey has not been completed. The results of this study may identify traditional resources in this area.

Wetland Mitigation Area

Archaeological surveys have not been conducted for the wetland mitigation area. In addition, the Lummi Indian Nation's second native plant survey has not been completed. The results of this study and its associated archaeological survey may identify traditional resources or sites in the

wetland mitigation area. Impacts on cultural resources in this area cannot be assessed until an evaluation has been made.

Operation

Operation of the project would not affect any cultural resources at any of the project components.

3.14.4 Impacts of No Action

Under the No Action Alternative, the cogeneration facility would not be constructed, and potential cultural resource impacts associated with the project would not occur.

3.14.5 Secondary and Cumulative Impacts

The BP Cherry Point Cogeneration Project and the GSX project may not spur further development within the refinery area. Construction for continued facility development, such as road building or transmission line construction, could affect archaeological deposits, tribal resources, and historic properties in currently undeveloped areas within the refinery complex. Specific locations where this development might occur, however, are unknown.

3.14.6 Mitigation Measures

Construction

Cogeneration Site, Refinery Interface, Transmission System, and Other Project Components

In the areas it surveyed, BOAS Inc. recommends that if intact archaeological resources or human burials are encountered during construction, then the construction foreman should immediately direct activities that could further disturb the deposits away from their vicinity. The construction foreman or the Applicant would then contact EFSEC, Dr. Robert G. Whitlam, Washington State Archaeologist, and Lummi Indian Nation cultural resource staff who would assist in determining how the materials should be treated. BOAS further recommends construction monitoring of the area within approximately 100 feet of the boundaries of the archaeological site discovered in Laydown Area 3.

In addition to the mitigation measures proposed by the Applicant, it is recommended that archaeological and native plant surveys be conducted for detention pond 2 and its discharge apron, the power substation located inside the refinery, industrial or sanitary wastewater pipelines, the piperack assembly, Alcoa water pipeline route, Access Road 3, and the wetland mitigation areas. If no significant archaeological resources are discovered or if they would not be affected by the project, construction of the proposed facility would not affect cultural resources

and no mitigation is necessary. If significant resources were found that would be affected by the project, however, appropriate mitigation measures should be devised before construction begins.

Custer/Intalco Transmission Line No. 2

URS recommends if intact archaeological resources or human burials are encountered during construction, that the construction foreman should immediately direct activities that could further disturb the deposits away from their vicinity. A qualified archaeologist should evaluate the find and determine an appropriate course of action.

Operation

Operation of the project would not affect any cultural resources, and no mitigation measures are required in this area.

3.14.7 Significant Unavoidable Adverse Impacts

Because cultural resources are not anticipated to be affected, no significant unavoidable adverse impacts on cultural resources would result from construction, operation, and maintenance of the proposed project.

3.15 TRAFFIC AND TRANSPORTATION

This section discusses potential traffic and transportation impacts associated with the proposed project and identifies mitigation measures designed to limit the extent and magnitude of the impacts. Transportation and traffic data and the impact analysis are based on a literature review and field surveys performed by the Applicant.

3.15.1 Existing Conditions

Site Location and Access

The proposed project would be sited on the eastern edge of the refinery between Grandview and Brown roads. The project area is approximately 6 miles northwest of Ferndale, Washington, 7 miles southeast of Blaine, Washington, and about 15 miles north of Bellingham, Washington. The nearest community is Birch Bay, Washington, approximately 2 miles northwest of the site. The U.S.-Canada border is approximately 8 miles directly north of the proposed project site.

Figure 3.15-1 shows the transportation network in the surrounding area. The cogeneration facility and construction laydown areas are located on the south side of Grandview Road, east and west of Blaine Road, respectively, and on the east side of the existing refinery.

Roadways

Figure 3.15-2 shows existing roadway characteristics in the project vicinity. SR 548 is a two-lane state highway classified by WSDOT as a collector and a class two access highway.

SR 548 was recently improved from I-5 to Blaine Road under a project that provided a pavement overlay and improved pavement markings and traffic signs. The roadway has 11-foot-wide lanes, 8-foot-wide paved shoulders, drainage ditches, and wire fences on both sides. The posted speed limit is 50 mph.

The SR 548/Blaine Road intersection is in the center of the project site. SR 548 makes a right-angle turn at this intersection, with the state highway designation on the east and north legs. North of the Blaine Road intersection, the posted speed limit is 45 mph.

Other than SR 548, the other public roads in the vicinity are county roads such as Grandview Road, which is west of Blaine Road along the north frontage of the refinery. County roads in the area are two-lane rural roads. Speed limits are generally 50 mph, except for more developed areas such as in the Birch Bay area and near Blaine, Ferndale, and the I-5 interchanges, where the speed limits are lower.

The Applicant's property has a network of private roads that serve the refinery and provide access to the project site. The south leg of the SR 548/Blaine Road intersection is a paved, private road with a locked gate. It is posted with a sign that reads, "BP Property, Contractor Entrance, Not a Through Road." The gate, marked with orange reflectors, is normally closed and locked.

Pedestrian and Bicycle Facilities

There are no improved pedestrian or bicycle facilities in the project vicinity.

Traffic Volumes

Table 3.15-1 summarizes average daily traffic (ADT) volumes at various locations on SR 548 (from 1996 through 2000). Trucks comprised approximately 12% of the 1999 ADT on SR 548 between I-5 and Portal Way, of which 6% were single unit, 3% double units, and 3% triple units.

Figure 3.15-3 shows available historical daily traffic counts on the roads in the project vicinity, taken from traffic counts conducted by WSDOT and Whatcom County (from 1995 through 2000). During 2000, the ADT on I-5 south of SR 548 was 33,000 and the ADT on I-5 north of SR 548 was 25,000.

Average weekday traffic volumes are generally higher in the summer and lower in the winter because of increased recreational, agricultural, and construction traffic in the summer. August has the highest traffic volumes, approximately 13% higher than the annual average, and January has the lowest traffic volumes, approximately 20% lower than the annual average.

Table 3.15-1: Average Daily Traffic Volumes on SR 548

Location	1996 ADT	1997 ADT	1998 ADT	1999 ADT	2000 ADT
West of I-5	7,300	7,500	7,500	7,600	9,100
West of Portal Way	Not Available	Not Available	Not Available	6,100	6,200
West of Vista Drive	2,800	2,900	3,500	3,600	3,700
West of Kickerville Road	2,700	2,800	2,800	3,200	3,200
South of Birch Bay-Lynden Road	2,000	2,000	2,100	2,100	2,800
South of Peace Portal Drive	7,400	5,700	5,800	6,000	6,000

Source: WSDOT and Whatcom County

Figure 3.15-4 shows 2001 average daily traffic volumes on roads in the project vicinity. Existing traffic volumes were predicted by applying a 6% annual growth rate in traffic volumes, which was determined by comparing the growth in ADT on SR 548 contained in WSDOT's annual traffic reports.

Figure 3.15-5 shows 2001 weekday PM peak-hour traffic volumes at intersections on SR 548. The Applicant identified these intersections as locations that would be used by project traffic traveling to and from the proposed project. Weekday PM peak-hour traffic volumes are typically used for analysis because they reflect traffic conditions when the potential for congestion is greatest. The PM peak-hour traffic volumes shown in Figure 3.15-5 were counted during the two-hour commuter peak period from 4 to 6 p.m. The PM peak hour typically begins between 4:30 and 5 p.m. The peak traffic direction on SR 548 is eastbound during the PM peak hour, largely from employees leaving the refinery.

Figure 3.15-1: Transportation Network in the Project Vicinity

Figure 3.15-2: Existing Roadway Characteristics

Figure 3.15-3: Available, Historical Daily Traffic Counts

Figure 3.15-4: 2001 Average Daily Traffic Volumes

Figure 3.15-5: 2001 Weekday PM Peak-Hour Traffic Volumes

Refinery Construction Activity

Construction activities are a regular occurrence at the refinery site. The number of construction workers varies between approximately 400 and 2,400 depending on the type and number of projects under way. According to the Applicant, the construction peak occurs during a two- to three-week period every two to three years, when a major maintenance overhaul is performed at the refinery.

Transit, Pedestrian, and Nonmotorized Traffic

There is no transit bus service in the project vicinity. Existing pedestrian and bicycle traffic volumes on roadways in the area are extremely low.

Levels-of-Service

Level-of-service (LOS) is a qualitative measure that is typically used to describe operational conditions within a traffic flow and the perception of these conditions by drivers or passengers. These conditions include factors such as speed, delay, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. LOS is given letter designations from A to F, with A representing the best operating conditions (free flow, little delay) and F representing the worst (congestion, long delays).

Table 3.15-2 shows existing PM peak-hour LOS and average delays at eight intersections on SR 548. Because of the relatively low existing traffic volumes, these intersections currently operate at LOS B or C, which indicates there is no significant traffic queuing or congestion.

Table 3.15-2: PM Peak-Hour Level-of-Service Summary

Intersection	Movement/Approach	LOS ¹
SR 548/I-5 northbound on-ramp (MP 0.00)	Northbound	C (17.6)
SR 548/I-5 southbound on-ramp (MP 0.09)	Southbound	B (11.7)
SR 548/Portal Way (MP 0.29)	Overall	C (16.3)
SR 548/Vista Drive (MP 0.97)	Overall	B (10.7)
SR 548/Kickerville Road (MP 4.93)	Northbound	B (14.0)
SR 548/Blaine Road (MP 5.93)	Southbound	B (12.0)
SR 548/Birch Bay-Lynden Road (MP 8.96)	Overall	B (13.8)
SR 548/Peace Portal Drive (MP 11.80)	Southbound	C (16.8)

1 Number shown is the average control delay in seconds per vehicle for the overall intersection at an all-way, stop-controlled intersection, or worst-case approach at a stop-sign-controlled intersection. These values determine the LOS for intersections according to the 2000 Highway Capacity Manual (Transportation Research Board 2000).

MP = milepost

The transportation element of the Whatcom County Comprehensive Plan designates LOS C as the LOS standard for rural state routes and LOS D as the LOS standard for urban state routes in Whatcom County (1997). The comprehensive plan designates various UGAs within the county. The proposed cogeneration facility is located within the Major/Port Industrial UGA. SR 548 is within the UGA from Kickerville Road to approximately one-half mile east of Blaine Road, and

Grandview Road is the northern boundary of the UGA from the west. All eight of the intersections listed in Table 3.15-2 are within one of Whatcom County's UGAs.

Roadway Safety

Table 3.15-3 summarizes the most recent five-year (1995-1999) traffic accident history on two segments of SR 548. There were no recorded fatal accidents. For comparison, the 1996 average accident rates on state highways were 1.74 in Whatcom County and 1.88 statewide. There are no high accident locations or high accident corridors on SR 548.

Table 3.15-3: Five-Year Accident History on Two Segments of SR 548

	1995	1996	1997	1998	1999	2000
I-5 to SR 548/Blaine Road (5.93 miles)						
Number	4	20	N/A	10	9	7
Accident Rate ¹	0.7	3.3	N/A	1.3	1.2	0.9
SR 548/Blaine Road to Dakota Creek Bridge (5.65 miles)						
Number	14	26	N/A	8	12	15
Accident Rate ¹	3.0	5.0	N/A	1.6	2.5	2.3

Source: BP 2002, Appendix I

1 Accidents per million vehicle miles

Table 3.15-4 summarizes a three-year (1998-2000) traffic accident history at selected major intersections on SR 548 between I-5 and Peace Portal Drive/Bell Road. The intersection accidents are included in the totals for the roadway segment. The number of intersection accidents and the resulting rates are low; SR 548 does not appear to be unusually hazardous.

Table 3.15-4: Three-Year Accident History at Selected Major Intersections on SR 548

Intersection	1998 ¹	1999	2000	Total	Rate ²
I-5 northbound on-ramp (MP 0.00)	0	0	0	0	0.00
I-5 southbound on-ramp (MP 0.09)	0	0	0	0	0.00
Portal Way (MP 0.29)	1	1	2	4	0.34
Vista Drive (MP 0.97)	1	0	1	2	0.23
Kickerville Road (MP 4.93)	1	2	0	3	0.45
SR 548/Blaine Road (MP 5.93)	1	0	1	2	0.28
Bay Road (MP 6.96)	0	0	0	0	0.00
Birch Bay-Lynden Road (MP 8.96)	0	3	1	4	0.37
Drayton Harbor Road (MP 10.85)	1	1	1	3	0.30
Peace Portal Drive/Bell Road (MP 11.80)	2	2	3	7	0.72

Source: BP 2002, Appendix I

MP = milepost

1 Partial Listing. According to WSDOT, approximately 36% of the accident records are not yet entered into the system.

2 Rate - Accidents per million vehicle miles.

Waterborne, Air, and Rail Traffic

Recreational boats, commercial ships, and barges operate in the Strait of Georgia and its bays in the project vicinity. Boat launch ramps and associated facilities are available to recreational boaters at Birch Bay.

The refinery owns and operates a pier at Cherry Point, about 1 mile southwest of the proposed project site. The refinery pier serves ocean-going tankers that deliver crude oil from Alaska to the refinery. Ships and barges also operate from the pier to move refined petroleum products from the refinery to market. Tanker trucks move petroleum products from a truck rack located at the refinery to local markets. The nearest airport is Blaine Municipal Airport, approximately 7 miles north of the proposed project site in Blaine. The other airport in the area is Bellingham Airport, approximately 12 miles to the southeast.

An active railroad track owned and operated by BNSF railway parallels I-5 along the west side of Portal Way and Peace Portal Drive (Figures 3.15-1 through 3.15-8). The single-track line connects the BNSF transcontinental mainline in Everett with Bellingham, Ferndale, Blaine, and Vancouver, Canada. The railroad speed limit is 50 mph. Between Ferndale and Blaine, the BNSF railroad track crosses 10 roadways. SR 548 is the principal route to and from I-5 for hauling materials. All of the railroad grade crossings on SR 548 are protected by active warning devices, including flashing red lights and gate arms, as well as passive warning devices such as signs and pavement markings. The railroad crossing and other locations are shown in Table 3.15-5 by milepost between I-5 and Peace Portal Drive.

Table 3.15-5: Railroad Crossings on SR 548

Crossing	Milepost
I-5 Overcrossing	MP 0.00
Portal Way	MP 0.29
BNSF Railroad Grade Crossing (No. 084841X)	MP 0.31
Vista Drive	MP 0.97
Kickerville Road	MP 4.93
BNSF Railroad Grade Crossing (No. 096133H)	MP 5.16
Blaine Road/SR 548	MP 5.93
Bay Road	MP 6.95
Birch Bay-Lynden Road	MP 8.96
Dakota Creek Bridge	MP 11.58
BNSF Railroad Grade Crossing (No. 084853S)	MP 11.78
Peace Portal Drive/Bell Road	MP 11.80

A BNSF spur track runs to the refinery from the junction just north of Custer on the Everett-Vancouver track approximately 5 miles south. The railroad speed limit on the spur track is 25 mph.

3.15.2 Impacts of the Proposed Action

Construction

Site Access and Parking

Primary access to the project area during construction would be from Grandview Road to Blaine Road, then Blaine Road to the west access road (Access Road 1). Secondary access to the facility would be from a proposed private access road (Access Road 2) that would run from the southwest corner of the site to the existing private road extension of Blaine Road. The Blaine Road extension, Brown Road, and other existing private roads within the Applicant's property would provide internal access.

A third access road (Access Road 3) would connect the facility to a private transmission corridor maintenance road located on the Applicant's property that extends south to Brown Road. This proposed access road would provide access to the transmission corridor south of the cogeneration facility and Tower 4. Another maintenance road within the transmission corridor connects Tower 3 and Tower 2 and intersects with Brown Road. If the option to reconstruct the towers and transmission lines of the Custer/Intalco Transmission Line No. 2 is selected, then access to the transmission corridor would be from various locations.

During construction, most of the site-generated traffic would use the existing private road extension of Blaine Road south from SR 548 into the Applicant's property. The contractors' parking lot, construction trailer parking, and Laydown Areas 1, 2, and 3 would be located on the west side of this existing Blaine Road extension. Laydown Area 4 would also be used during construction. The laydown areas would be used for the storage and assembly of construction materials and equipment.

Vehicle Trip Generation

Project-generated traffic volumes during construction would be produced by employees commuting to and from work at the job site, as well as owner, contractor, supplier, regulator, and service vehicles (including trucks of various sizes) doing business at the site. The Applicant has estimated the number of vehicle round trips each month during construction, assuming mobilization in February 2004 through December 2005 (Duke/Fluor Daniel 2001). These round-trip estimates are based on detailed monthly estimates of the number of workers onsite for each construction craft and trade, the number of management staff onsite, truck deliveries of equipment, heavy equipment deliveries, and deliveries of site preparation materials.

Construction would require approximately 24 months, during which time the size of the work force would vary. Construction work at the cogeneration facility is expected to occur primarily on weekdays during the daytime.

Table 3.15-6 shows the estimated vehicle trip generation during average and peak construction conditions. Estimates are also shown for an average weekday and for the AM and PM peak hours. Trip generation estimates are based on the Applicant's round-trip estimates, supplemented

by published trip generation data available for utilities and other comparable land uses (Institute of Transportation Engineers 1997).

A vehicle trip, as shown in Table 3.15-6 and as used in this analysis, is defined as a single or one-direction vehicle movement with either the origin or destination (exiting or entering) inside the project site. The trip generation values shown in Table 3.15-6 account for all site trips made by all vehicles for all purposes, including employee, owner, contractor, supplier, regulator, visitor, and service and delivery vehicle trips.

Table 3.15-6: Estimated Vehicle Trip Generation

Time Period	Trips Entering	Trips Exiting	Total Trips
Average Construction Conditions			
Average Weekday	325 (50%)	325 (50%)	650
AM Peak Hour	144 (90%)	16 (10%)	160
PM Peak Hour	25 (15%)	140 (85%)	165
Peak Construction Conditions			
Average Weekday	600 (50%)	600 (50%)	1,200
AM Peak Hour	266 (90%)	30 (10%)	296
PM Peak Hour	46 (15%)	258 (85%)	304
Project Operation Conditions			
Average Weekday	70 (50%)	70 (50%)	140
AM Peak Hour	23 (90%)	3 (10%)	26
PM Peak Hour	4 (15%)	23 (85%)	27

Based on information developed by the Applicant, the peak number of monthly round trips would be approximately 10,300 in December 2004. This would be approximately 600 round trips each workday, or 1,200 one-way trips. For this analysis, an estimate of 1,200 (one-way) site-generated trips is shown in Table 3.15-6 for an average weekday during peak construction conditions.

The roadway traffic PM peak hour is the highest traffic volume hour of the day and is used as the basis for determining traffic impacts. As shown in Table 3.15-6, the PM peak-hour vehicle trips generated by the proposed project during peak construction are estimated to be 46 entering the site and 258 exiting, for a total of 304 trips.

Truck Trips

Truck trips are included in the trip generation estimates shown in Table 3.15-6. Large, heavy equipment would be transported to the refinery site by rail. Cranes would probably transfer this large, heavy equipment from the railroad car to an oversize truck for delivery to the job site.

During construction, some onsite soil would be removed and disposed of at approved sites. Various quantities of fill, including sand and gravel, would also be imported to the site. In addition, construction materials would be brought to the site that would include concrete, sheet and metal piping. Table 3.8-1 in Section 3.8 lists estimated quantities of these materials to be

used during construction of the proposed project. Imported fill, sand, and aggregate quantities are estimated at 151,650 cubic yards. Assuming trucks with a 20-cubic-yard capacity, this would result in 7,583 one-way truck trips.

Acquisition of fill material, sand, and gravel would be the responsibility of the construction contractor. Specific routings to and from the sources of materials would need to be identified in the Construction Transportation Management Program and approved by WSDOT and Whatcom County.

While specific routings are not known at this time, truck traffic would most likely use the principal arterials or roadways from material sources to the cogeneration facility. Potential impacts could affect roadway and/or intersection operations thereby worsening levels of service or increasing queue lengths or delays. Other impacts could include an increase in accidents or at least the potential for more accidents that accompany increased congestion (see Figure 3.1-6).

Vehicle Trip Distribution

Figure 3.15-6 shows the estimated distribution and assignment of project-generated trips for peak construction conditions. The distribution of site-generated trips is based on the characteristics of the road network, existing traffic patterns, historical and projected development in the area, locations where workers would likely reside, and the location of other potential trip origins and destinations.

Construction materials would arrive at the project site in trucks via I-5 and SR 548, except for large, heavy equipment that would arrive by rail. Heavy equipment would be transported by rail and off-loaded at the BNSF rail spur at the refinery. Heavy equipment would be loaded onto heavy haul vehicles or trailers and delivered to the cogeneration facility area via interior refinery roads. The steam turbine would be delivered in sections and assembled onsite.

Heavy equipment would include the following: turbines, generators, transformers, and other pieces of large, heavy equipment required for the project. The approximate sizes of these various pieces of equipment range up to almost 17 feet in height, over 19 feet in width, and 77 feet in length. Approximate weights range from 85,000 to 741,000 pounds.

The project's trip distribution for average construction conditions is expected to be the same as for the peak construction conditions. Since the estimated vehicle trip generation is proportional to employment, the average weekday and PM peak-hour volumes generated during average construction conditions would be approximately 54% of the volumes shown in Figure 3.15-6 for peak conditions.

Figure 3.15-6: Project-Generated Trips for Peak Construction Conditions

Traffic Volumes

Travel demand on the roadway network is typically composed of three elements:

- Existing traffic
- Estimated project-generated traffic
- Estimated future non-project traffic

Estimated future non-project traffic may include traffic volumes generated by other land development projects that are planned, but not yet operational, changes in traffic patterns from roadway improvements or operations, and the effects of population and business growth. No changes in traffic patterns from roadway improvements or operations are expected by 2004. A 5% annual growth rate for traffic volumes was used to estimate future traffic volumes. This rate was calculated based on PM peak-hour traffic volumes at the SR 548/Kickerville Road intersection. This 5% growth rate accounts for the effects of general population and business growth in the project vicinity.

Figure 3.15-7 shows projected 2004 PM peak-hour and average weekday traffic volumes during peak construction conditions at intersections on SR 548. These volumes include the existing traffic volumes, the estimated project-generated traffic volumes, and the 5% growth rate.

Levels-of-Service

LOS was determined at the intersections on SR 548 during the PM peak hour during peak construction conditions (Table 3.15-7). Average delays would increase because of the project, but the intersections would continue to operate at LOS B or C, which is within acceptable county standards. Exceptions are the I-5 northbound ramp intersections and the Portal Way intersection. The I-5 northbound ramp intersections would drop to LOS D during the PM peak hour during peak construction conditions, which is still considered to be acceptable by WSDOT.

Table 3.15-7: PM Peak Hour Level-of-Service Summary – Proposed Action

Intersection	Movement/Approach	2004 With Project ¹
SR 548/I-5 northbound on-ramp (MP 0.00)	Northbound	D (29.4)
SR 548/I-5 southbound on-ramp (MP 0.09)	Southbound	B (13.3)
SR 548/Portal Way (MP 0.29)	Overall	F (64.6)
SR 548/Vista Drive (MP 0.97)	Overall	C (18.1)
SR 548/Kickerville Road (MP 4.93)	Northbound	C (21.7)
SR 548/Blaine Road (MP 5.93)	Southbound	C (24.0)
SR 548/Birch Bay-Lynden Road (MP 8.96)	Overall	C (21.6)
SR 548/Peace Portal Drive (MP 11.80)	Southbound	C (20.8)

1 Number shown is the average control delay in seconds per vehicle for the overall intersection at an all-way, stop-controlled intersection, or worst-case approach at a stop-sign-controlled intersection. These values determine the LOS for intersections according to the 2000 Highway Capacity Manual (Transportation Research Board 2000).

MP = milepost

The SR 548/Portal Way intersection would operate at LOS F during the PM peak hour during peak construction conditions without any mitigation. The project is not expected to have a significant impact on I-5 because of its distance from the project site (more than 5 miles) and its large capacity. Approximately 45% of site-generated traffic (approximately 540 vehicles per day during the construction peak) is expected to use I-5 south of SR 548. Significantly less site-generated traffic would use I-5 north of SR 548. Therefore, even with the project, I-5 would continue to operate at a high level-of-service, with traffic volumes well below capacity.

Other Traffic Impacts

Other traffic impacts may include the following:

- Accident rates are not expected to increase with construction of the proposed project.
- Any modifications or improvements made to county roads and SR 548 would be done in accordance with the appropriate county and WSDOT safety standards.
- The amount of hazardous waste generated at the site during construction is expected to be small. However, any hazardous waste would be transported by licensed contractors to licensed disposal facilities, in accordance with existing county and state regulations.

Waterborne, Air, and Rail Traffic

Most construction materials for the facility would not require rail transport. However, large, heavy pieces of equipment (such as turbines, generators, and transformers) may be delivered by rail and transferred to oversize trucks, as discussed above. Such transport is anticipated to be incidental, and the transfer of components to oversized trucks for onsite delivery would occur at existing local railroad tracks. If rail transport is used, it is expected that BNSF would be able to coordinate transport and unloading activities without adversely affecting its system. The project is not expected to require waterborne or air transport during construction of the proposed facility.

Operation

Site Access and Parking

Primary access to the project site (Access Road 1) would be from a proposed access road that would intersect the south side of SR 548. Passenger vehicle parking would be provided in a parking lot adjacent to the administration building on the west side of the proposed access road. The primary access would be used by nearly all of the site-generated traffic during operation of the proposed project.

Figure 3.15-7: Projected 2004 PM Peak-Hour and Average Weekday Traffic Volumes with Project

Secondary access to the site (Access Road 2) would be available from the existing extension of Blaine Road into the refinery. Access Road 3 would link the existing maintenance road that runs south to Brown Road. The existing private roads within the Applicant's property would provide for the relatively small amount of internal traffic expected between the refinery and the proposed cogeneration facility. These internal roads would allow access to the project from the existing refinery gates. However, the Blaine Road extension and other existing gates would not normally be used by traffic generated by the proposed project.

Access Road 3 to the maintenance road from the project site south would be used for maintenance and security access to the transmission line corridor just south of the project.

Vehicle Trip Generation

Traffic volumes during operation of the project would result from employees commuting to and from work at the site, as well as owners, suppliers, regulators, and maintenance and service workers (including trucks of various sizes) conducting business at the site. When the project is operational, about 30 employees would be needed to staff the facility daily. A maximum of 25 employees are expected to be present on the site at any point in time (including shift change and training). The cogeneration facility is expected to operate 24 hours per day, seven days per week. It is anticipated that some employees would work standard office hours, while others would work in shifts.

Table 3.15-6 shows the project construction and operation vehicle trip generation. Estimates are shown for an average weekday and for AM and PM peak hours. Trip generation estimates are based on the number of employees and published average vehicle trip generation rates available for utilities and other comparable land uses. The trip generation rate is 4 trips per employee on an average weekday, 0.74 trips per employee during the AM peak hour, and 0.76 trips per employee during the PM peak hour.

Chemicals to be used during operation would be shipped to the project site in tanker trucks, including anhydrous ammonia, caustic, sulfuric acid, and BFW chemicals (oxygen scavenger, neutralizing amine). Each truck typically holds approximately 8,000 gallons. The number of estimated truck trips is as follows:

- Approximately 23 round-trip tanker truck trips (46 one-way trips) per year would be required for anhydrous ammonia deliveries.
- Approximately 28 round-trip tanker truck trips (56 one-way trips) per year would be required for caustic deliveries.
- Approximately 13 round-trip tanker truck trips (26 one-way trips) per year would be required for sulfuric acid deliveries.
- Approximately three round-trip tanker truck trips (six one-way trips) per year would be required for each BFW chemical.

As shown in Table 3.15-6, the PM peak-hour vehicle trips generated by operation of the project are estimated to be four entering the site and 23 exiting, for a total of 27 trips. Truck trips are included in the trip generation estimates shown in the Table 3.15-6.

Vehicle Trip Distribution

The distribution of vehicle trips during project operation is estimated to be the same as for the peak construction conditions shown in Figure 3.15-6. The resulting trip assignment on an average weekday during project operation would be 104 trips on SR 548 east of the project site (including 20 PM peak-hour trips), six trips on Grandview Road west of Blaine Road (including one PM peak-hour trip), and 31 trips on SR 548 north of the Blaine Road intersection (including six PM peak-hour trips). Chemicals and most other materials and equipment would arrive at the site in trucks from I-5 and SR 548.

Traffic Volumes

Project-generated traffic volumes during operation would be minimal. The increase in traffic volumes from operation of the proposed project would be low. Total volumes on SR 548 would remain low relative to the capacity of the roadway.

Because of the low traffic volumes during project operation, the study area intersections on SR 548 would continue to operate at LOS B or C. The only exception is the SR 548/Portal Way intersection; it is calculated to operate at LOS D, which is considered acceptable by WSDOT. Delays would be few, and no substantial traffic queuing or congestion is expected.

The volume of maintenance and security traffic generated by the transmission line towers would be very low. The amount of hazardous waste generated at the site during project operation is expected to be small.

An analysis of the potential occurrence of icing and fogging as a result of the cooling tower was performed by the Applicant to determine if there would be any impact to local traffic. The analysis determined that there is no potential for icing, and that fogging may occur 2.5 hours per year, approximately 650 to 1,650 feet to the northwest and northeast, which is on the north side of Grandview Road, and would not impact vehicle traffic.

Waterborne, Air, and Rail Traffic

Operation of the cogeneration facility would not require waterborne, air, or rail transport except for the unanticipated need to replace a large piece of equipment. In that case, rail transportation may be used.

The presence of the cogeneration facility, the exhaust stacks, and the new 230-kV transmission line is not anticipated to result in a significant impact on air traffic. Air traffic in the area is low since the nearest airport is 7 miles away, and there are no major destination areas in the project vicinity. The Federal Aviation Administration has indicated that warning lights are not needed on the exhaust stacks (BP 2002).

3.15.3 Impacts of No Action

Proposed Roadway Improvements

Whatcom County's Six-Year Transportation Improvement Program lists the following proposed road improvements in the project vicinity:

- Birch Bay-Lynden Road/Portal Way intersection: Traffic signalization
- Kickerville Road from Rainbow Road to SR 548: Reconstruction
- Vista Drive from Ferndale city limits to SR 548: Reconstruction
- Grandview/Point Whitehorn from Koehn Road to Jackson Road: Reconstruction
- Bay Road from Valleyview Road to the east 0.25 mile: Intersection improvements
- Kickerville Road from SR 548 to Birch Bay-Lynden Road: Reconstruction

WSDOT has three proposed improvement projects scheduled for SR 548, as follows:

- SR 548 from MP 3.75 to MP 3.80 Northstar Road vicinity: Culvert replacement
- SR 548 MP 5.16 Kickerville railroad crossing: Culvert installation
- SR 548 from MP 11.54 to MP 11.58 Dakota Creek Bridge 548/10: Bridge replacement

Traffic Volumes

Travel demand on the roadway network would be composed of two elements:

- Existing traffic
- Estimated future non-project traffic

Existing traffic volumes were discussed in Section 3.15.1. Estimated future non-project traffic growth is generally composed of the following:

- Traffic volumes generated by other land development projects that are planned but not yet operational,
- Changes in traffic patterns from roadway improvements or operations, and
- Effects of population and business growth.

No new developments are proposed in the project vicinity that would add traffic volumes to the roadway system in the next few years. Also, no anticipated changes in area traffic patterns from roadway improvements or changes in traffic operations are expected by 2004. Finally, a 5% annual traffic growth rate was used to estimate future impacts from population and business growth in the area. This rate was based on historical traffic counts during the PM peak hour at the SR 548/Kickerville Road intersection.

The 5% annual growth rate in traffic volumes, which accounts for the effects of general population and business growth in the area, provides a conservative estimate since the rate of population growth in Whatcom County is expected to be about 2% per year.

Figure 3.15-8 shows projected No Action 2004 ADT volumes and PM peak-hour traffic volumes at intersections on SR 548. These volumes include the existing traffic volumes plus the 5% annual traffic growth rate.

Under the No Action Alternative, traffic volumes in the area would be expected to increase at approximately 5% per year. As shown in Table 3.15-2, intersections on SR 548 would continue to operate at LOS B or C. The only exception is the SR 548/Portal Way intersection, which would operate at LOS D, which is still considered acceptable by WSDOT. No traffic or transportation impacts would result.

Levels-of-Service

LOS was determined at the intersections on SR 548 during the PM peak hour for the No Action Alternative (Table 3.15-8). Average delays would increase over existing conditions, but the intersections would continue to operate at LOS B or C, which is within acceptable county standards. The only exception is the SR 548/Portal Way intersection; it is calculated to operate at LOS D, which is still considered acceptable. Delays would be of short duration, and no substantial traffic queuing or congestion is expected. No traffic or transportation impacts would result from the proposed project.

Table 3.15-8: PM Peak Hour Level-of-Service Summary – No Action

Intersection	Movement/Approach	2004 Without Project ¹
SR 548/I-5 northbound on-ramp (MP 0.00)	Northbound	C (24.8)
SR 548/I-5 southbound on-ramp (MP 0.09)	Southbound	B (12.7)
SR 548/Portal Way (MP 0.29)	Overall	D (25.6)
SR 548/Vista Drive (MP 0.97)	Overall	B (12.1)
SR 548/Kickerville Road (MP 4.93)	Northbound	C (15.6)
SR 548/Blaine Road (MP 5.93)	Southbound	B (13.0)
SR 548/Birch Bay-Lynden Road (MP 8.96)	Overall	B (18.8)
SR 548/Peace Portal Drive (MP 11.80)	Southbound	C (20.6)

1 Number shown is the average control delay in seconds per vehicle for the overall intersection at an all-way, stop-controlled intersection, or worst-case approach at a stop-sign-controlled intersection. These values determine the LOS for intersections according to the 2000 Highway Capacity Manual (Transportation Research Board 2000).

MP = milepost

3.15.4 Secondary and Cumulative Impacts

No significant cumulative traffic or transportation impacts are anticipated for the following reasons:

- Because of the low population and rural nature of the surrounding area, there are no commercial services such as housing, lodging, retail, restaurant, or medical facilities in the immediate vicinity of the site.
- The nearest facilities are 2 miles to the north in Birch Bay and 5 miles to the east near I-5. More extensive commercial facilities and services are located in Blaine, Ferndale, and Bellingham.

Figure 3.15-8: Projected 2004 PM Peak-Hour and Average Weekday Traffic Volumes without Project

- Because of the anticipated short-term project construction (24 months) and the associated workforce, permanent commercial services would not likely be established near the site.
- The low employment levels during project operation also would not support permanent commercial services near the site.

The construction schedule of the GSX Pipeline coincides with construction of the cogeneration facility. There may be a degree of cumulative impact during construction, but the magnitude is not possible to quantify at this time.

3.15.5 Mitigation Measures

The Applicant is meeting with WSDOT and traffic engineers from Whatcom County to discuss appropriate mitigation measures to address the impacts described above.

Mitigation Proposed by the Applicant

- A traffic signal would be installed at the intersection of Grandview Road (SR 548)/Portal Way to improve LOS.
- A westbound left-turn lane would be constructed on SR 548 at the Blaine Road intersection.
- An access road would be located approximately 1,000 feet east of Blaine Road. WSDOT has determined that the access road has adequate sight stopping distance. The access road would be constructed and paved to meet applicable geometric and safety standards. Pavement markings, gates, and traffic signs would be installed on the proposed road, including a stop sign at the SR 548 intersection.
- Temporary traffic control plans would be developed and implemented to ensure safe travel conditions during construction within the Grandview Road and SR 548 rights-of-way.
- An onsite Transportation Coordinator could be designated during construction. Duties of the coordinator would include managing site-generated traffic and parking at the site, establishing and managing any remote parking lots and related shuttle bus or van services, and promoting carpooling and vanpooling to site workers. The Transportation Coordinator would also serve as the point of contact for county and state agencies regarding traffic and transportation issues and permits related to the construction project.
- Preferential parking for carpools and vanpools could be established at the site during construction.
- To the extent practical, the work hours of various groups of workers (such as a construction trade or employees of a company) during the daytime on weekdays would be shifted slightly away from each other. This would disperse the site-generated traffic during the AM and PM peak hours and reduce the potential for queuing.
- Permits or approvals would be obtained as required to conduct oversize or overweight hauls. Delivery of heavy or oversized equipment would be by rail or barge, as practical.

Additional Recommended Mitigation Measures

- Intersection improvements to accompany traffic signalization should be investigated at the Portal Way/Grandview Road (SR 548) and Blaine Road/Grandview Road (SR 548)

intersections. Traffic signalization may warrant changes to intersection operation such as left- or right-turn lanes.

- All mitigation measures listed above should be carried out by the Applicant to maintain a positive and safe traffic flow. Preferably, these would be incorporated into a Transportation Management Plan that would be applicable during both construction and operation of the proposed project and approved by EFSEC prior to the beginning of construction.
- The Applicant would keep and maintain county roads and SR 548 free of any debris or hazardous material related to the project. Any spilled material would be cleaned up promptly.

3.15.6 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on surface or rail transportation systems are anticipated. During regular operation of the facility, intersection LOS are within acceptable limits. During construction, intersection LOS are acceptable except for one location, which exceeds LOS standards. At the completion of facility construction, all intersections operate within acceptable limits.

3.16 HEALTH AND SAFETY

This section describes the potential environmental health and safety impacts associated with the construction and operation of the proposed project. For purposes of this section, potential environmental health and safety impacts refer to potential levels of risk to workers and the general public during construction and operation of the proposed project. The level of risk presented herein is based on the current level of design of the proposed project, health and safety and spill prevention regulations, operating procedures, and mitigation plans to be prepared prior to the start of construction or operation of the project.

The existing BP Cherry Point Refinery is adjacent to the proposed cogeneration facility. The refinery has established health, safety, and emergency and security plans. The procedures described in these plans are practiced by refinery employees on a periodic basis, are updated regularly, and comply with applicable local, state, and federal regulations. In many instances, the potential hazards and risks present at the refinery would be the same or similar to the potential hazards and risks that may be present at the proposed cogeneration facility. The refinery's health, safety, and emergency and security plans would be modified for use at the cogeneration facility. Where additional sources of information have been used to evaluate the potential impacts associated with the proposal, those sources have been cited.

State, federal, and local health and safety regulations would govern work activities during construction and operation of the proposed project. Additionally, industrial codes and standards also apply to worker and public health and safety. Should any of the existing regulations, standards, or codes be updated during construction and operation of the proposed project, the Applicant would ensure its personnel and its contractors' personnel adhere to the revised or updated regulations. For a listing of the applicable state and federal health and safety regulations, standards, and applicable industrial standards and codes governing the construction and operation of the proposed project, see Table 3.16-1 below.

Table 3.16-1: Applicable Health and Safety Regulations

Applicable State Requirements	
Labor and Industries	• Chapter 49.17 RCW, Washington Industrial Safety And Health Act; • Chapter 296-24 WAC, L&I General Safety And Health Standards; • Chapter 296-27 WAC, L&I Record keeping and Reporting, which provides for record keeping and reporting for employees covered under Chapter 49.17 RCW; • Chapter 296-36 WAC, L&I Safety Standards - Compressed Air Work, which provides safety standards for compressed air work; • Chapter 296-45 WAC, L&I Safety Standards For Electrical Workers; • Chapter 296-46A WAC, L&I Safety Standards - Installing Electrical Wires and Equipment - Administration Rules; • Chapter 296-62 WAC, L&I General Occupational Health Standards; • Chapter 296-67 WAC, L&I Safety Standards For Process Safety Management Of Highly Hazardous Chemicals, which establishes requirements for preventing or minimizing consequences of releases of toxic, reactive, flammable or explosive chemicals; • Chapter 296-155 WAC L&I Safety Standards For Construction Work; • Chapter 173-60 WAC Maximum Environmental Noise Levels, and • Chapter 173-303 WAC Dangerous Waste Regulations.

Table 3.16-1: Continued

Washington Utilities and Transportation Commission	- Chapter 480-93-020 WAC Gas companies – safety – proximity considerations. - Chapter 480-93-180 WAC Gas companies – safety – operations and maintenance procedures.
Applicable Federal Requirements	
	29 CFR 1910.175-1910.177, et seq., which gives full enforcement powers to the state of relevant occupational and health standards; 29 CFR 1910.177, et seq., which implements the Occupational Safety and Health Act Of 1970 to protect the health and safety of workers; 29 CFR 1910.177, et seq., which contains the minimum occupational health and safety standards for general industry in the U.S.; 29 CFR 1910.177, et seq., which contains the minimum occupational health and safety standards for the construction industry in the U.S.; and 29 CFR 1910.177, et seq., which generally implements the Occupational Safety and Health Act of 1970 to protect the health and safety of workers.
Applicable Industry Requirements	
	- U.S. Environmental Protection Agency Standards, including Standard of Performance for New Stationary Sources; - National Electrical Code, National Fire Protection Association (NFPA) 70, 1999; - National Electrical Safety Code, American National Standards Institute (ANSI) C2, 1997; - Standards administered through the ANSI; - Standards and guidelines administered through the Institute of Electrical and Electronics Engineers; - Standards and guidelines administered through the Insulated Cable Engineers Association; - Standards and guidelines administered through the National Electric Manufacturers Association; - Standards and guidelines administered through the NFPA; - Codes administered through the American Society of Mechanical Engineers; - Uniform Building Code; - Uniform Plumbing Code; 40 CFR 112 (Oil Spill Containment Structures); - American Institute of Steel Construction Standards; - Standards and guidelines administered through the American Society of Testing and Materials; - Standards administered through the American Welding Society; - American National Standard for the Storage and Handling of Anhydrous Ammonia, K61.1.; and - All applicable Washington State, Whatcom County, and local codes and regulations.
Pertinent Local Ordinances and Permits	
	- Chapter 8.06 Smoking in the Workplace - Chapter 8.12 Solid Waste Disposal - Chapter 8.16 Flammable Liquids

Whatcom County Fire District No. 7 provides firefighting resources within a 73-square-mile area of the County including the project area, the City of Ferndale, and all major industrial facilities. The Whatcom County Sheriff's Office provides police services to unincorporated Whatcom County including the project area. The Whatcom County Emergency Center and St. Joseph Hospital in Bellingham provide medical services to the general public and to refinery personnel as needed. For a description of these public safety services, see Section 3.13.

In addition to the public services noted above, the refinery has established communication protocols and a response plan in the event of a large refinery fire. The plan stipulates that Whatcom County Fire Department would be notified and the refinery's FERO plan would be implemented. The FERO plan provides detailed guidelines to facilitate effective response actions to emergencies. The plan is described further later in this section.

3.16.1 Existing Health and Safety Risks

Cogeneration Facility and Refinery Interface

Land surrounding the proposed cogeneration facility and the refinery interface area is zoned for industrial or rural use and is generally undeveloped. The cogeneration facility would be sited on the eastern edge of the refinery between Grandview and Brown roads. The existing refinery and cogeneration facility are approximately 6 miles northwest of Ferndale, Washington, 7 miles southeast of Blaine, Washington, and about 15 miles north of Bellingham. The nearest community is Birch Bay, Washington, located approximately 2 miles northwest of the refinery. The U.S.-Canada border is approximately 8 miles directly north of the proposed project.

The proposed cogeneration facility and the interconnecting piping, transmission lines, access roads, and laydown areas would be constructed on undeveloped land that has not been graded. Drainage ditches were constructed in the past to drain the proposed project site and surrounding area for use as farmland. According to the Applicant, there is no evidence that hazardous waste or contaminated materials were deposited within the area of the cogeneration facility or the eastern portion of the refinery (refinery interface). However, a Phase I Environmental Site Assessment of the area has not been performed; therefore, the level of potential health risk associated with contaminated soils is not known at this time. Natural and cultural resources within and surrounding the project area are described in Sections 3.1 through 3.7, and Section 3.14, respectively.

Transmission System

A new 230 kV double circuit transmission line would be installed between the cogeneration facility switchyard and existing Bonneville Custer/Intalco Transmission Line No. 2. The new transmission line would require four lattice-style towers and one monopole-style tower and would be approximately 0.8 mile long. The Applicant has not performed a Phase I Environmental Site Assessment of this transmission corridor; therefore, the health risk associated with contaminated soil is not known at this time.

Custer/Intalco Transmission Line No. 2

An option for interconnection with the existing Bonneville transmission system would involve reconstructing an existing transmission line between the Custer Substation and the cogeneration facility interconnection point (approximately 5 miles in length). The existing single-circuit line would be replaced with a double-circuit line using either lattice steel or steel monopole structures. The Applicant has not performed a Phase I Environmental Site Assessment of this

transmission corridor; therefore, the health risk associated with contaminated soil is not known at this time.

Other Project Components

The Applicant has not performed a Phase I Environmental Site Assessment for the corridor of the industrial water supply piping from the Alcoa Intalco Works to Access Road 3, wetland mitigation areas, and Laydown Area 4. Therefore, the level of potential health risk associated with contaminated soil areas is not known at this time.

3.16.2 Impacts of the Proposed Action

This subsection describes potential health and safety risks associated with construction and operation of the proposed project. Features inherent in the design of proposed project facilities as well as compliance with mandatory regulations, plans, and policies to reduce these potential risks are summarized within each risk category. Additional mitigation measures proposed by the Applicant are summarized in Section 3.16.5. Risk levels present during construction and operation consider the degree or probability of exposure to hazardous and toxic substances and the exposure pathway (ingestion, inhalation, and dermal contact).

Construction

Cogeneration Facility and Refinery Interface

Potential health and safety risks present during construction of the cogeneration facility and ancillary structures connecting the refinery with the facility are generally typical of the risks present on major industrial/commercial construction sites. Health and safety concerns include the risk of fire or explosion from general construction activities; chemical storage and handling; spill response and release reporting; collection, storage, and disposal of non-hazardous and hazardous wastes; sanitary waste handling; risk of fire or explosion associated with a natural gas release; worker exposure to radiation; and medical emergencies. Anticipated construction wastes to be generated throughout the four-year construction period are shown in Table 3.16-2. Chemicals to be used during construction are shown in Table 3.16-3.

Risk of Fire or Explosion from General Construction Activities

Contractors experienced with the construction of gas-fired electrical generation plants would build the proposed cogeneration facility. Construction specifications would require that contractors prepare and implement a construction health and safety program that is intended to control worker activities as well as establish procedures to prevent, manage, and control possible fires or explosions, should they occur. The probability of a significant fire or explosion during construction of the proposed project is considered low. With implementation of mitigation measures and procedures described in the following paragraphs, health and safety risks to construction workers and the public are also considered low.

During construction, small quantities of flammable liquids and compressed gases would be used and stored onsite. Liquids would include construction equipment fuels, paints, and cleaning solvents. Compressed gases would include argon gas, acetylene, helium, nitrogen, and oxygen for welding (see Table 3.16-4). Potential risk hazards associated with the use of flammable liquids and compressed gases would be reduced by compliance with a construction health and safety program and proper storage of these materials when not in use, in accordance with all applicable local, state, and federal regulations. The construction health and safety program would include the following major elements:

- An injury and illness prevention program,
- A written safety program (including hazard communication),
- A personnel protection devices program, and
- Onsite fire suppression and prevention plans.

Table 3.16-2: Anticipated Construction Waste Streams

Waste Stream	Waste Stream Classification	Estimated Amount	Estimated Frequency of Generation	No. Truck Trips and Frequency	Quantity Shipped
Scrap wood, steel, glass, plastic, paper, calcium silicate insulation, mineral wool insulation	Non-hazardous solids	50 cubic yards	Weekly	1 per week	50 cubic yards
Empty hazardous material containers	Hazardous solids	1.5 cubic yard	Weekly	1 per week	1.5 cubic yard
Used and waste lube oil during CT and ST lube oil flushes	Hazardous or non-hazardous liquids	55 gallon drums	200 drums over life of construction	1 per 60 days	25 55-gallon drums
Oil rags, oil absorbent generated during normal construction activities, excluding lube oil flushes	Hazardous liquids	55 U.S. gallons	Monthly	1 per month	55 U.S. gallons
Solvents, used construction equipment lube oils, paint, adhesives	Hazardous liquids	200 U.S. gallons	Monthly	1 per month	200 U.S. gallons
Spent lead acid batteries	Hazardous solids	3 batteries	Yearly	1 per year	3 batteries
Spent alkaline batteries	Hazardous solids	80 batteries	Monthly	1 per month	80 batteries
ST and pre-boiler piping cleaning waste, chelant	Hazardous or non-hazardous liquids	400,000 U.S. gallons	Once before initial startup	34	400,000 U.S. gallons
Waste oil from oily waste holding tank	Hazardous or non-hazardous liquids	25 U.S. gallons	Monthly	1 per month	25 U.S. gallons
Sanitary waste from potable chemical toilets and construction office holding tanks	Non-hazardous liquids	500 U.S. gallons	Daily	1 per week	500 U.S. gallons
Storm water from construction area	Non-hazardous liquids	950,000 U.S. gallons	For a once in 2 year, 24-hour storm event	N/A	N/A
Fluorescent, mercury vapor lamps	Hazardous solids	40	Yearly	1 per year	40
Hydrotest water	Non-hazardous liquids	2 to 3 million U.S. gallons	Once before initial startup	N/A	2 to 3 million U.S. gallons

Source: BP 2002

Table 3.16-3: Chemicals to be Used and Stored during Construction

Chemical	Purpose	Estimated Quantity	Storage Location
STG and pre-boiler piping cleaners	STG and pre-boiler piping cleaning waste, chelant chemical cleaner, or demineralized water treated with oxygen scavenger and amine	400,000 gallons	Brought to site by equipment vendor/contractor
Solvents, used equipment lube oils, paints, adhesives	Used in construction	200 gallons monthly	Not known at this time
Used and waste oils	For CGT and STG lube oil flushes	200 55-gallon drums over life of construction	Not known at this time
Spent lead batteries	Various	3 batteries annually	Not known at this time
Spent alkaline batteries	Various	80 batteries monthly	Not known at this time
Waste oil from oily waste holding tank	Collected on site	25 gallons monthly	Not known at this time
Oil rags, oil absorbent	Generated during normal construction activities, excluding lube oil flushes	55 gallons monthly	Not known at this time
Argon gas	Welding and HRSG components	Not known at this time	Temporary warehouse
Acetylene	Cutting torches	Not known at this time	Temporary warehouse
Helium	Welding aluminum ducts	Not known at this time	Temporary warehouse
Nitrogen	Welding	Not known at this time	Temporary warehouse
Oxygen	Cutting torches	Not known at this time	Temporary warehouse

Source: BP 2002

Table 3.16-4: Anticipated Compressed Gases Use during Construction

Gas	Estimated Quantity	Storage	Use
Argon Gas	Not known at this time	Temporary warehouse	Welding and heat recovery steam generator components
Acetylene	Not known at this time	Temporary warehouse	Cutting torches
Helium	Not known at this time	Temporary warehouse	Welding aluminum ducts
Nitrogen	Not known at this time	Temporary warehouse	Welding
Oxygen	Not known at this time	Temporary warehouse	Cutting torches

During construction mobilization, the general contractor would coordinate with the BP Cherry Point Refinery Fire Marshal and the Whatcom County Fire District regarding planned activities at the construction site. Also, a Joint Unified Command Structure or system would be established prior to the start of construction.

During construction, fire prevention and detection would be the responsibility of individuals working at the site. Heat and smoke detectors would be provided in buildings and temporary warehouses as required by federal, state, and local regulations. In addition, safe working practices would also be exercised. These would include, but would not be limited to, the following:

- Maintaining appropriate fire extinguishers within easy access of all work areas,

- Prohibiting the general public from entering working areas, in areas where heavy equipment is used, and where there would be potential exposure to toxic or hazardous materials,
- Prohibiting smoking in all areas, and
- Using a permit system for all hot work (welding, cutting, and grinding) outside of designated “free-burn” areas.

During construction, personnel properly trained in fire extinguisher deployment would address small fires controllable by handheld extinguishers. If a larger fire occurs, the Whatcom County Fire Department would be notified and the refinery’s FERO plan would be implemented.

- The FERO plan provides detailed guidelines to facilitate effective response actions to emergencies. The FERO plan provides specific information to assist responders, and includes set up of command structure, duties and responsibilities, checklists for responders, equipment lists, instructional guides, and strategic actions for potential or critical incident scenarios that may occur in or around the refinery. The plan applies to all emergency response activities except oil spill and response, which are covered by regulatory-mandated response plans. General incident and response categories covered by the plan that would be modified to apply to the proposed cogeneration facility and refinery interface are summarized in Section 3.16.5. In the case of a large fire or explosion, a companion Emergency Preparedness Plan (EPP), which provides preparedness and planning information, would be implemented. This plan is intended to conform with, and incorporate, applicable regulatory guidelines of local, state, and federal agencies. General incident and response categories covered by the EPP that would be modified to apply to the proposed cogeneration facility and refinery interface are summarized in Section 3.16.5.

Where appropriate, the refinery would coordinate emergency response efforts with local emergency agencies (sheriff/fire services/emergency medical services), the Washington Department of Ecology, the local emergency planning commission, and other organizations to mitigate potential emergency situations.

As described in the FERO plan, Whatcom County Fire District No. 7 and the Refinery Fire Department would be summoned in the case of a large fire and/or explosions. Although the refinery has specialized equipment to fight fires unique to refineries and power plants and trained personnel to fight these fires, the Applicant may require additional resources to mitigate any incident beyond the firefighting resources of the refinery. In this event, the Applicant would develop response protocols with the Jurisdiction Having Authority, Whatcom County Fire Department District No. 7, to ensure that additional support and resources would be available from the district and other jurisdictions through the District Mutual Aid Agreements. Firefighting resources in Whatcom County are provided through 17 fire protection districts and two municipal city fire departments, and a total of approximately 175 paid firefighters and approximately 645 volunteer firefighters.

Chemical Storage and Handling

During construction, chemicals stored onsite may include paints, coatings, solvents, and adhesive materials, as listed in Table 3.16-3. These materials would be stored in a locked utility shed or

secured in a fenced area. Storage of the various types of chemicals would conform to OSHA and applicable state guidelines. Construction personnel would be trained in handling chemicals, including hazardous materials, and would be alerted to the dangers associated with the storage of chemicals. An onsite Environmental Health and Safety Representative would be designated to implement the construction health and safety program and to contact emergency response personnel and the local hospital (St. Joseph Hospital), if necessary. Material Safety Data Sheets (MSDS) for each onsite chemical would be kept onsite, and construction employees would be made aware of their location and content.

The specific procedures for managing petroleum product storage tanks to be located onsite during and after construction and onsite petroleum use would be as follows:

- Lubrication oil used in construction equipment would be contained in labeled barrels. The barrels would be stored in a secondary containment area to contain any spillage, or in temporary warehouses.
- Vehicle refueling would occur at a designated area and would be closely supervised to avoid leaks or releases. Should a spill occur during refueling, the fuel would be properly cleaned up by the safety engineer and properly documented. If fuel tanks are used during construction, the fuel tank(s) would be located within a secondary containment with an oil-proof liner sized to contain the single largest tank volume plus an adequate space allowance for rainwater.
- When filling transformers with non-PCB mineral oil, the oil would be pumped from a truck located within a temporary secondary containment area to contain any spillage.
- All paint containers would be sealed and properly stored to prevent leaks or spills. Unused paints would be disposed of in accordance with applicable local and state regulations. Spray painting would not be performed on windy days, and drop cloths and vertical walls would be used to stop, collect, and dispose of drips and over-spray associated with painting activities.

During construction, the worst-case scenario would be a major leak during chemical cleaning of the HRSGs and steam and water piping before being placed into service. This method of cleaning consists of an alkaline degreasing step (in which a surfactant, caustic, or ammonia solution is used), a 3 to 4% citric acid cleaning step, and a passivation step. Most of the solution would be contained in permanent facility piping and equipment (specifically the HRSGs). The components of the process that would be most likely to leak are the temporary chemical cleaning piping, pump skids, and transport trailers. The HRSGs would be within curbed areas, and spills would be manually cleaned up and contaminated materials disposed of in accordance with the SPCC plan described in the following section.

Impacts to the public are unlikely. All these chemicals are liquid, and the likelihood of a spill reaching or affecting the area of Grandview Road, the nearest public thoroughfare located approximately 300 feet north of the proposed facility, is low.

Spill Response and Release Reporting

Machinery fluids, including diesel fuel, gasoline, motor oil, hydraulic fluid, brake fluid, and anti-freeze, could spill during construction. The general contractor's responsibility would include

implementation of spill control measures and training of all construction personnel and subcontractors in spill avoidance. Training would also include appropriate response when spills occur, and containment, cleanup, and reporting procedures consistent with applicable regulations. The primary plan to be developed by the Applicant would describe spill response and clean up procedures.

Construction equipment would be monitored for leaks and undergo regular maintenance to ensure proper operation and reduce the chance of leaks. Maintenance of onsite vehicles would occur in a designated location. To further reduce the possibility of spills, no topping-off of fuel tanks would be allowed. Petroleum products would be stored in clearly labeled and sealed containers or tanks. If fuel or oil spills occur, the resultant contaminated soil would be removed and disposed of at an approved disposal site in accordance with the SPCC plan.

The State of Washington Utilities and Transportation Commission (WUTC), Washington Department of Labor and Industries (L&I), and the Local Emergency Planning Committee (Whatcom County Fire District No. 7 and Whatcom County Sheriff's Department) are the agencies primarily responsible for the administration of programs for managing a release of dangerous and hazardous chemicals and the notification of the appropriate agencies or parties. Additional mitigation measures regarding accidental spills and spill control and reporting procedures are described in Section 3.16.5.

Onsite supervisory personnel would coordinate with the Department of Ecology and other appropriate agencies to ensure spill control compliance and notification in case of an emergency release. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) notification and reporting requirements would be made directly to the EPA.

Non-Hazardous and Hazardous Waste Collection, Storage, and Disposal

All non-hazardous waste materials such as empty containers, scrap wood, scrap metal, and trash would be collected, deposited, and stored in appropriate containers provided by a licensed solid waste management contractor. The general contractor would remove the containers and recycle or dispose of the material in accordance with applicable federal, state, and/or local regulations. No construction waste material would be burned or buried onsite. The onsite safety engineer would instruct all site personnel regarding proper waste disposal procedures.

Hazardous solid waste materials may be generated during the cleanup of a spill, particularly if contaminated soils must be removed from the site. Other hazardous materials potentially generated by construction activities include used oil, spent antifreeze, unused adhesives, discarded water treatment chemicals and residuals, and spent lead acid batteries, as listed in Table 3.16-2. The exact type and quantity of hazardous and toxic materials to be generated during construction have not been established at this time. However, Tables 3.16-2 and 3.16-3 list typical hazardous and toxic materials that may be used during construction.

A discussion of risks associated with the use and storage of hazardous materials and steps to mitigate those risks is presented in the previous section. A licensed waste management contractor

would be responsible for treating or disposing of the various hazardous materials in compliance with all federal, state, and local regulations.

To minimize the potential release of hazardous materials during construction, BMPs would be employed. These would include good housekeeping measures, inspections, containment facilities, and spill prevention practices. Construction personnel would be instructed regarding the use of BMPs, and the onsite safety engineer would be responsible for the enforcement of the use and maintenance of the BMPs.

During pre-construction geotechnical investigations at the cogeneration facility site as well as during ground-disturbing construction activities, the Applicant would monitor and analyze soils to identify contaminated material. If contaminated soil were encountered, soils would be tested, handled, and disposed of in accordance with all applicable federal, state, and local requirements.

The Department of Ecology and the Whatcom County Fire District No. 7 would be notified if unknown water wells or underground storage tanks are discovered during construction. Subsequent abandonment, removal, and/or remediation of such facilities would be conducted in accordance with applicable federal, state, and local codes.

Sanitary Waste Management

Portable sanitation units would be used during construction. These units would be regularly maintained, and a licensed sanitary waste management contractor would collect waste from the units for disposal in accordance with applicable regulations. The production of 500 gallons of sanitary waste per day is anticipated during the construction phase of the project.

Risks of Fire or Explosion from a Natural Gas Release

Natural gas is currently supplied to the refinery via the Ferndale natural gas pipeline. Natural gas from this pipeline would be the primary source of fuel for the proposed project. The Ferndale natural gas pipeline system receives natural gas from the Westcoast Pipeline near Sumas, at the Washington State/Canadian border. The gas is then metered and odorized by Arco Western Gas Pipeline near the border. The Ferndale pipeline then transports and delivers natural gas to the refinery and to the Alcoa Intalco Works aluminum smelter near Ferndale.

The 16-inch Ferndale natural gas pipeline passes along the western and northern edges of the proposed project site adjacent to Grandview Road. The existing refinery metering station is the preferred tie-in location to connect the natural gas pipeline system with the proposed cogeneration facility. The metering station is immediately east of Blaine Road and immediately west of the proposed cogeneration facility. A short pipeline connection (150 feet) would be constructed from the metering station to a gas compressor, and then another short pipe connection (375 feet) would be constructed from the gas compressor to the cogeneration facility.

Generally, the risks of fire or explosion during pipeline construction are minimal, although natural disasters such as earthquakes or volcanic releases could trigger an accidental fire or explosion incident. Excavation/placement of soil and the welding of pipe sections are the

primary construction tasks. “Lockout tagout” procedures would be used to verify that sections of the pipeline are isolated and free of gas prior to the start of work. The exact locations of existing natural gas pipelines near the metering station would be established and kept marked during construction. A 10-foot minimum clearance (buffer zone) between the existing and new pipe would be maintained to preclude stocking of soil on, or work over, the existing natural gas pipeline. Heavy construction equipment would not be allowed to run over the existing pipe in the new pipe construction zone. Construction methods and safety procedures would be established to avoid damaging the existing pipe. The contractor installing the new gas pipeline would be familiar with and experienced in performing this type of work. Implementation of normal pipeline construction BMPs and elements of the construction health and safety plan would reduce the risk of fire or explosion. A description of additional construction methods and safety procedures to be implemented during pipeline construction include the following:

- Existing utilities on Blaine Road would be located and staked before construction begins, and would be physically located every 1,000 feet and at intersections of other pipes and crossings. This would confirm the location and depth to ensure new construction does not impact the existing utilities.
- OSHA regulations for excavations would be followed. The trench for the new gas pipeline connections would be covered or cordoned off after work hours to prevent anything from falling into the trench. Heavy equipment would not normally be operating over the existing utilities during construction of the new line. If heavy equipment or trucks must cross the existing utilities, they would cross at right angles and the ground would be covered with mats or additional soil cover to protect the existing pipe.
- As the trench is excavated, the pipeline connections would be constructed in sections at the edge of the trench. After the welds are X-rayed, the pipe would be lowered into the trench using a series of side booms. Tie-in welds performed in the trench would be X-rayed after the pipe is in the trench. Once the pipe is completed in the trench and backfilled with soil, it would be pressure-tested with water. Onsite inspectors representing the Applicant would be present during construction to verify that the construction contractor is following engineering specifications and meeting regulatory requirements.

Radiation Risks

Some radioactive sources may be used for quality-control purposes during construction of the natural gas pipeline connections and high-pressure steam-lines. Examples of these uses may include soil density testers and X-ray sources for evaluating weld quality. No releases of radioactive materials would occur during these uses because these materials are strictly regulated. The radiation levels of these devices, and their use, storage, and application would be in accordance with all applicable state and federal regulations. Therefore, the risk of radiation exposure to workers is considered low.

Medical Emergencies during Construction

Selected construction personnel working on the cogeneration facility piping would receive first aid and CPR training. Onsite treatment would be provided in medical situations that require only first aid treatment or stabilization of the victim(s) until professional medical attention is attained.

Any injury or illness that requires treatment beyond first aid would be referred to the refinery's medical clinic or to St. Joseph Hospital in Bellingham.

Transmission System

The transmission line connecting the cogeneration facility switchyard to Bonneville's Transmission Line No. 2 would be constructed in accordance with Bonneville standards. The transmission line would require four lattice-style structures and one monopole. An interconnection agreement between the Applicant and Bonneville would establish protocols and procedures to prevent fires within the electrical transmission corridor.

The Applicant has been issued a Corps of Engineers permit to construct the 0.8-mile transmission line. As part of the application for the permit, a SEPA Checklist described the potential impacts resulting from constructing and operating the line. Although the county made no SEPA determination, few impacts were identified and described in the checklist. The principal risks associated with construction of the transmission line were fire or explosion and releases or potential releases of hazardous materials to the environment, as described below.

Risk of Fire or Explosion

The risk of a fire or explosion during construction of the transmission line should be low. During construction, small quantities of flammable liquids and compressed gases would be used. Liquids would include construction equipment fuels, paints, and cleaning solvents. Compressed gases would include acetylene, oxygen, helium, hydrogen, and argon for welding.

The potential hazards associated with the compressed gases and flammable liquids used during construction welding, painting, and other activities as well as general worker risks associated with constructing elevated structures and installing electrical transmission lines would be reduced by compliance with a construction health and safety program (see description for the cogeneration facility). For example, while working to assemble and erect the towers, workers would be required to wear warning vests to increase their visibility to heavy equipment operators. In addition, workers would be trained to maintain safe distances from elevated loads, avoiding heavy working equipment, and preventing potentially dangerous situations.

The general construction contractor would administer the health and safety program to ensure compliance with construction safety laws, ordinances, regulations, and standards pertaining to worker safety, including the State of Washington construction safety standards and Bonneville regulations dealing with elevated structures and installation of electrical transmission lines. The program would also include requirements to meet OSHA regulations. In the event of a fire, the Applicant's fire-fighting personnel would assist Whatcom County Fire District No. 7 in suppressing a grass fire.

Releases or Potential Releases of Hazardous Materials to the Environment

Hazardous materials used during construction of the transmission line would be limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux and gases, various lubricants, paint, and paint thinner.

Small quantities of fuel, oil, and grease may leak from construction equipment. Such leakage should not be a risk to health and safety or the environment because of low relative toxicity and low concentrations. Fuel oil and greases used would be biodegradable. If a large spill from a service or refueling truck were to occur, a licensed, qualified waste contractor would place contaminated soil in barrels or trucks for off-site disposal. Appropriate procedures would depend on the waste classification of the contaminated soil. For example, if soils were classified as dangerous waste, they would be transported to a permitted hazardous waste disposal facility.

If a spill were to involve hazardous materials equal to or greater than the specific reportable quantity, all federal, state, and local reporting requirements would be met. Other wastes likely to be generated include used oil, spent antifreeze, unused adhesives, and discarded chemicals and residuals. Non-hazardous solid waste associated with construction activities could include empty containers, scrap wood, scrap metal, and trash.

In general, the construction contractor would be considered the generator of waste oil and miscellaneous hazardous waste produced during construction and would be responsible for compliance with applicable federal, state, and local laws, ordinances, regulations, and standards. This would include licensing, personnel training, accumulation limits, reporting requirements, and record keeping.

During pre-construction geotechnical investigations as well as during ground-disturbing construction activities along the proposed transmission corridor, the Applicant has proposed and is committed to monitoring and analyzing soils to identify contaminated material. If contaminated soil is encountered, soils would be tested, handled, and disposed of in accordance with all applicable federal, state, and local requirements.

The Department of Ecology and the Whatcom County Fire District No. 7 would be notified if unknown water wells or underground storage tanks are discovered during construction. Subsequent abandonment, removal, and/or remediation of such facilities would be conducted in accordance with applicable federal, state, and local codes.

Custer/Intalco Transmission Line No. 2

Assuming the interconnection with the existing Bonneville transmission system involves the reconstruction of approximately 5 miles of an existing transmission line between the Custer Substation and the cogeneration facility interconnection point, then construction activities within the existing Bonneville transmission line right-of-way would occur. One of two types of transmission line towers would be used to replace the existing towers within the Bonneville transmission right-of-way. The new towers would either be a double circuit monopole or double

circuit lattice design as shown in Figure 1-2. The towers that connect the cogeneration facility with the Bonneville transmission system would be the lattice design.

The potential environmental impacts resulting from the reconstruction of Custer/Intalco Transmission Line No. 2 would be similar to the impacts described for the construction of the 0.8 mile transmission line connecting the cogeneration facility to the Bonneville intertie point. Those mitigation measures described in the previous section for the proposed transmission line would be implemented during the reconstruction of Bonneville's transmission line. Minor electrical modification to the Custer Substation would be within the fence line of the substation and no significant impacts to the environment or to the public are anticipated.

Other Project Components

Construction of Access Road 3, the industrial water supply piping at Alcoa Intalco Works, Laydown Area 4, and the wetland mitigation areas would not result in significant environmental impacts. Potential impacts resulting from the construction of these project components would be similar to those impacts resulting from the construction and installation of pipelines, transmission connections, and support structures associated with the cogeneration facility and refinery interface.

As described above for the proposed transmission system, the Applicant would monitor soils for contamination during pre-construction geotechnical investigations as well as during ground-disturbing construction activities in these areas. If contaminated soil is encountered, soils would be tested, handled, and disposed of in accordance with all applicable federal, state, and local requirements. The Department of Ecology and the Whatcom County Fire District No. 7 would be notified if unknown water wells or underground storage tanks are discovered during construction. Subsequent abandonment, removal, and/or remediation of such facilities would be conducted in accordance with applicable federal, state, and local codes.

Operation and Maintenance

The potential risks present during operation of the proposed project are similar to those present during construction. Three categories of accidents could occur that would pose a health and safety risk to individuals at the cogeneration facility, the refinery, or in the project vicinity: risk of anhydrous ammonia release, risk of fire or explosion either from general facility operations or specifically from a natural gas release, and risk of a hazardous chemical release or spill. In addition, potential effects of electromagnetic fields (EMF) created with the use of electrical equipment, including the transmission lines, are described below.

All operational systems would be designed to provide the safest working environment possible for all site personnel. Design provisions and health and safety policies would comply with OSHA standards and consist of, but not be limited to, the following:

- Safe egress from all confined areas;
- Adequate ventilation of all enclosed work areas;
- Fire protection;

- Pressure relief of all pressurized equipment to a safe location;
- Isolation of all hazardous substances to a confined and restricted location;
- Separation of fuel storage from oxidizer storage; and
- Prohibition of smoking in the workplace.

For these reasons, the potential risks resulting from operation of the proposed cogeneration facility and associated infrastructure are considered low, as described in further detail below.

Cogeneration Facility and Refinery Interface

Risk of Anhydrous Ammonia Release

Each HRSG would be equipped with a SCR system used to inject anhydrous ammonia to minimize the production of NO_x emission. The anhydrous ammonia storage and transfer system would consist of equipment intended to vaporize the anhydrous ammonia. This equipment would be located next to each SCR system, and there would be a common ammonia storage vessel (tank), ammonia transfer pumps, vaporizer, associated piping, and controls. An unloading station for trucks would be set up at the common ammonia storage tank located adjacent to the proposed cogeneration facility.

Approximately 60,000 pounds or 1,579 cubic feet (at 70°F) of anhydrous ammonia would be stored at the cogeneration facility. The ammonia would be stored in a 7-foot by 45-foot tank and would be sufficient for approximately four weeks of operation. A spill containment facility (curbed area to contain small spills) would be constructed around the truck unloading station, and a curbed containment area large enough to contain spilled ammonia and deluge water would be constructed around the liquid ammonia storage tank.

The refinery currently uses anhydrous ammonia in one of its process units. The original refinery ammonia tank was sized to contain a working volume of 59,200 pounds. A few years ago, a smaller tank containing a working volume of 40,000 pounds replaced the 59,200-pound tank. When the refinery Risk Management Plan (RMP) was first developed and submitted to the U.S. EPA, the refinery was using the larger ammonia tank and the modeling for the worst-case release of ammonia used the larger tank volume.

Potential Impact from an Uncontrolled Ammonia Release

Although the liquid ammonia storage tank would be designed with appropriate controls to withstand the risk of potential upset, an accidental or uncontrolled release of ammonia could occur during a natural disaster, such as an earthquake or volcanic eruption, or possibly due to intentional acts such as vandalism or terrorism. Therefore, the Applicant modeled the potential effects of an ammonia release at the proposed cogeneration facility to human health and safety at the project site and in the project vicinity under different release scenarios, as described below.

Because the cogeneration facility proposes a nominal 60,000-pound ammonia storage tank, the Applicant used the same worst-case scenario for a release of ammonia as the refinery used for its RMP. Under this scenario, the tank containing 59,200 pounds of ammonia was assumed to fail,

releasing a liquid and vapor of ammonia at a rate of 5,900 pounds per minute, with a release duration of 10 minutes. Wind speed was set at 5 feet per second with an atmospheric stability class "F." Atmospheric stability class "F" refers to "stable atmospheric conditions, clear skies and light winds with very little horizontal or vertical turbulence." Topography was set as "urban." "Urban" topography refers to tree-covered terrain with buildings. The modeling results and a description of the potential human health effects from a release of ammonia from the refinery are described in the following paragraphs.

Under the worst-case scenario, the projected concentration of anhydrous ammonia above 200 ppm would be within approximately 2.8 miles north of the refinery; this general area includes portions of the residential community of Birch Bay as well as recreational sites such as Birch Bay State Park. Following the recommended Emergency Response Planning Guidelines (ERPG) of the American Industrial Hygiene Association (AIHA), the potential effects of vaporized ammonia at this concentration would be: "maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action. There would likely be a strong odor and some eye irritation at this level, but serious health effects would be unlikely" (AIHA 1988). This would mean that workers and members of the general public would have approximately one hour to seek indoor shelter to avoid the transitory ammonia vapor before they would notice the odor and experience eye irritation. The exposure pathway would be through inhalation and dermal contact. There is a low probability of this worst-case scenario occurring due to storage tank equipment features designed to prevent releases and the highly regulated nature of ammonia, therefore the health and safety impacts to workers and the public is considered low.

Under the same worst-case scenario, projected concentration of anhydrous ammonia of 1,000 ppm would be within approximately 0.8 mile north of the refinery. Following ERPG, the potential effects of vaporized ammonia at this concentration would be: "maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing life-threatening health effects. This concentration may cause severe eye and nasal irritation; however, based on animal toxicology data, lethality would not be expected" (AIHA 1988). This would mean that workers and members of the general public would have approximately one hour to seek indoor shelter to avoid the transitory ammonia vapor before they would notice severe eye and nasal irritation. The exposure pathway would also be through inhalation and dermal contact. There is a low probability of this worst-case scenario occurring due to the storage tank equipment features designed to prevent releases and the highly regulated nature of ammonia, therefore the health and safety impacts to workers and the public is considered low. If, however, there is less than an hour's warning of an ammonia release, it is anticipated that Whatcom County Emergency Service personnel would assist members of the public in seeking temporary indoor shelter until the vapor has dissipated and is no longer at a concentration that could cause health effects.

The Applicant also modeled a failure event that more closely represents a potential release. Under this scenario, 14,500 pounds of ammonia would be released through a ruptured transfer hose at a rate of 1,450-pounds per minute; the release duration would be 10 minutes. Wind speed was set at 10 feet per second with an atmospheric stability class "D." Topography was set as

“urban.” Atmospheric stability class “D” refers to neutral atmospheric conditions, cloudy skies, and moderate-to-strong winds.

Under this scenario, the projected concentration of anhydrous ammonia over 200 ppm would be within approximately 1.10 miles north of the refinery. The potential health impacts within 1.10 miles would be the same as the impacts described above. An analysis to determine the location/direction of anhydrous ammonia at a concentration of 1,000 ppm was not performed by the Applicant.

Applicant-proposed mitigation measures to be implemented in the case of an accidental ammonia release are summarized in Section 3.16.5. In addition, EFSEC has asked the Applicant to perform additional modeling to identify the probable area of exposure to ammonia at a concentration of 1,000 ppm or higher under a realistic release scenario to allow assessment of health impacts from such an exposure.

Risk of Fire or Explosion from General Facility Operations

Operation of the proposed cogeneration facility and refinery interface would involve the use of flammable and combustible materials that pose an overall risk of fire or explosion at the project site. The potential for fire or explosion at the cogeneration facility and refinery interface would be minimized through implementation of appropriate fire protection measures. Prevention is the first consideration in any fire protection program. Specific elements of a facility-wide fire prevention program implemented during project operations are identified in Section 3.16.5 and summarized below.

Facility personnel would use general good housekeeping practices to control the accumulation of flammable and combustible waste materials and residues so that they do not contribute to a fire emergency. Proper storage and use of chemicals are also important for fire prevention. MSDS would be consulted to aid in determining the correct storage for incompatible chemicals.

All state and local fire codes would be adhered to during operation of the proposed project. All areas of high risk would have engineered safeguards and automatic fire suppression systems in place.

The combustion turbine generator units would be equipped with specialized fire detection and protection systems. The details of this system would be determined at the time the manufacturer and model of the generator are decided.

Qualified personnel following written procedures would operate the proposed facility. Procedures would provide clear instructions for safely conducting activities involved in the initial startup, normal operations, temporary operations, normal shutdowns, emergency shutdowns, and subsequent startups. The procedures for emergency shutdowns would include the conditions under which emergency shutdowns are required and the assignment of shutdown responsibilities to qualified operators to ensure that shutdowns are done in a safe and timely manner. Also covered in the procedures would be the consequences of operational deviations and the steps required to correct or avoid the deviations.

Before they are allowed to operate the facility, employees would be given a facility plan, including a health and safety plan, and would receive training regarding the operating procedures and other requirements for safe operation of the proposed cogeneration facility. In addition, employees would receive annual refresher training, which would include the testing of their understanding of the procedures. The Applicant would maintain training and testing records.

Risk of Fire or Explosion from a Natural Gas Release

The proposed natural gas pipeline would be a specific source of potential fire or explosion during project operations. The first line of defense against a natural gas leak is the shutoff valves that can isolate a section of the gas line. Actuating these valves limits the amount of gas that can leak from any breach of the line. Shutoff valves would be installed along the new gas pipeline connecting the cogeneration facility to the Ferndale pipeline. A mercaptan (similar to odorant used for propane) is used in the existing natural gas line for leak detection because it has a very strong distinctive odor and makes a gas leak readily apparent. The gas would continue to be odorized and signage would be placed over the new pipeline to reduce the risk of pipeline rupture resulting from unauthorized excavation above or near the buried pipeline. Finally, operating and emergency plans would be prepared in accordance with state codes and regulations, and routine safety inspections would be conducted in accordance with state pipeline safety rules. Based on these design features and operating procedures, the risk of a fire or explosion resulting from the failure of or from a leak in the natural gas pipeline is considered low. Specific information regarding notification in the case of an emergency is described in Section 3.16.2.

Corrosion potential is a primary safety concern relating to the operation of gas pipelines in the vicinity of power generation. The Applicant proposes to use special pipeline coatings and cathodic protection to reduce the likelihood of corrosion. Cathodic protection is the use of direct current electricity from an external source to oppose the discharge of corrosion current from anodic areas that would be present naturally in the soil. When a cathodic protection system is installed, the protected structure (the new pipeline in this case) collects current from the surrounding electrolyte and the entire exposed surface becomes a single cathodic area.

In the unlikely event there is a fire and/or explosion resulting from the release of natural gas from the connecting pipeline to the cogeneration facility, the pipeline shutoff valves would close, and fire response services would be called. Specifically, the Applicant would call Whatcom County Fire District No. 7. Two stations within the district are located near the proposed project, at 4047 Brown Road (1.5 miles from the project) and 5419 Grandview Road (2.5 miles from the project). The district is a combination department consisting of 16 career and 70 volunteer firefighters. The district maintains and staffs seven engines out of the six stations, along with five licensed aid units (three rescues and two transport-capable ambulances). The district is currently purchasing a 100-foot aerial platform ladder truck designed to meet refinery and power plant needs.

Risk of Hazardous Chemical Release or Spill

The chemicals and hazardous substances to be used and stored at the proposed project during operation are listed in Table 3.16-5. The estimated waste streams that would be generated during operation are listed in Table 3.16-6. Petroleum products used onsite during operation would be stored following the same storage and handling guidelines described for construction. Additional measures planned by the Applicant during operation to minimize the risk of an accidental chemical release or spill are summarized in Section 3.16.5. During operation, the worst-case scenario would be a major leak during chemical cleaning of the HRSGs and associated piping. This method of cleaning consists of an alkaline degreasing step (in which surfactant, caustic, or ammonia solution is used), a 3 to 4% citric acid cleaning step, and a passivation step. Most of the solution would be contained in permanent facility piping and equipment (specifically the HRSGs). The components that would be most likely to leak would be the temporary chemical cleaning piping, pump skids, and transport trailers. The probability of a major leak of the cleaning solution is considered low and therefore the potential worker and public health and safety risk is considered low. The exposure pathway would be inhalation and dermal contact. All these chemicals are liquid, and the likelihood of a spill reaching or affecting Grandview Road, the nearest public thoroughfare, is low.

Table 3.16-5: Chemical and Hazardous Substances Anticipated to be Used during Operation

Chemical	Estimated Quantity	Storage	Purpose
Lubricating oil	25,800 gallons	In STG and GTG equipment	STG/GTG equipment
Control oil	400 gallons	In STG equipment	STG equipment
Hydrogen	605,000 scf	GTG/STG gas bottles	Power generation
Carbon dioxide	32,500 scf	GTG/STG gas bottles	Power generation, estimate based on purge and fire protection requirements
Transformer oil	49,500 gallons	Combustion turbine transformers	Coolant
Transformer oil	17,000 gallons	Steam turbine transformers	Coolant
Transformer oil	10,000 gallons	Auxiliary transformers	Coolant
Anhydrous ammonia	168,500 gallons annually	Above grade horizontal cylindrical tank	No _x reduction
SCR Catalyst ¹	4,800 ft ³	In HRSG	No _x reduction
CO Catalyst ¹	990 ft ³	In HRSG	CO reduction
Propylene glycol	22,800 gallons	Above-grade tank	Closed-loop cooling water system
Nitrate/borate corrosion inhibitor	50 gallons	Drum	Closed-loop cooling water system
Diethyl hydroxylamine oxygen scavenger	500 gallons	Tank	Boiler feedwater treatment
Morpholine corrosion inhibitor	500 gallons	Tank	Boiler feedwater treatment
Di- and trisodium phosphate pH/scale control agent	200 pounds	Bags/tank	Boiler feedwater treatment

Source: BP 2002

1 Total amount of catalyst for all three HRSGs

Table 3.16-5: Continued

Chemical	Estimated Quantity	Storage	Purpose
Cation resin	950 ft ³	Warehouse/tank	Water treatment system
Anion resin	900 ft ³	Warehouse/tank	Water treatment system
Caustic (50 wt%)	8,000 gallons	Tank	Water treatment system
Sulfuric acid (93 wt%)	16,000 gallons	Two tanks	Water treatment system
Polyquaternary amine polymer	350 gallons	Tank	Water treatment system
Powered cellulose and activated carbon	2,000 lb	Bags or drums	Water treatment system
Sodium hypochlorite 15% solution	16,000 gallons	Two tanks	Cooling tower circulating water treatment
Polyacrylamide polymer	800 gallons	Two tanks	Cooling tower circulating water treatment
Zinc and phosphonate solution	800 gallons	Two tanks	Cooling tower circulating water treatment
Natural gas	N/A	Pipeline	Plant fuel system

Source: BP 2002

1 Total amount of catalyst for all three HRSGs

Table 3.16-6: Estimated Waste Streams during Operation

Waste Stream	Classification	Amount	Disposition
Boiler feedwater demin regeneration waste, boiler B/D, treated washdown, misc. oily drains	Non-hazardous liquids	70 gpm	Discharged to refinery for treatment per NPDES
Spent SCR catalyst (heavy metals)	Hazardous solids	Approx. 4,800 cubic feet (once every 3 - 5 years)	Recycle
Spent oxidation catalyst (noble metals, heavy metals)	Hazardous /non-hazardous solids	Approx. 990 cubic feet (once every 3 - 5 years)	Recycle/reclaim
CGT used air filters	Non-hazardous	Approx. 1,500 filters (once every 3 years)	Landfill disposal
CGT offline wash water	Non-hazardous liquid based on soap type	< 4,000 gallons/month	Refinery water treatment system
Scrap wood, steel, glass, plastic, paper	Non-hazardous solids	3 cubic yards/week	Landfill disposal
Used oil filters, grease, oil rags, oil absorbent	Hazardous solids	_ cubic yard/month	Hazardous waste disposal facility
Spent batteries	Hazardous solids	100 batteries/year	Recycle
Solvents, paint, adhesives	Hazardous solids	<55 gallons/month	Hazardous waste disposal facility
Used lube oils and hydraulic fluids	Hazardous liquid	25,000 gallons (once every 10 years)	Recycle at refinery
Oily water separator oil	Hazardous liquid	20 gallons/month	Recycle at refinery

Source: BP 2002

A chemical cleaning contractor would be responsible for supplying neutralization chemicals and the technical expertise to address any spill or release. To mitigate the risks, the contractor would be expected to provide temporary berms around the chemical cleaning equipment and chemicals.

A number of safeguards would be incorporated to further reduce potential risks. These include, but are not limited to, bermed secondary containment, tank overfill protection, routine maintenance, safe handling practices, supervision of all loading/unloading by site personnel and the truck driver, and appropriate training of operation and maintenance staff. Additional mitigation measures are described in Section 3.16.5.

Medical Emergencies

All permanent employees at the cogeneration facility would receive first aid and CPR training. Onsite treatment would be provided in medical situations that require only first aid treatment or stabilization of the victim(s) until professional medical attention is obtained. Any injury or illness that requires treatment beyond first aid would be referred to the refinery's medical clinic or to a local medical facility.

Spill Prevention and Control

The emergency response plan and a SPCC plan for the BP Cherry Point Refinery would be modified for applicability to possible spills at the site during project operations. The Applicant would coordinate with the Washington State Department of Ecology during the preparation of both plans.

Transmission System

Risk of Fire or Explosion

The transmission line conductors would be located high above ground. Only qualified personnel would perform maintenance on the transmission lines. Sufficient clearance would be provided for all types of vehicles traveling under the transmission lines. Bonneville, the operator of the line, would establish and maintain safe clearance between the tops of trees and the proposed transmission lines to prevent fires.

Ground wires and counterpoise wires would be installed on the new transmission system, providing lightning strike protection and therefore reducing the risk of explosion. However, a brush fire could occur in the rare event that a conductor parted and one end of the energized wire fell to the ground, or perhaps in the event of lightning strikes. Under these circumstances, the normal fire fighting capabilities of both Whatcom County and the refinery would be called upon.

Bonneville would operate and maintain the transmission facilities consistently with Bonneville safety and health programs (similar to the construction health and safety program).

Releases or Potential Releases of Hazardous Materials to the Environment

Hazardous materials used during maintenance of the transmission facilities would be limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux and gases, various lubricants, paint, and paint thinner. Small quantities of fuel, oil, and grease may

leak from maintenance equipment. Such leakage should not be a risk to health and safety or the environment because of low relative toxicity and low concentrations.

Electric and Magnetic Fields

Magnetic fields are the result of movement of electrons in a wire (current), and electric fields are created by voltage, the force that drives the electrical current. All electrical wiring, devices, and equipment, including transformers, switchyards, and transmission lines, produce EMF. The strength and distance of EMF depends on the voltage and the design of the electrical component, and the distance from the electrical component. The strength of EMF diminishes rapidly with distance from the EMF source. Building material, insulation, trees, and other obstructions can reduce electric fields, but do not significantly reduce magnetic fields.

The electrical field strength can be measured and expressed as kilovolts per meter, or kV/m. The magnetic field strength is expressed as a unit of magnetic induction (gauss) and is normally measured as a milligauss (mG), which is one thousandth of a gauss. The average home electric appliance typically has an electrical field of less than 0.01 kV/m. In most homes, when in a room away from electrical appliances, the magnetic field is typically less than 2 mG. However, when very close to an appliance carrying high voltage, the magnetic field can be tens of hundreds of mG. Table 3.16-7 lists the typical electric and magnetic field strengths from common household appliances.

Table 3.16-7: Typical Electric and Magnetic Field Strengths at 1 foot from Common Appliances

Appliance	Electric Fields (kV/m)	Magnetic Fields ¹ (mG)
Coffee maker	0.03	1 – 1.5
Electric range	0.004	4 – 40
Hair dryer	0.04	0.1 – 70
Television	0.3	0.4 – 20
Vacuum cleaner	0.016	20 – 200
Electric blanket ²	0.01 – 1.0	15 - 100

Source: Miller 1975; Gauger 1985

kV/m = kilovolt 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, less than 1 foot away.

Electric fields from power lines are relatively stable because line voltage does not vary much. However, magnetic fields on most lines fluctuate greatly as current changes in response to changing loads (consumption or demand). Magnetic fields are described statistically in terms of averages, maximums, etc. Figure 3.16-1 shows typical mean magnetic fields calculated for 321 power lines for 1990 annual mean loads. During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels shown in Table 3.16-7.

Figure 3.16-1: Typical Electromagnetic Levels for Transmission Lines

Electric transmission lines contribute a relatively small portion of the electric and magnetic fields to which people are exposed. Nonetheless, members of the public often express concerns about EMF from transmission lines. Scientific research about EMF from transmission lines has focused on magnetic fields, because electric fields are shielded from the interior of homes and buildings where people spend the vast majority of their time. To evaluate potential impacts from magnetic fields, hundreds of epidemiological and laboratory studies have been conducted in the United States and other countries. The results of these studies do not demonstrate any link between exposure to magnetic fields from transmission lines and adverse health effects (Frey 1993).

For nearby homes, businesses, and other facilities, transmission lines can be a source of exposure to magnetic fields. There are no national standards for electrical or magnetic fields, but some states have established electric or magnetic field standards. In the Northwest, Bonneville has not established a standard or magnetic field strength, but has established an electrical field standard of 9 kV/m maximum on the right-of-way and 5 kV/m at the edge of the right-of-way. Washington State does not have a regulatory standard for electrical or magnetic field exposure.

With the startup of the cogeneration facility, the three existing substations within the confines of the refinery would be disconnected. Any potential health risks present within and adjacent to the substations would be eliminated. The 230 kV switchyard to be located within the cogeneration facility would contain transformers to step down the power from 230 kV to an internal rate voltage (either 69 kV or 115 kV) to supply the refinery. Given that the results of studies have indicated that there are no known health effects from exposure to magnetic fields, operation of the cogeneration facility substation would not present health risks to workers or the general public.

Custer/Intalco Transmission Line No. 2

Following the reconstruction of Bonneville's Transmission Line No. 2 no significant human health and safety risks are anticipated from operation of the transmission line. The transmission line, including tower construction, wires, and clearances, would meet the requirements of Bonneville, including meeting the electrical field strength standards described above.

A locked fence encloses the existing Custer Substation and access is limited to authorized personnel. The substation's ground surface is covered with crushed rock, and no combustible vegetation is located within the fenced area. The risk of a major fire is low because the substation switchyard does not contain large oil-filled equipment. The substation contains coupling capacitor voltage transformers, each containing non-PCB oil.

Other Project Components

Following installation of the industrial water supply pipeline below grade, no health and safety impacts are anticipated from operation of the pipeline. Use of Access Roads 1 and 3 and conversion of the open space north of Grandview Road to the wetland mitigation areas would not result in health and safety effects either to the public, to workers at the refinery, or at the cogeneration facility.

3.16.3 Impacts of No Action

The Ferndale and Cascade natural gas pipelines and the BP Cherry Point Refinery have been adjacent to the project site for decades. If the proposed project were not constructed, the worker and public health and safety risks related to the use, storage, collection, and treatment of non-hazardous and hazardous chemicals at the refinery would still exist. Under the No Action Alternative, there would be no additional health and safety risks related to construction and operation of any of the components of the proposed project.

3.16.4 Secondary and Cumulative Impacts

No significant cumulative impacts on workers or public health and safety were identified resulting from fire and explosion, spill or releases of hazardous or toxic materials, and toxic air emissions during the construction of the cogeneration facility and ancillary infrastructure. The mitigation measures described above would reduce potential worker and public health and safety impacts under normal construction and operational conditions. During the two-year construction period, additional chemicals and hazardous and toxic materials would be transported to the project area. The additional chemicals and hazardous and toxic materials transported through this industrial region with several operating industrial facilities also transporting, storing, and using chemicals and hazardous and toxic materials, is not expected to result in cumulative impacts. The transport of these chemicals and materials is regulated by local, state, and federal regulations; should an accidental release of these chemicals and/or materials occur, the resulting impact would be less than significant and local in extent.

Potential operational risks to worker and public health and safety relate to the unexpected or accidental release of toxic and flammable gases. With the transport and use of toxic and flammable gases by the cogeneration facility and surrounding industrial facilities, there is the potential for a release due to an operational accident and/or through a natural catastrophe such as an earthquake. The probability of this type of worker and public risk is considered low given the design of the industrial facilities, proposed safety protocols in maintenance plans and programs, and mitigation measures described previously. Although workers, both within the proposed project and in surrounding industries, and the general public could be exposed to the toxic and flammable gases, the significance of the potential cumulative impact has not been determined. A regional determination of cumulative impacts would require a risk analysis based on procedures and operating conditions of regional industrial facilities.

Another project is planned for construction in the project vicinity. The GSX natural gas pipeline would be constructed along Grandview Road immediately north of the proposed project. Potential increased health risks resulting from construction of the pipeline include accidental rupture and failure of the Ferndale and Cascade natural gas pipelines and the occupational hazards associated with the operation of heavy equipment and use of hazardous materials. The new buried pipeline would have the same risks as other existing pipelines that transport natural gas—that is the risk of leaks, fires, and explosions resulting from an accidental rupture of the pipeline. Operation of the GSX natural gas pipeline would increase the potential risk for fire and explosion of the existing natural gas pipelines, the proposed cogeneration facility, and the refinery.

3.16.5 Mitigation Measures

Worker and public health and safety risks would be minimized through an integrated combination of health and safety plans, procedures, and training proposed by the Applicant. The Applicant ensures that these plans and procedures would be adhered to and enforced. In addition to the mitigation measures and design features described previously in this section, the following mitigation measures are proposed by the Applicant to reduce potential health and safety impacts resulting from construction and operation of the proposed project.

Construction

Before construction starts, the Applicant would require its Engineering, Procurement, and Construction (EPC) contractor to prepare an Environmental, Health, and Safety Program (EHSP) to address the management, prevention, and control of possible fire or explosion during construction. During construction mobilization, the contractor would coordinate with the refinery's Fire Marshal, Whatcom County Fire District No. 7, and regulating authorities regarding activities that would be occurring at the various construction sites.

The following is an overview of the mitigation plans to be prepared by the Applicant's EPC contractor. For the most part, these plans represent a modification of plans currently implemented at the refinery. The plans, when approved by regulatory agencies, would be part of the EHSP, implemented by the EPC contractor, and overseen by the Applicant.

Fire Prevention and Response Plan

This plan would address fire prevention and detection, and describe the responsibility of subcontractors and individuals working at the various sites. Safe working practices such as maintaining appropriate fire extinguishers within easy access of any work area, restricting smoking to designated locations, and using a permit system for all hot work (welding, cutting, and grinding) outside of designated "free burn" areas.

A FERRO plan would be prepared for the cogeneration facility. This plan, a modification of the refinery's FERRO plan, would describe procedures and protocols to address the following conditions:

- Fire and explosion
- Rescue
- Emergency medical services
- Insulation removal during emergencies
- Terrorist and bomb threats
- Civil disorder
- Earthquakes
- Pipeline leak/rupture
- Offsite ammonia release

To address potentially larger fires, a companion plan known as the EPP would be prepared. This plan would describe preparedness and planning information and would conform with and incorporate applicable regulatory guidelines of local, state, and federal agencies.

Medical Emergency Plan

This plan would describe how construction staff would address minor injuries and provide initial first aid on more serious situations. Onsite treatment guidelines for first aid and/or injury stabilization would be described. A procedural plan to handle any injury or illness that requires treatment beyond first aid would also be described.

Spill Prevention Plan

This plan would describe who would have the responsibility for implementing spill control measures and training in spill avoidance. Training procedures to be described include appropriate spill response, containment, cleanup, and reporting protocols consistent with applicable regulations and refinery policy.

With respect to petroleum products located onsite during and after construction, specific instructions for the handling and storage of petroleum products would be described. Examples include:

- Lubrication oil stored onsite would be contained in barrels. The barrels would be stored in a secondary containment area to contain any spillage or in temporary warehouses.
- Construction refueling would be closely supervised to avoid leaks or releases. If fuel tanks are used during construction, they would be located within a secondary containment with an oil-proof liner sized to contain the single largest tank volume plus an adequate space allowance for rainwater.
- When filling transformers with oil, the oil would be pumped from a truck within a temporary secondary containment area to contain any spillage.

Hazardous Materials Management Plan

This plan would describe a specific area within a construction site designated for servicing and fueling the construction equipment. Also included in the plan would be instructions for training of all construction personnel and subcontractors in spill avoidance, containment, cleanup, and reporting procedures consistent with the Applicant's policy and regulatory requirements. The plan would identify an onsite Safety Engineer who would be designated to implement health and safety guidelines and to contact emergency response personnel and the local hospital, if necessary.

Hazardous Waste Management Plan

This plan would describe the responsibilities of a licensed Solid Waste Management contractor who would be responsible for collection, treatment, or disposal of wastes generated during construction in compliance with all federal, state, and local regulations. In addition, the plan

would identify BMPs to be used, including good housekeeping measures, inspections, containment facilities, and spill prevention practices. Finally, the responsibilities of the Applicant's onsite project manager would be described in the plan.

Explosion Risk Management Plan

The risks of fire or explosion during construction of the pipeline connections are considered minimal. Nevertheless, a management plan to reduce the risks of explosion would be prepared. The plan would include work and pipeline isolation procedures to safeguard against accidents while working around pipelines. Examples of such procedures include locating and marking the existing gas pipeline to avoid construction damage, and limiting construction equipment or heavy haul crossings to suitably designated locations.

Operation and Maintenance

During operation and maintenance of the proposed project, specific plans, procedures, and protocols for managing worker and public health and safety would be developed. These may include:

- Safety and Health Manual;
- Emergency Preparedness Response Plan; and
- Fire Emergency Response Operations Plan.

Operational plans would be prepared before startup of the cogeneration facility. Mitigation features have been incorporated into the design of the cogeneration facility. The following plans to be prepared and design features are described below.

Fire Prevention and Response Plan

The following elements of the fire prevention and response plan would be described:

- Protective materials to be used for equipment and pipelines;
- Means to gauge the contents of materials contained in storage vessels;
- Spill kits;
- Signs;
- Preventive maintenance program;
- Procedures for visual inspections;
- Good housekeeping procedures;
- Procedures for handling flammable liquids;
- Mandatory hazardous communication written procedures and training program;
- Procedures for establishing designated flammable storage areas;
- Employee training; and
- Safety and environmental audits.

In addition, a response protocol would be developed with Whatcom County Fire District No. 7 to ensure that additional support and resources are available from the district and other fire jurisdictions through the District Mutual Aid Agreements.

Spill Prevention Plan

To minimize the potential for hazardous material and chemical spills during operation of the proposed project, an operational spill prevention plan would be prepared. Design features have been incorporated into the layout of the project. The design and location of storage tanks and secondary containment areas are intended to prevent spills from tanks and transfer locations.

The following tanks would hold diesel fuel oil for the emergency generator and fire suppression water pump or lube oil for major rotating equipment. These tanks would have secondary containment for spill control with adequate space for rainwater.

- The fire pump diesel fuel storage tank would be a horizontal tank with a capacity of approximately 460 gallons.
- The diesel generator diesel fuel storage tank would be a vertical tank with a capacity of approximately 1,500 gallons.
- The steam turbine lube oil storage tank would be a rectangular tank with a capacity of approximately 7,200 gallons. Depending on the supplier of the steam turbine, the electro-hydraulic control oil system may be integrated with the lube oil system or it may be a stand-alone system.
- One combustion turbine lube oil storage tank would be provided for each of the three CGTs. Each tank would have a capacity of approximately 6,200 gallons. These lube oil tanks would be located inside the accessory module.
- Transformers would be installed into secondary containment areas that would hold the transformer's volume plus an adequate space to accommodate rainwater. Transformer oil would be pumped from a truck within a temporary secondary containment area. Spills that occur during filling of the transformer would be properly cleaned up and reported.
- A secondary containment area would be constructed around the ammonia tank that would contain 150% of the working volume. The additional containment would be provided to accommodate water from a deluge spray system and rainwater.
- The caustic tanks would be surrounded by a secondary containment area and sized with sufficient space for rainwater.
- The acid tanks would be located within a secondary containment area lined with an acid-proof coating and sized with sufficient space for rainwater.
- Oxygen scavenger, neutralizing amine, corrosion inhibitors, phosphate, and cooling tower chemical storage tanks would be contained in a curbed area sufficiently sized to contain the volume of the single largest storage tank.

The design of the cogeneration facility includes an oil-water separator system that collects selected drainage and runoff from within curbed areas that could carry trace oil. Collected drainage and runoff would be pumped to the refinery's treatment system.

Hazardous Waste Management

Little waste would be produced during the operation and maintenance of the proposed project. Used lubrication and transformer oils, small quantities of used paints, thinners, and solvents used during operation would be disposed of in accordance with federal, state, and local regulations. Safeguards would include bermed secondary containment, tank overfill protection, routine maintenance, safe handling practices, supervision of all loading/unloading by plant personnel and truck drivers, and appropriate training of operation and maintenance staff.

Prevention of Natural Gas Release During Operation

The Applicant would comply with all federal and state regulatory requirements regarding pipeline safety. In addition, all underground gas piping and pipeline connections to the cogeneration facility would be have cathodic protection systems and corrosion-resistant coatings.

Explosion Risk Management

Several proposed mitigation measures would ensure prompt detection of a natural gas release at the project site. First, the natural gas would be odorized with mercaptan to give the gas a strong, distinctive odor that should make any gas leak immediately apparent. Second, a breach in the natural gas system would result in a drop in the pressure of the gas line, which would be detected in the control room so that the system would be shut down until the situation is resolved. Automatic shutoff valves in the existing pipeline would close to limit the amount of gas that could leak from the system.

If a local, small gas leak were suspected, a combustible gas indicator would be used to measure the percentage of oxygen and concentrations of natural gas in the ambient air.

In the event of a leak, the pipeline system would be isolated by closing a shutoff valve. The leaking section would be repaired or replaced by a licensed contractor. Upon completion of the repair work, the pipeline system would be pressure tested to ensure that the leak has been appropriately addressed.

The Applicant has taken additional steps to reduce the opportunities for pipeline failure. These steps include: (1) pipeline appurtenances would be limited to fenced (controlled) areas within the project site, (2) the pipeline would be buried in all other uncontrolled locations, (3) the pipeline appurtenances would be protected within the cogeneration facility site by being contained within buildings or within fenced areas, (4) steel posts would be erected to ensure that onsite vehicles are not able to reach critical areas, and (5) access to critical areas would be limited to authorized personnel.

3.16.6 Significant Unavoidable Adverse Impacts

With implementation of the Applicant's proposed project design and mitigation measures, no significant unavoidable adverse impacts to workers or to the general public's health and safety

resulting from construction, operation, and maintenance of the proposed project and ancillary infrastructure have been identified.

3.17 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed cogeneration facility would be located on land within Whatcom County zoned for Heavy Impact Industrial Use. The facility site is also located within the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone defined in the Whatcom County Comprehensive Plan. Construction and operation of the facility and ancillary infrastructure would be consistent and compatible with existing zoning, land uses, plans, and ordinances within the Cherry Point Major Industrial Urban Growth Area. Although the land within the project vicinity was historically used for agricultural purposes, much of it has been used for industrial purposes for the past 30 years. The proposed short-term use of the area's natural resources would be in accordance with state and federal resource agencies' permit conditions.

Construction of the entire project would result in short-term impacts and uses of natural resources to produce 720 MW of long-term electrical power to the Pacific Northwest, and electrical power and steam to the BP Cherry Point Refinery. Short-term construction effects would potentially include the generation of construction jobs, noise, particulate air pollution, and local inconvenient traffic conditions. Short-term soil erosion and water quality impacts also may result during and shortly after construction, although mitigation measures would be carried out to minimize these impacts. In the long term, the use of water from the Nooksack River would not represent a change in the quantity of water withdrawn from the river. Water that was piped to the Alcoa Intalco Works would now be piped to the cogeneration facility. In addition, the expected retirement of three older steam boilers within the refinery would result in a net reduction of air pollutants released from the refinery.

The cogeneration facility site would be committed for the life of the proposed project, but would be restored as described in a site restoration plan to be prepared by the Applicant and approved by EFSEC.

To the extent the short-term (30 years) operation of the proposed project would contribute to the possibility of a long-term increase in global warming from the release of greenhouse gases, the project would have a potential effect on long-term productivity. As long as the Applicant owns and operates the cogeneration facility, greenhouse gas emissions from the cogeneration facility would be offset by the reduction of greenhouse gas emissions from other Applicant-owned operations worldwide. If, at some time in the future, the Applicant sold the cogeneration facility, mitigation for the greenhouse gas emissions would be as follows:

- The proposed CO₂ emission standard would be 0.675 pounds CO₂/kWh calculated on the basis of cogeneration fuel charged to power in Btu/kWh.
- Emissions in excess of the emission standard would be mitigated either by: (1) an annual payment to a qualifying organization such as the Climate Trust of \$0.57/ton CO₂, or (2) greenhouse gas reductions obtained by the cogeneration owner, or (3) a combination of the two.
- Mitigation would be satisfied annually for 30 years, which is the assumed economic life of the proposed project. Mitigation would be reported to EFSEC on an annual basis.

The emission of greenhouse gases from the cogeneration facility is discussed in Section 3.2 Air Quality.

The use of natural and other resources would result in the generation of electrical energy, which could enhance the petroleum industry's productivity in the Pacific Northwest and the local and regional economy. With the exception of wetland impacts, the short-term use of environmental resources is projected to have minor adverse impact on the long-term viability of the environmental resources in the project vicinity.

3.18 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed project would require a commitment of natural, physical, and human resources. In all of these categories, an irreversible and irretrievable commitment of resources would occur.

Construction of the proposed project would consume energy and building materials. In general, natural and propane gas and diesel fuel would be consumed directly by construction equipment and to generate electrical power and heat. Construction materials such as steel, cement, and aggregate would also be expended (see Section 3.8). These physical resources are generally in sufficient supply, and their commitment to the project would not have an adverse effect on their availability.

Operation of the proposed project would consume approximately 42.5 MMBtu natural gas annually for the life of the project (projected at 30 years) (see Section 3.8, Energy and Natural Resources). This is an irretrievable commitment of nonrenewable natural gas resources. Electrical energy would be consumed during the startup of the proposed project. Bonneville would provide approximately 21 MW during startup and testing, with a projected annual consumption or power demand of approximately 146,300 MWh/yr during operation (see Section 3.8). Electrical energy generated during operation would be supplied to the BP Cherry Point Refinery and power generated in excess of the refinery's needs would be exported to Bonneville's FCRTS under an interconnection agreement with Bonneville. Interconnection with the FCRTS is essential to deliver power from generation facilities to loads both within and outside the Pacific Northwest. Finally, petroleum products would continue to be consumed during operation; however, quantities would be significantly less than during construction.

Some biological resources would be irreversibly and irretrievably lost with the construction of the proposed project. Approximately 35 acres of wetlands would be filled with approximately 5 acres restored as part of a restoration effort. The permanent loss of approximately 30 acres would be mitigated with the establishment of a 110-acre wetland mitigation area north of the cogeneration facility. In addition, wildlife habitat would be lost within the project area. However, mitigation measures are proposed to minimize the loss wildlife resources.

In terms of human resources, trade and non-skilled laborers would be used in the preparation, fabrication, and construction of the project. During the beginning phase of construction, approximately 45 skilled and non-skilled laborers would be required. That number would increase during the second year of construction up to 670 laborers. During the latter half of the second year of construction, approximately 460 laborers would be needed to complete construction activities. Approximately 30 new and permanent job positions would be needed to help run the proposed project. Labor is generally not considered to be a resource in short supply, and commitment to the project would not have an adverse effect on the continued availability of these resources.

The local and regional economic and employment benefits are factors counterbalancing the commitment of the above-described resources.

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CHAPTER 5: ACRONYMS AND ABBREVIATIONS

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
AASHTO	American Association of State Highway Transportation Officials
ACC	air-cooled condensing
ADT	average daily traffic
AHPA	Archaeological and Historic Preservation Act
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
APE	Area of Potential Effect
Applicant	BP West Coast Products, LLC
AQI	air quality index
AQRV	air quality related values
ASC	Application for Site Certification
ASILs	Acceptable Source Impact Levels
B&O	business and occupation
BACT	Best Available Control Technology
BE	Biological Evaluation
BFW	boiler feedwater
BMPs	Best Management Practices
BNSF	Burlington Northern Santa Fe
BOD	Biochemical Oxygen Demand
Bonneville	Bonneville Power Administration
BP	BP West Coast Products, LLC
Btu/kWh	British thermal units per kilowatt hour
CAA	Clean Air Act
CB	citizens band
CEQ	Council on Environmental Quality
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGTs	combustion gas turbine generators
CMA	Compensatory Mitigation Area
CO	carbon monoxide
COD	Chemical Oxygen Demand
Corps	U.S. Army Corps of Engineers
CPR	cardiopulmonary resuscitation
CRGNSA	Columbia River Gorge National Scenic Area
dB	decibels
dbh	diameter at breast height
DOT	U.S. Department of Transportation
Dth/d	decatherms per day
Ecology	Washington Department of Ecology
EFSEC	Washington State Energy Facility Site Evaluation Council
EHSP	Environmental, Health, and Safety Program

EIS	Environmental Impact Statement
EMF	electromagnetic fields
EMI	electromagnetic interference
EOs	Executive Orders
EPA	U.S. Environmental Protection Agency
EPC	Engineering, Procurement and Construction
EPP	Emergency Preparedness Plan
ERPG	Emergency Response Planning Guidelines
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FAA	Federal Aviation Administration
FCRTS	Federal Columbia River Transmission System
FEMA	Federal Emergency Management Agency
Ferndale pipeline	Arco Western Natural Gas Pipeline
FERO	Fire Emergency Response Operations
FM	frequency modulated
FPPA	Farmland Protection Policies Act
GLO	General Land Office
gpm	gallons per minute
GPT	Gateway Pacific Terminal
GSX	Georgia Strait Crossing
GTN	Gas Transmission, Northwest
GVRD	Greater Vancouver Regional District
H ₂ SO ₄	sulfuric acid mist
HAP	hazardous air pollutants
HHV	Higher Heat Value
HII	Heavy Impact Industrial
horsepower	hp
HRSGs	heat recovery steam generators
IPCC	Intergovernmental Panel on Climate Change
ISC	Industrial Source Complex
kHz	kilohertz
kpph	thousand pounds per hour
kV	kilovolt
kV/m	kilovolts per meter
kW	kilowatt
L&I	Washington Department of Labor and Industries
lbs/kW _{hr}	pounds per kilowatt-hour
LII	Light Impact Industrial
LOS	level-of-service
MACT	Maximum Available Control Technology
MDth/day	million decatherms per day
mG	milligauss
MMBtu	million British thermal units
MMlb	million pounds
MMTCE	million metric tons of carbon equivalents

MP	milepost
MSDS	Material Safety Data Sheets
MSL	mean sea level
MVA	million volt amp
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSPS	New Source Performance Standards
NSR	New Source Review
NWAPA	Northwest Air Pollution Authority
NWPCC	Northwest Power and Conservation Council
O ₃	ozone
OAHP	Office of Archaeology and Historic Preservation
OSHA	Occupational Safety and Health Administration
OTED	Washington State Office of Trade and Economic Development
Pb	lead
PEM	palustrine emergent
PFO	palustrine forested
PFOC	seasonally flooded palustrine forested
PG&E	PG&E National Energy Group
PGA	peak ground acceleration
PM ₁₀ , PM _{2.5} ,	particulate matter
ppb	parts per billion
ppm	parts per million
ppmdv	parts per million volume dry
PSD	Prevention of Significant Deterioration
PSE	Puget Sound Energy
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PSS	Potential Site Study
PSS	palustrine scrub-shrub
PSSA	temporarily flooded palustrine scrub-scrub
PUD	Whatcom County Public Utility District No. 1
RAS	Remedial Action Scheme
RCW	Revised Code of Washington
RI	Radio Interference
RMP	Risk Management Plan

ROD	Record of Decision
ROW	right-of-way
SCR	selective catalytic reduction
SE2	Sumas Energy 2 Generation Facility
SEPA	State Environmental Policy Act
SILs	Significant Impact Levels
SO ₂	sulfur dioxide
SPCC	Spill Prevention Control and Countermeasures
SQER	Small Quantity Emissions Rate
STG	steam turbine generator
SWPP	Stormwater Pollution Prevention
tcf	trillion cubic feet
TESC	Temporary Erosion and Sedimentation Control
TMDL	Total Maximum Daily Load
tpy	tons per year
TransCanada	Alberta Natural Gas Pipeline
TSP	total suspended particulate
TSS	total suspended solids
TVI	television interference
UGA	Urban Growth Area
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compounds
WAAQS	Washington Ambient Air Quality Standards
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WECC	Western Electricity Coordinating Council
WRIA	Water Resource Inventory Area
WRAT	Water Right Application Tracking
WSCC	Western System Coordinating Council
WSDOT	Washington State Department of Transportation
WUTC	Washington Utilities and Transportation Commission
WWTP	Birch Bay Wastewater Treatment Plant

CHAPTER 6: LIST OF PREPARERS

The lead agencies for the BP Cherry Point Cogeneration Project Draft EIS are Bonneville and EFSEC. The Draft EIS was written with the technical assistance of Shapiro and Associates, Inc. Individuals responsible for preparing the EIS are listed below.

6.1 BONNEVILLE STAFF

Thomas C. McKinney – Bonneville Power Administration, NEPA Compliance Officer. Contributed to underlying need for action section. Education: B.A. Geography. Experience: 23 years of environmental analysis experience.

Patrick R. Rochelle – Bonneville Power Administration, Network Planning, Electrical Engineer. Performed technical evaluation of the integration of the project into the Bonneville Power Administration system. Education: B.S. Electrical Engineering, M.S. Electrical Engineering. Experience: 15 years of electrical engineering in maintenance and utility engineering.

6.2 CONSULTING STAFF

Christopher J. Andersen – Senior Environmental Planner, Shapiro and Associates, Inc. Primary author or contributor to agricultural land, crops, and livestock, energy and natural resources, land use, visual resources, light and glare, population housing and economics, and public services and utilities. Education: B.S. Environmental Science and Public Policy. Experience: 11 years.

Mark Adams – CDM. Author for water/water resources section. Education: B.S. Geology, University of Oregon; M.S. Geology. Experience: 25 years.

Monica Beckman – CDM. Responsible for Health and Safety Section. Education: B.S.E. Industrial and Operations Engineering. Experience: 15 years.

Marc E. Boulé – Senior Vice President, Shapiro and Associates, Inc. Responsible for the analysis of water resources, water quality, wetlands and wetland mitigation, and vegetation. Education: B.S. Geology, M.S. Marine Science. Experience: 33 years.

Jason Detamore – Acoustic and Air Quality Specialist, Shapiro and Associates, Inc. Primary author of the air quality section. Education: B.S. Environmental Science, certification in FHWA Fundamentals and Abatement of Highway Traffic Noise, and Modeling of Mobile Source Air Quality Impacts. Experience: 3 years.

Calvin Douglas – Senior Ecologist, Shapiro and Associates, Inc. Responsible for the analysis of wetlands, agricultural land, crops, and livestock, vegetation, wildlife, habitat, fisheries, and T&E species. Education: B.S. Wildlife Biology. Experience: 18 years.

Linda Goetz – Senior Archaeologist, Shapiro and Associates, Inc. Responsible for the analysis of cultural resources. Education: B.A. Anthropology and Archaeology. Experience: 18 years.

Jack Gougé – Regulatory Compliance Manager, Shapiro and Associates, Inc. Responsible for the health and safety section. Education: B.S. Geology and Cultural Anthropology, M.S. Biological Sciences and Residential Development. Experience: 29 years.

John Greene – Senior Environmental Scientist, Shapiro and Associates, Inc. Responsible for preparing the earth and water quality sections of the EIS. Education: B.S. Environmental Science. Experience: 19 years.

Stephen B. Lovell – Senior Transportation Planner, Shapiro and Associates, Inc. Responsible for preparation of the traffic section. Education: B.S. Civil Engineering, Professional Certificate in Transportation Planning. Experience: 33 years.

Shannon Moore – Acoustic Specialist, Shapiro and Associates, Inc. Primary author for the noise section. Education: B.S. Zoology, certification in FHWA Fundamentals and Abatement of Highway Traffic Noise. Experience: 8 years.

Dick Myers, ASLA – Senior Landscape Architect, Shapiro and Associates, Inc. Contributor to analysis of visual resources, light and glare. Education: B.S. Landscape Architecture. Experience: 29 years.

Lance Peterson – CDM. Education: B.S. Geology, Western Michigan University; M.S. Geology. Experience: 15 years.

Keith Ward – CDM. Author for Earth Section. Education: P.S. Civil Engineering, Michigan State University; M.S. Civil/Geotechnical Engineering. Experience: 10 years.

CHAPTER 7: DISTRIBUTION LIST

Federal Agencies

Dale Bambrick	National Marine Fisheries Service
Richard Clark	US EPA, Aquatic Resources Unit
Dan Meyer	US EPA Region 10 Air Operating Permits OAQ 107
Olivia H. Romano	US Army Corps of Engineers, Seattle District
Dr. Tom Sibley	National Marine Fisheries Service
Dee Morse	NPS - Air Resources Division
Bob Bachman	USDA FS NR U.S. Forest Service
Bill Jolly	Parks and Recreation Commission
Thomas McKinney, Kec-4	Bonneville Power Administration
John Notar	National Park System, Air Resources Division
Thomas M. Noguchi	Bonneville Power Administration
Patrick R. Rochelle	Bonneville Power Administration
Herbert V. Adams	Bonneville Power Administration

Tribal Government

Bob Kelly Jr.	Nooksack Tribe - Natural Resources
Daryl Williams	Tulalip Tribes
Merle Jefferson	Lummi Nation - Natural Resources
Honorable Herbert A. Williams Jr.	Tulalip Tribes
Honorable Art George	Nooksack Tribe
Honorable Darrel Hillaire	Lummi Nation

Canadian Governments and Agencies

Nancy Knight	Greater Vancouver Regional District
Ali Ergudenler	Greater Vancouver Regional District
Hu Wallis	BC Ministry of Water Land and Air Protection
Adrian Duncan	Environment Canada Pacific and Yukon Region
Ray Robb	BC Ministry of Water Land and Air Protection
Carl Alleyne, Ph.D.	Health Canada - BC/Yukon Region
David A. Bricklin	Bricklin Newman Dold, LLP
Hu Wallis	BC Ministry of Water Land and Air Protection
Steve Sakiyama	BC Ministry of Water Land and Air Protection
Stephany Meyn	BC Ministry of Water Land and Air Protection
Paul Jarman	BC Ministry of Attorney General
Hugh Sloan	Fraser Valley Regional District
Bob Smith	Fraser Valley Regional District
Adam Larusic	Environment Canada
Colin Di Cenzo	Environment Canada

State Agencies

Doug Brown	Department of Ecology NWRO
Michael Lufkin	Counsel for the Environment
Curt Leigh	Department of Fish and Wildlife
Dick Grout	Department of Ecology
Rich Siffert	Department of Health
Ann Kenny	Ecology, Northwest Regional Office
Kim Wigfield	Department of Ecology Industrial Section
Tony Usibelli	Community, Trade and Economic Development
Alan Newman	Department of Ecology Air Quality Program
Doug Kilpatrick	Utilities and Transportation Commission
Jim Luce	EFSEC
David Mudd	Department of Fish and Wildlife
Susan Meyer	Department of Ecology, Northwest Regional Office
Bob Burmark	Ecology
John Thielemann	WA Dept of Health
Todd Harrison	Department of Transportation
Barry Wenger	WA Dept of Ecology
Lee Conrad	WSDOT - Mt Baker Area HQ
Hugo Flores	Department of Natural Resources
Barbara Ritchie	Dept of Ecology – SEPA Unit
Sondra Walsh	WUTC

Local Government

Gary Russell	Whatcom County Fire District No. 7
John Guenther	Whatcom County Planning and Develop Services
Terry Galvin	City of Blaine Planning Department
Jamie Randles	Northwest Air Pollution Authority
Tom Anderson	Whatcom Public Utility District No 1
Neil Clement	Whatcom County Department of Emergency Management
Pete Kremen	Whatcom County Executive
James S. Darling	Port of Bellingham
David M. Grant	Whatcom County Prosecutors Office

Librarires and Educational Institutions

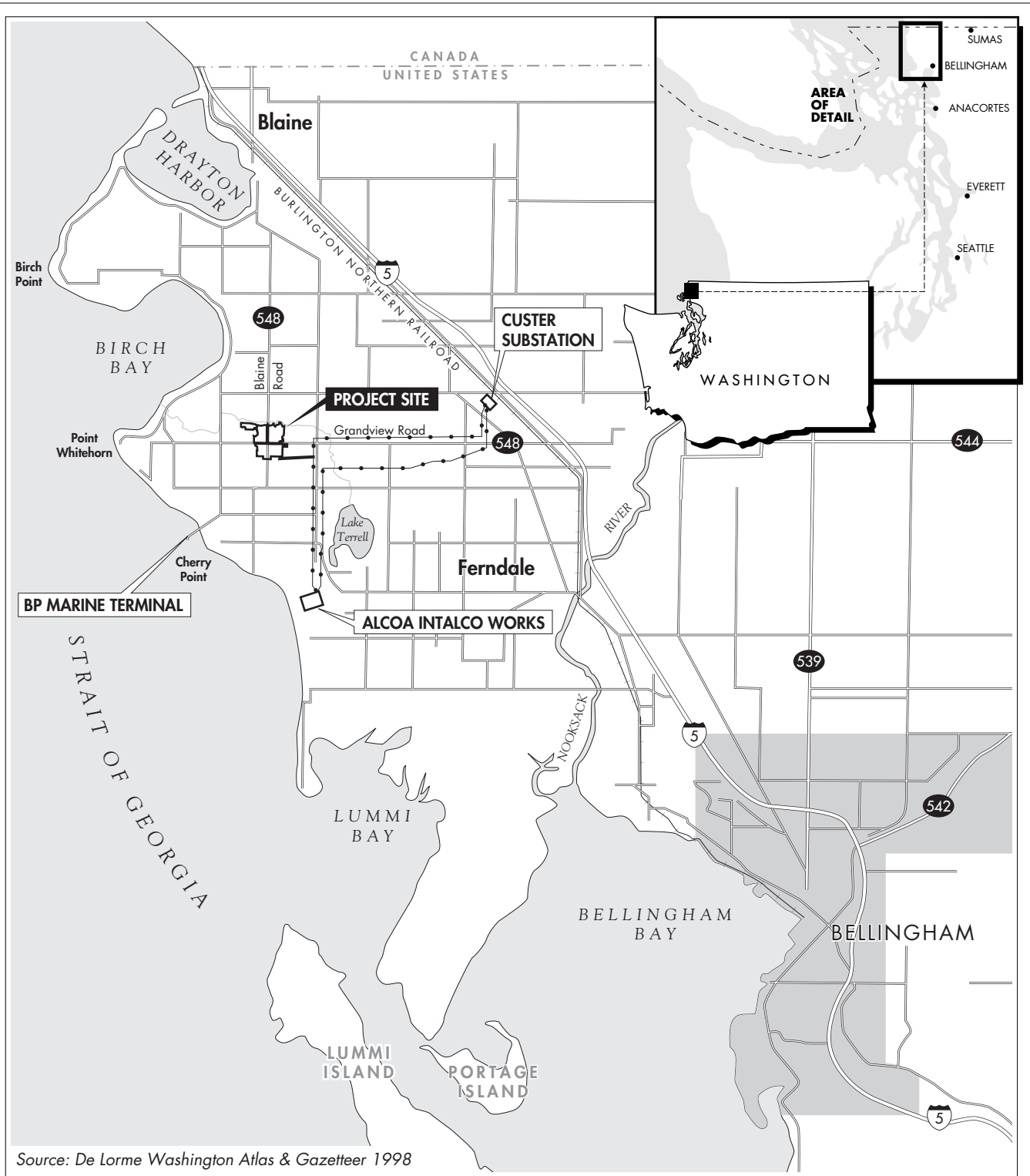
Barb Hynek	White Rock Public Library
Isabelle Hay	Ocean Park Library
Joel M. Pritchard Library	WA State Library
Gayle Helgoe	Bellingham Library Reference Desk
Dave Menard	Whatcom County Library System
Kathy Richardson	Whatcom County Library

Businesses and Individuals

Brian Steele, P.E.G.
Doug Caldwell
Rose Lathrop
Andy Foley
Pat French
Craig Noordmans
Mike Torpey
Karen McGaffey
Mark Moore
Karen Payne
Rick Porter
Bill Kidd
Mike Abendhoff
Cynthia Weston
Darryl Thorson
Kevin Casey
Liz McDougall
Wolfgang Neuhoﬀ
Howard Brad
Steeve Terri
Steve DeMinco

Materials Testing and Consulting, Inc.
ISCA Management Ltd.

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BP Cherry Point Refinery
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BP Cherry Point Refinery
BP Cherry Point Refinery
BP Legal
BP Energy
BP Energy
Perkins Coie
TransCanada
TransCanada
TransCanada
Bechtel



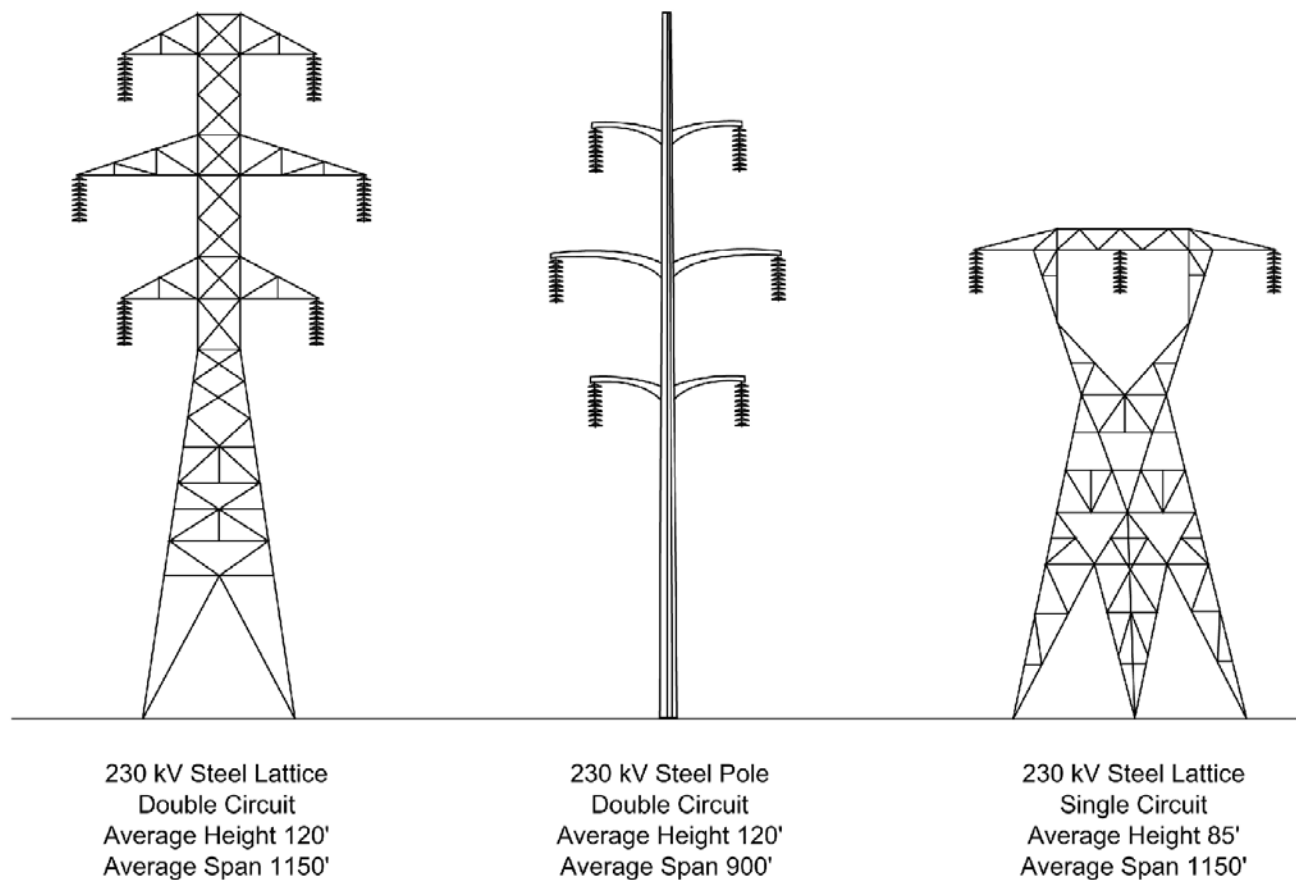
0 3
Approximate Scale in Miles

—•—•—•— transmission line

FIGURE 1-1

PROJECT VICINITY MAP



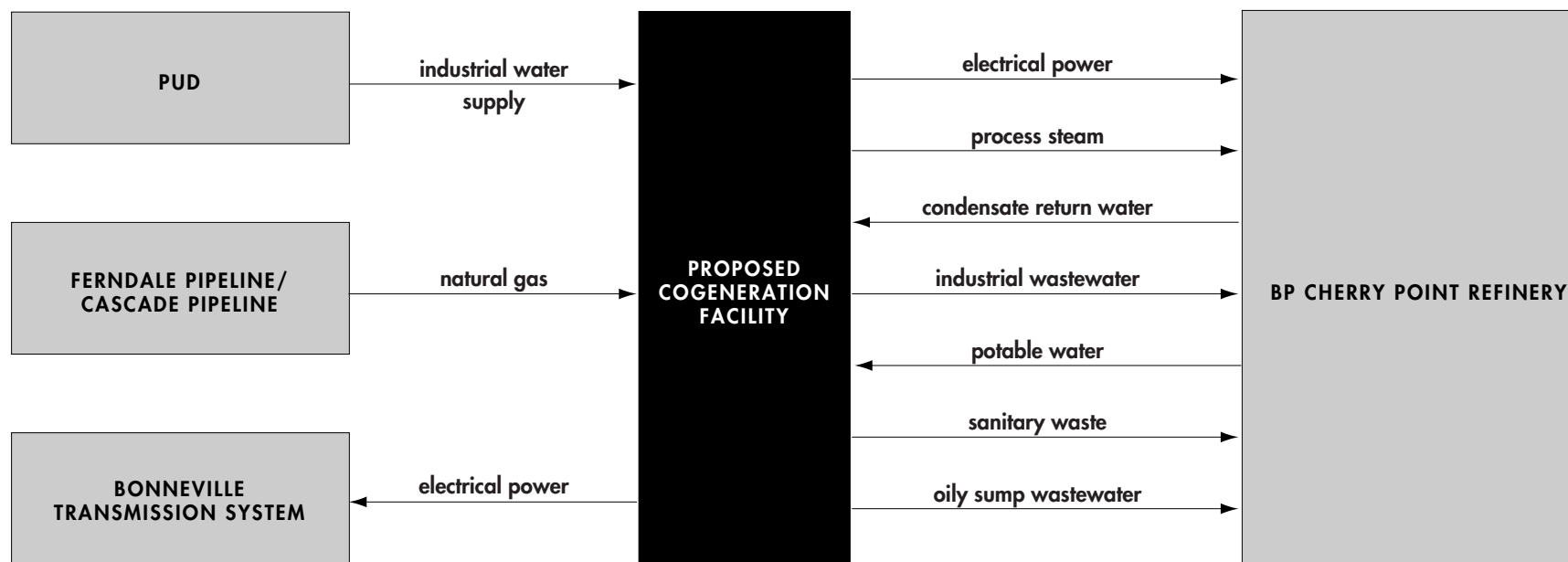


Source: Bonneville Power Administration 2003

FIGURE 1-2

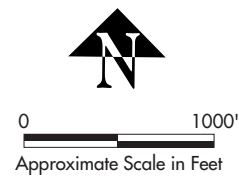
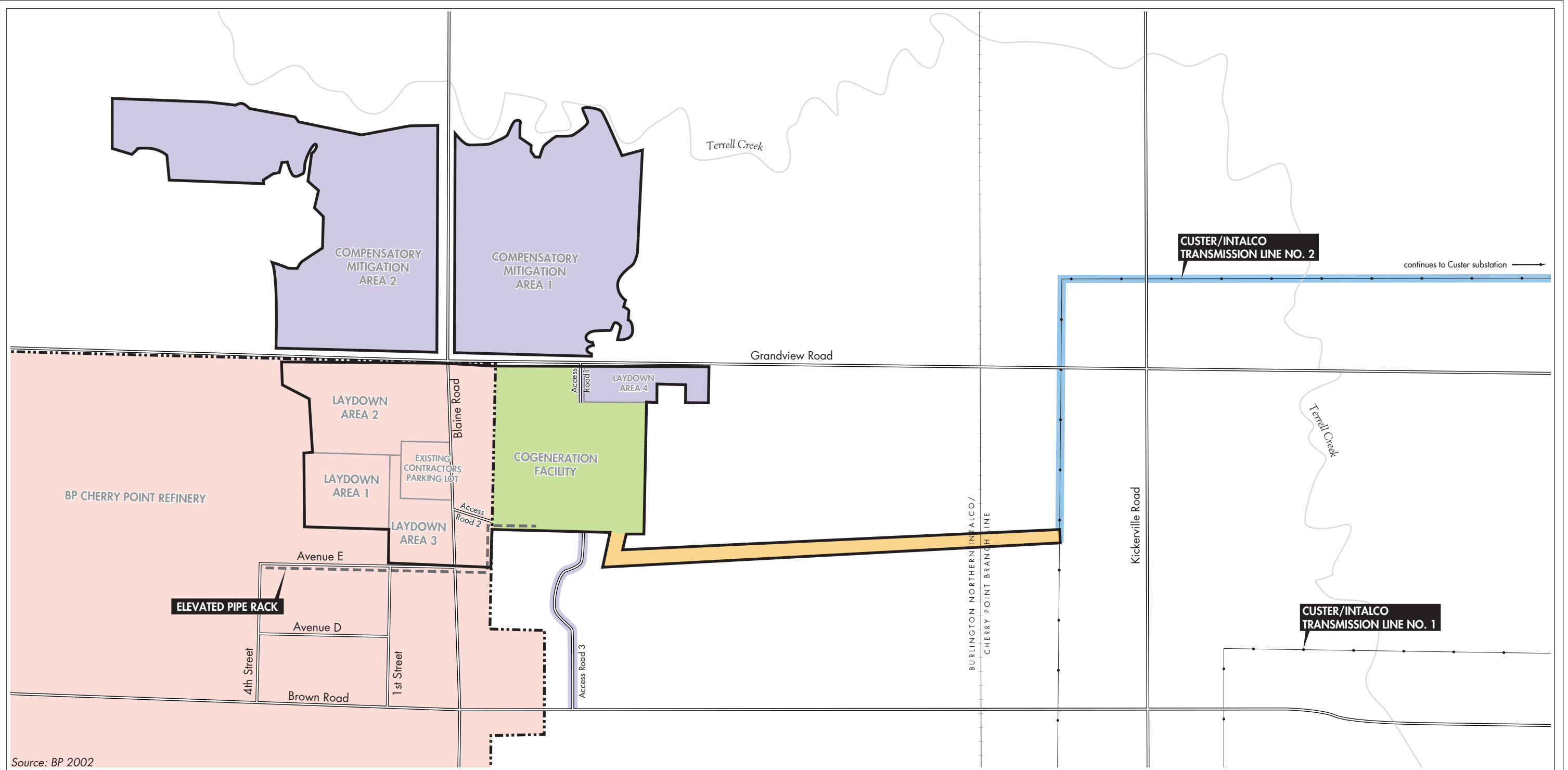
NOT TO SCALE

TYPICAL TRANSMISSION TOWER DESIGNS



Source: BP 2002

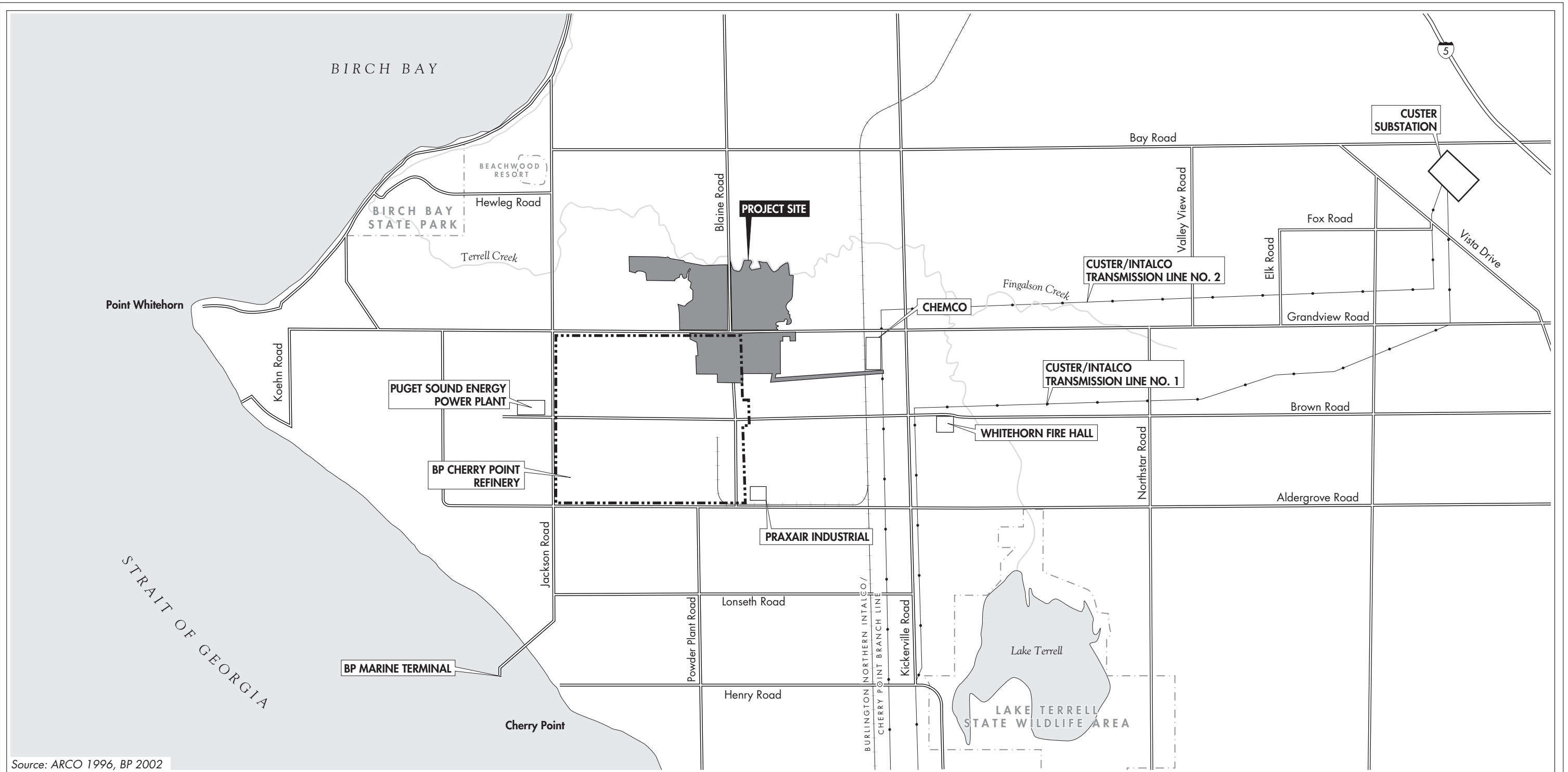
FIGURE 1-3
COGENERATION FACILITY INFRASTRUCTURE
AND REFINERY INTERCONNECTIONS



- cogeneration project boundary
- - - BP Cherry Point Refinery boundary
- cogeneration facility
- refinery interface
- transmission system
- Custer/Intalco transmission line No. 2
- other project components

FIGURE 2-1

PROJECT ELEMENTS



Source: ARCO 1996, BP 2002

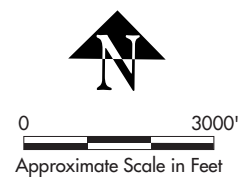
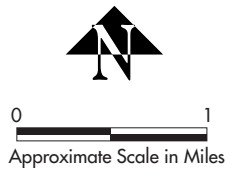
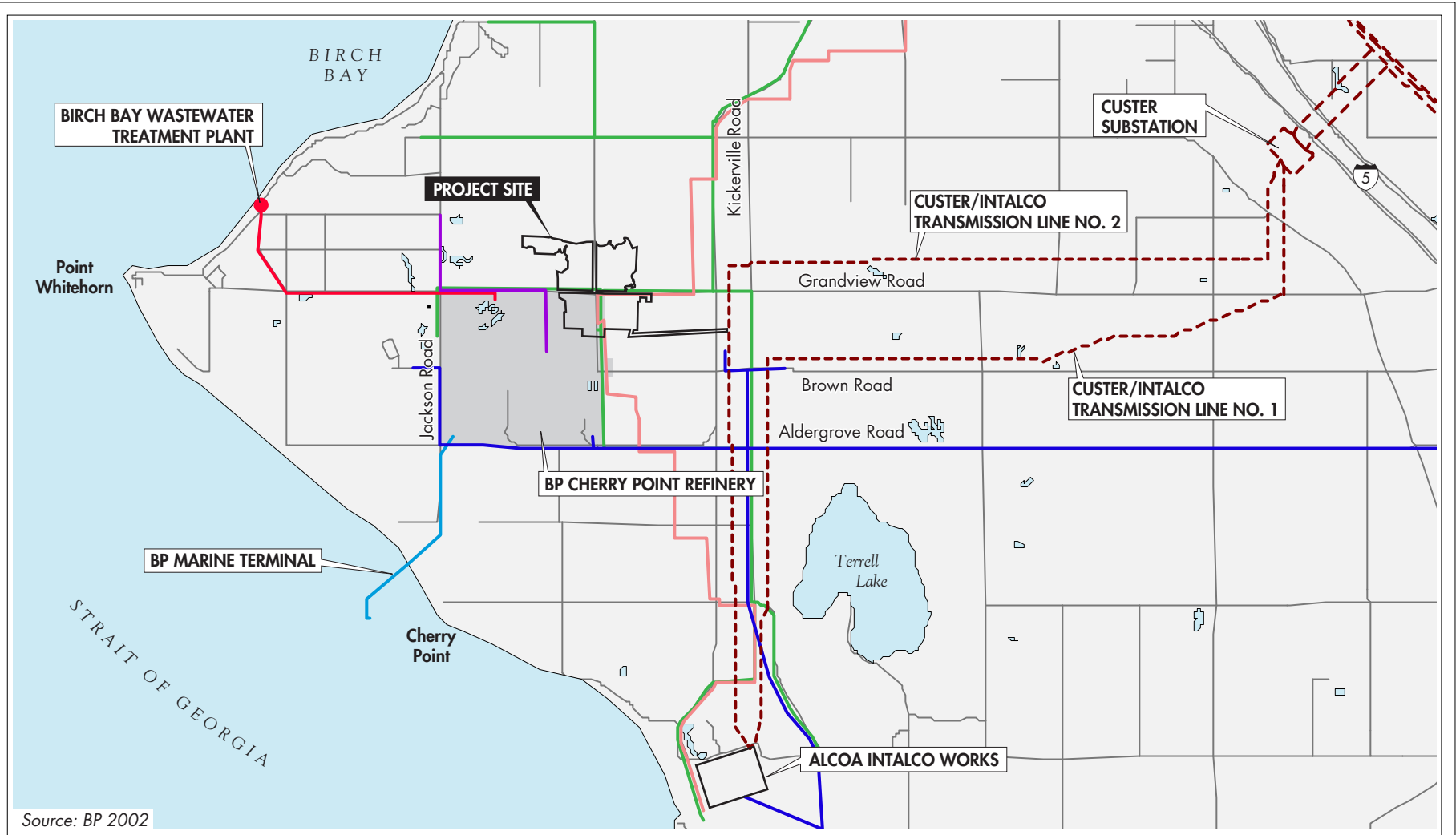


FIGURE 2-2

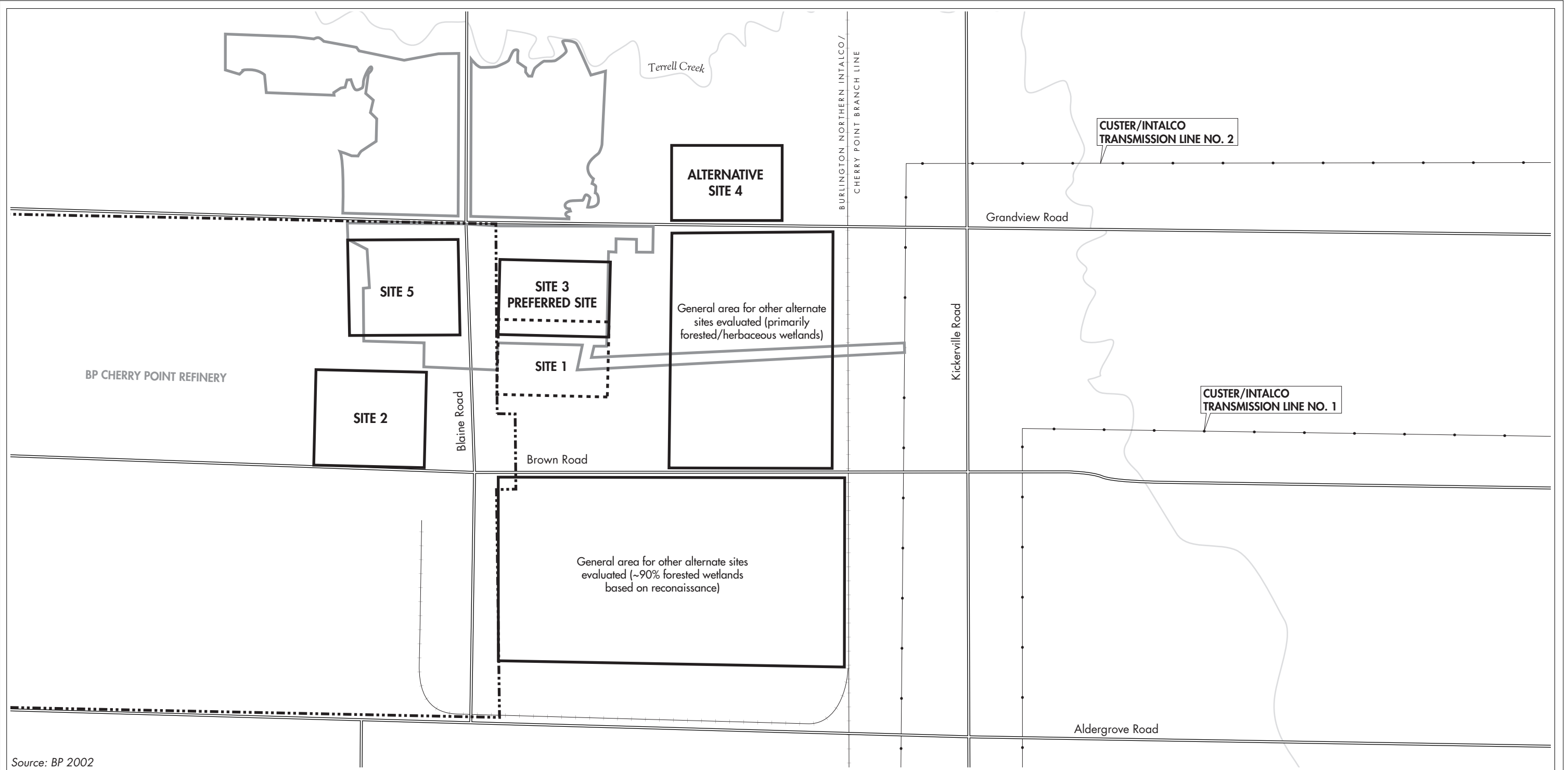
PROJECT SITE AND SURROUNDING AREA



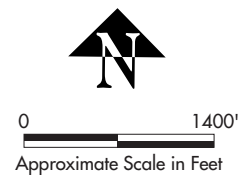
— Ferndale natural gas pipeline	— Birch Bay water pipeline
— Cascade natural gas pipeline	— Whatcom County PUD Point Whitehorn water transmission pipeline
- - - BPA transmission line	— BP treated wastewater discharge pipeline
— Birch Bay sewer pipeline	

FIGURE 2-3

EXISTING UTILITY INFRASTRUCTURE



Source: BP 2002



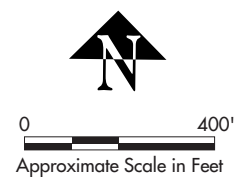
- cogeneration project boundary
- - - - BP Cherry Point Refinery boundary

FIGURE 2-4

ALTERNATIVE COGENERATION SITE LOCATIONS



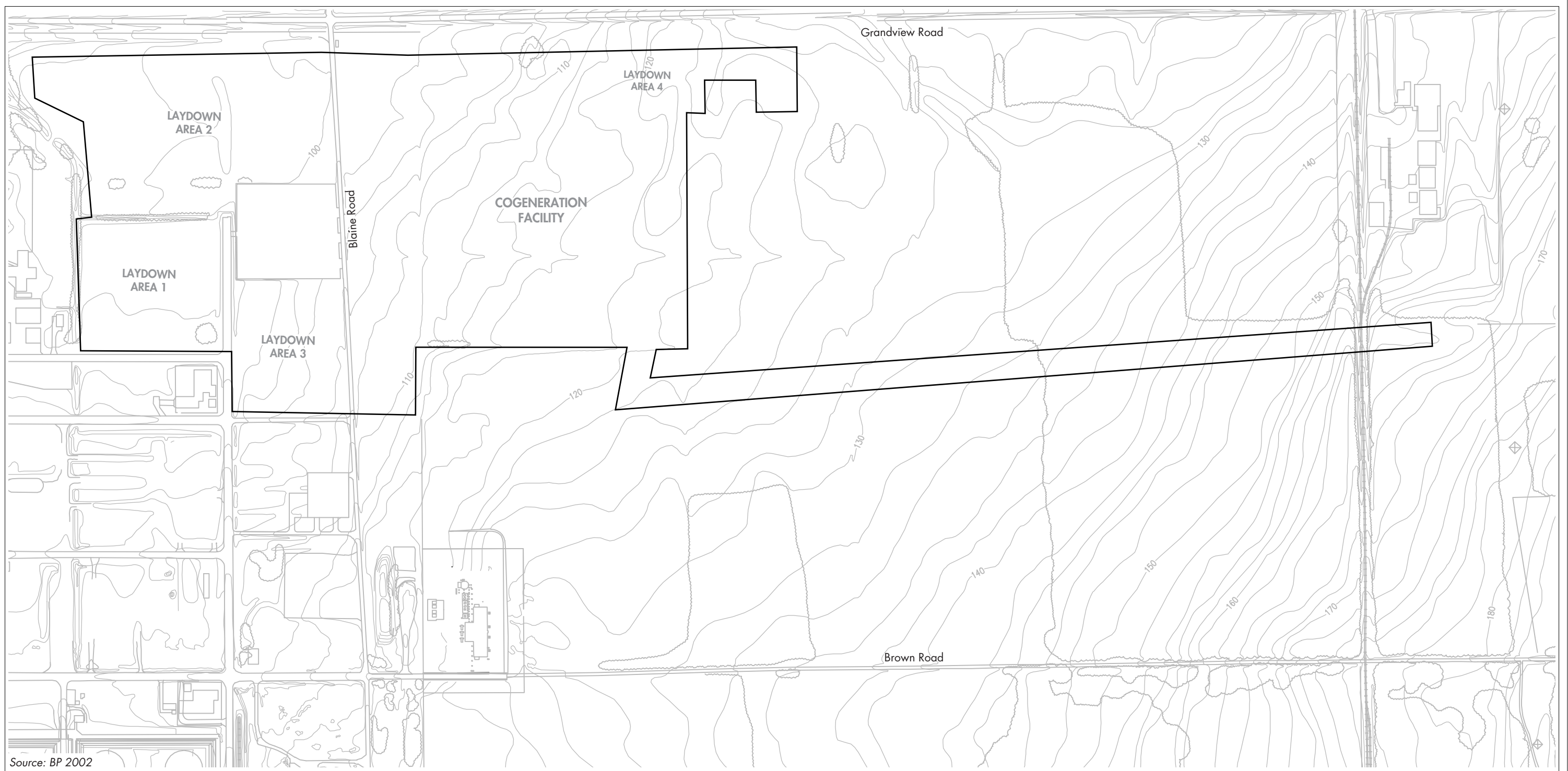
Source: BP 2002



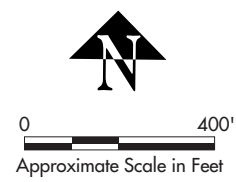
— project site boundary

FIGURE 3.1-1

**PROJECT SITE TOPOGRAPHY
NORTH OF GRANDVIEW ROAD**



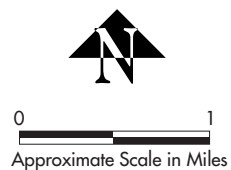
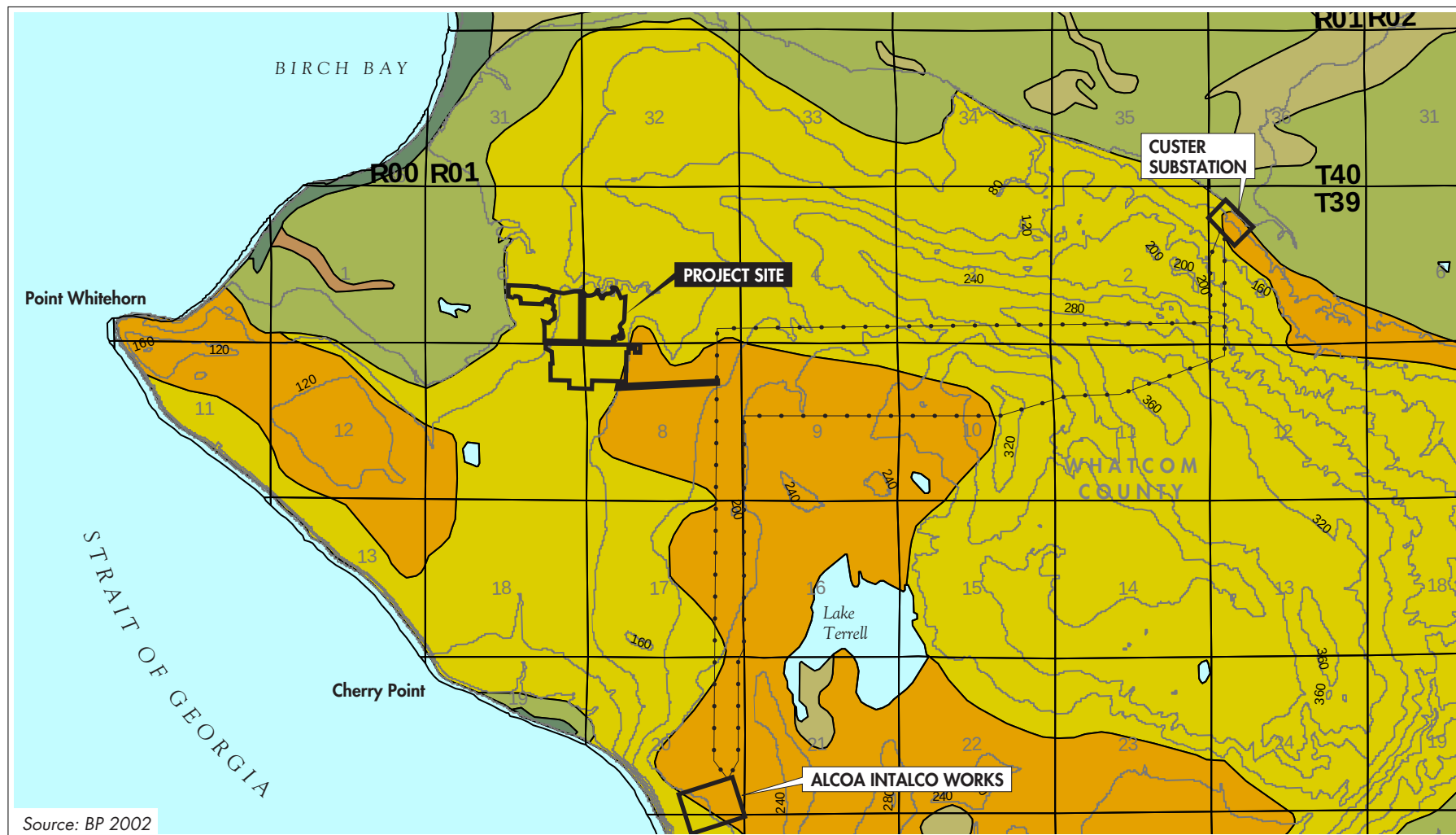
Source: BP 2002



— project site boundary

FIGURE 3.1-2

**PROJECT SITE TOPOGRAPHY
SOUTH OF GRANDVIEW ROAD**



- geologic units
- alluvium
 - beach deposits
 - Bellingham drift
 - sand and gravel overlying Bellingham drift
 - terrace deposits
 - peat

—•—•—•—•— transmission line

FIGURE 3.1-3

GEOLOGIC MAP

BP CHERRY POINT COGENERATION EIS





Source: BP 2002



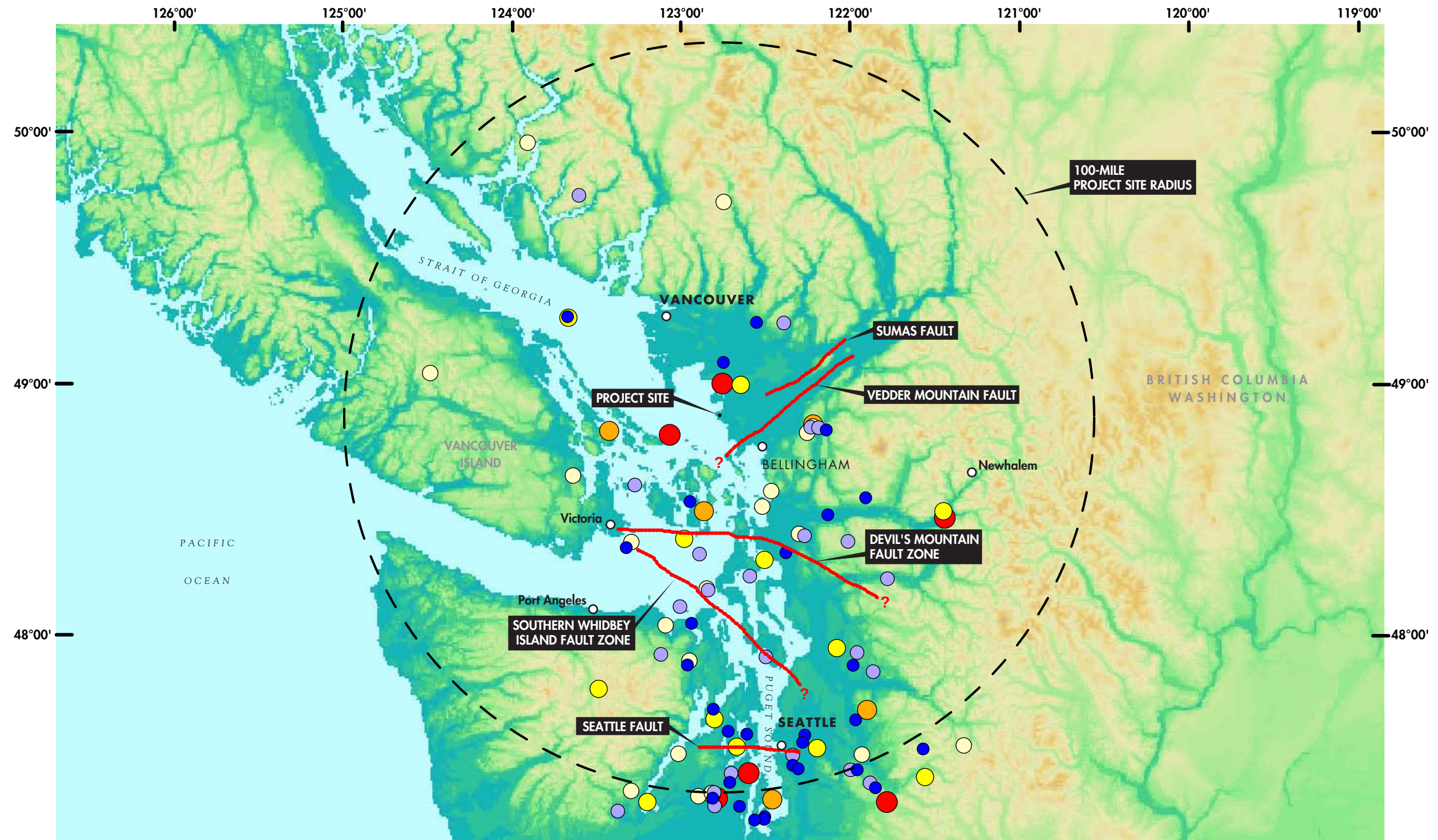
NOT TO SCALE

- 12 Birch Bay
- 80 Kickerville
- 93 Labounty
- 94 Labounty, drained
- 171 urban land
- 184 Whitehorn

FIGURE 3.1-4

SOIL TYPES





Source: BP 2002

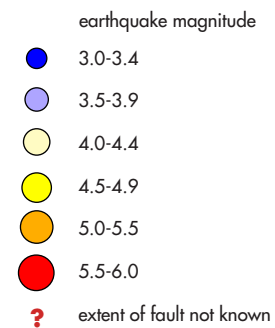
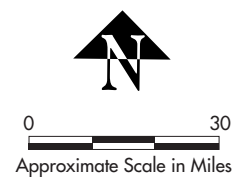
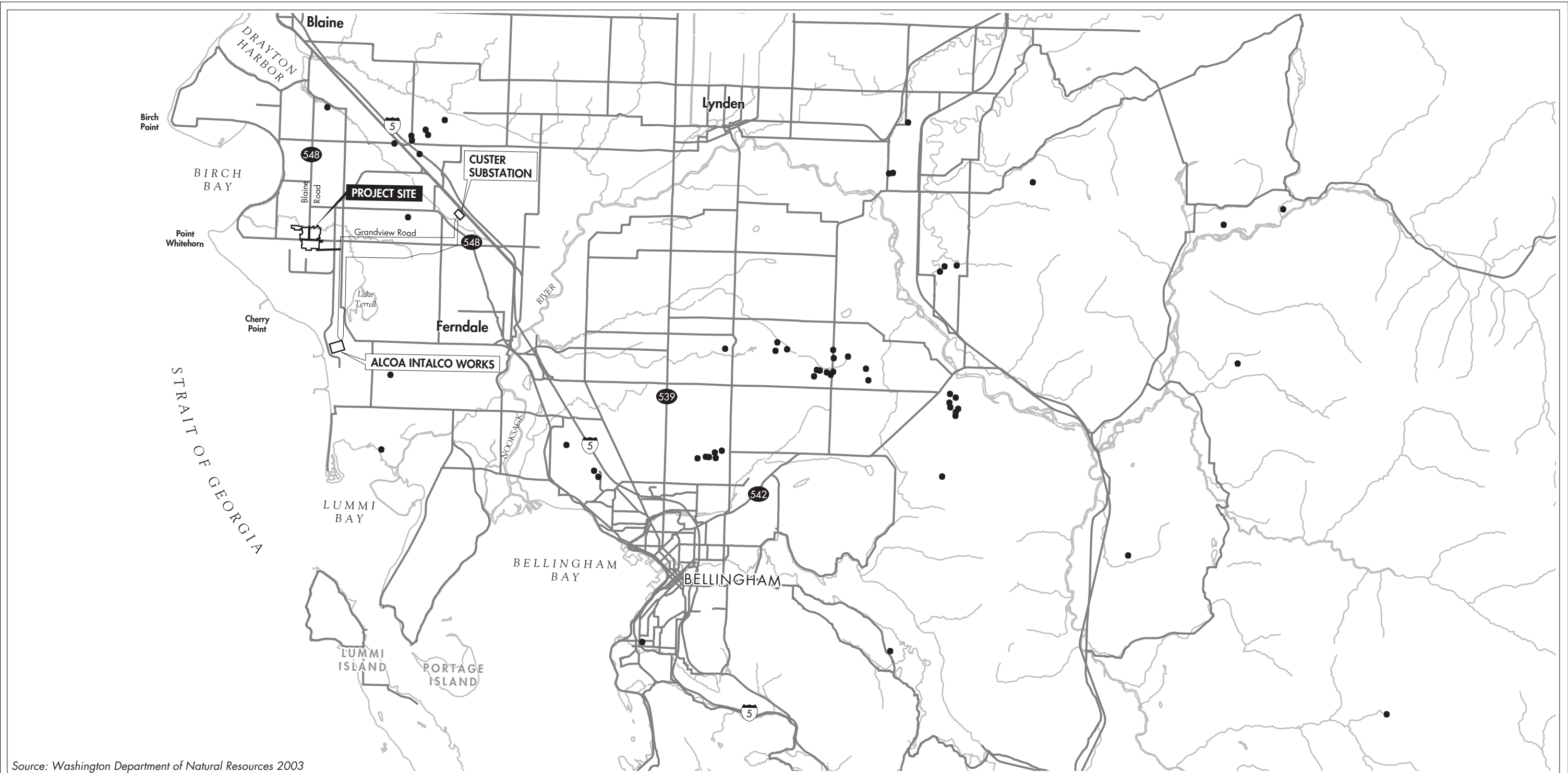
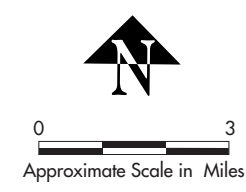


FIGURE 3.1-5

SEISMOTECTONIC MAP OF NORTHWEST WASHINGTON AND SOUTHWEST BRITISH COLUMBIA



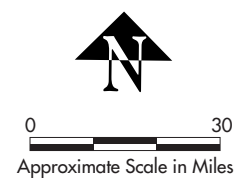
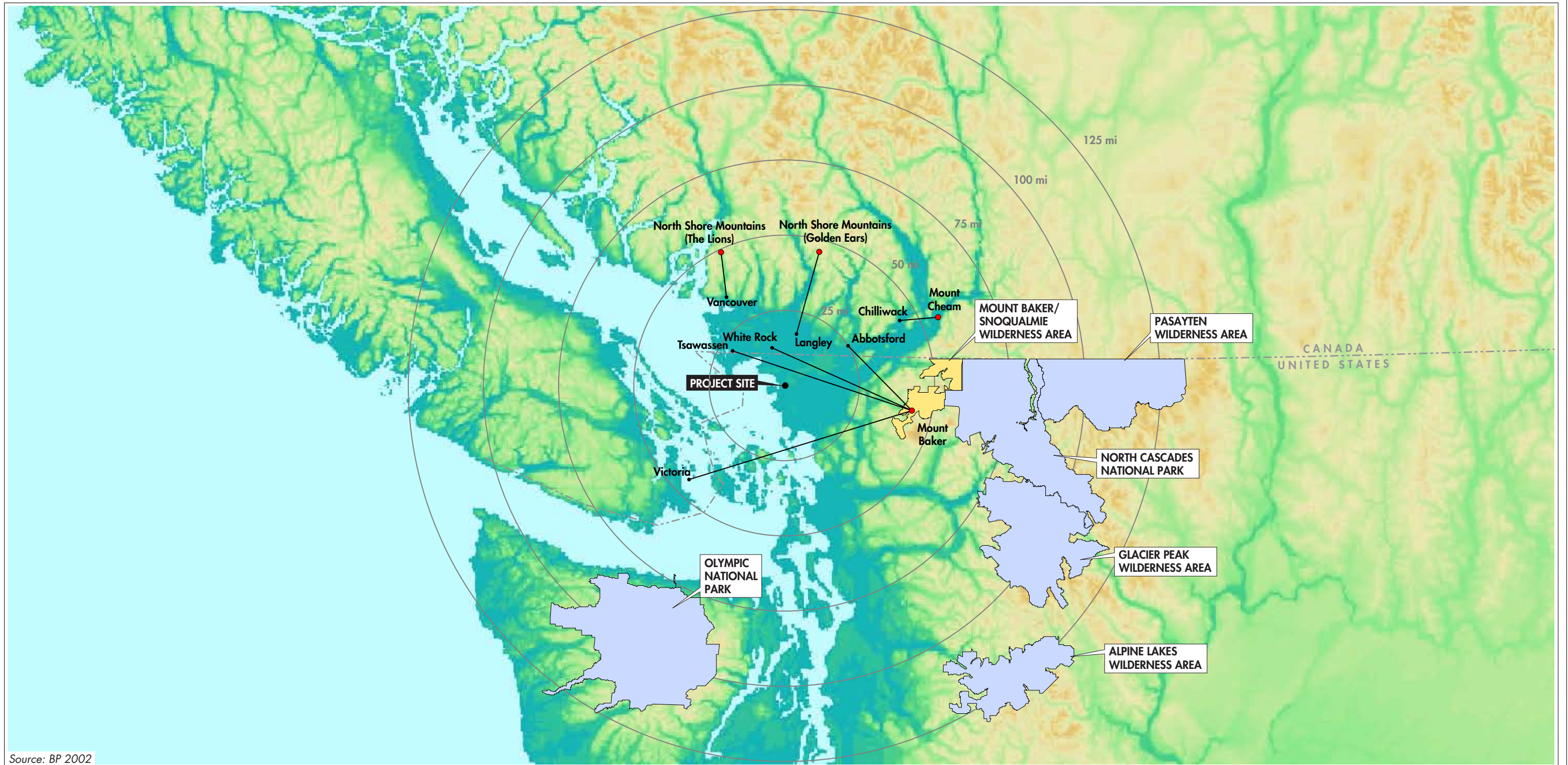
Source: Washington Department of Natural Resources 2003



● mine

FIGURE 3.1-6

**PERMITTED, ACTIVE SURFACE MINES
IN WHATCOM COUNTY**



- line of sight
- sensitive viewshed
- Class 1 airshed

FIGURE 3.2-1

**AIRSHEDS OF INTEREST WITHIN
125 MILES OF PROJECT SITE**

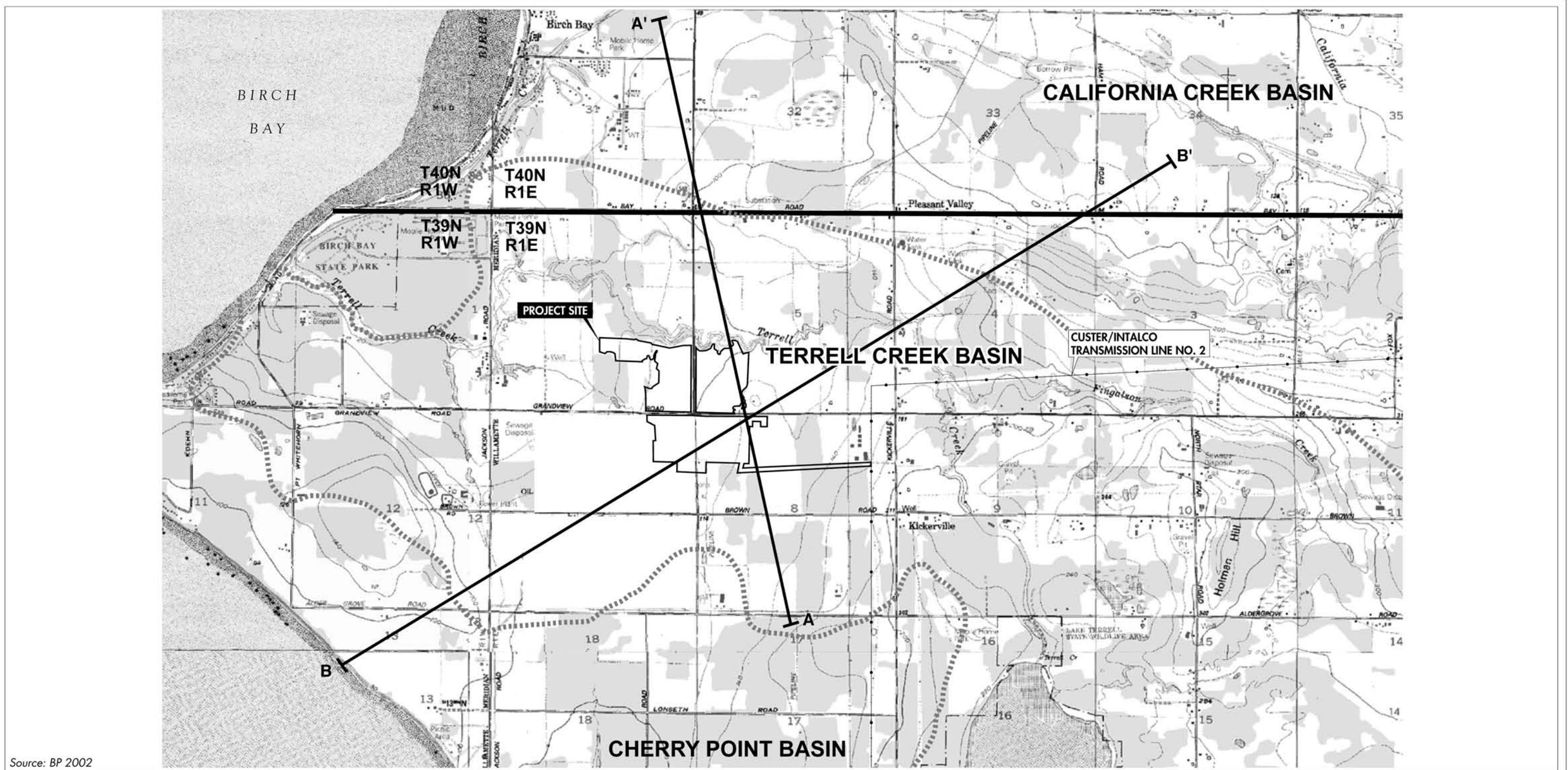
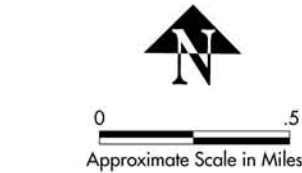
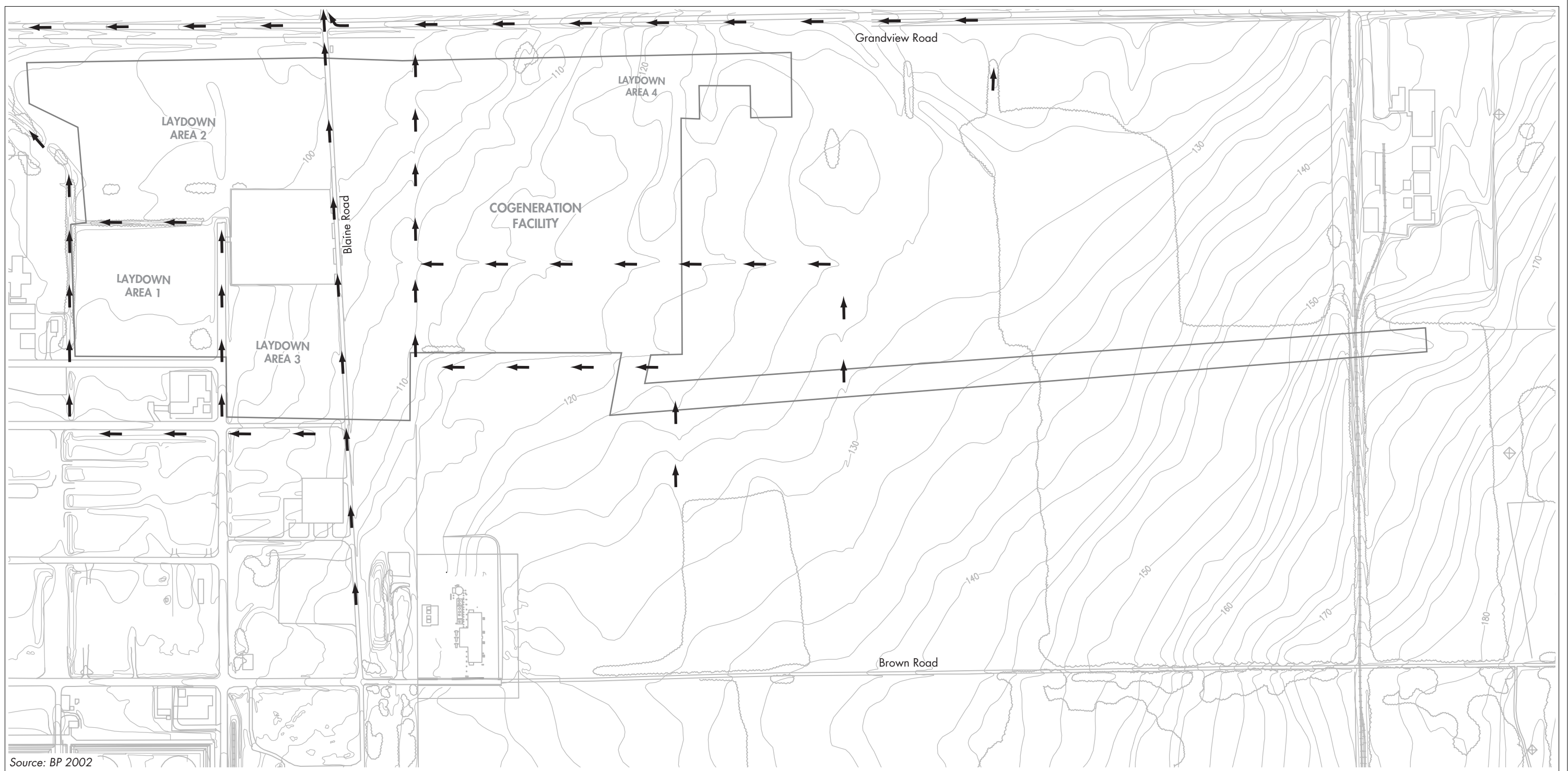


FIGURE 3.3-1

SURFACE WATER DRAINAGE BASIN



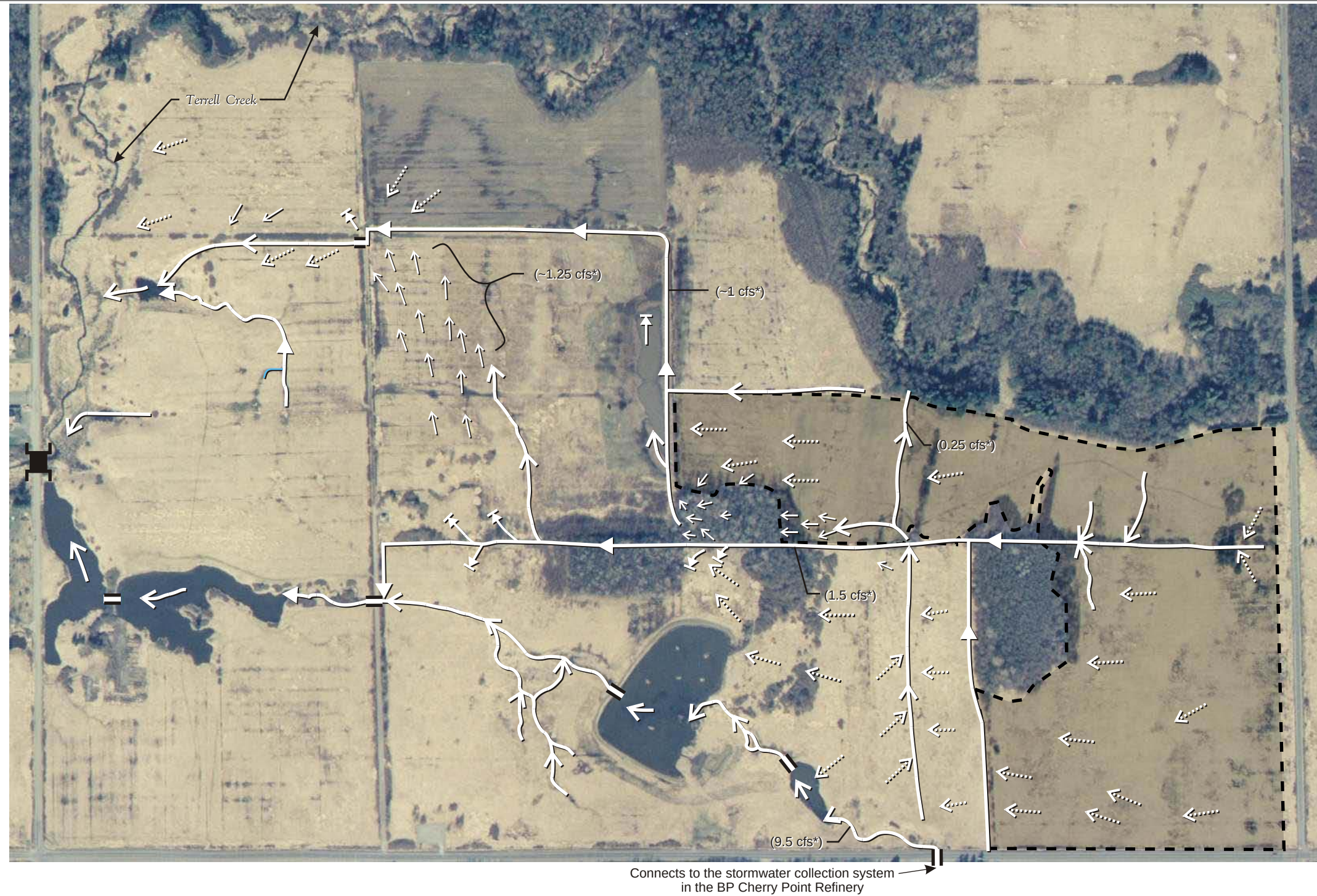


0 400'
Approximate Scale in Feet

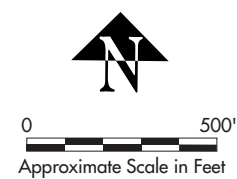
— project site boundary
← local drainage

FIGURE 3.3-2

PROJECT SITE DRAINAGE



Source: URS 2003

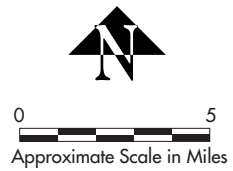
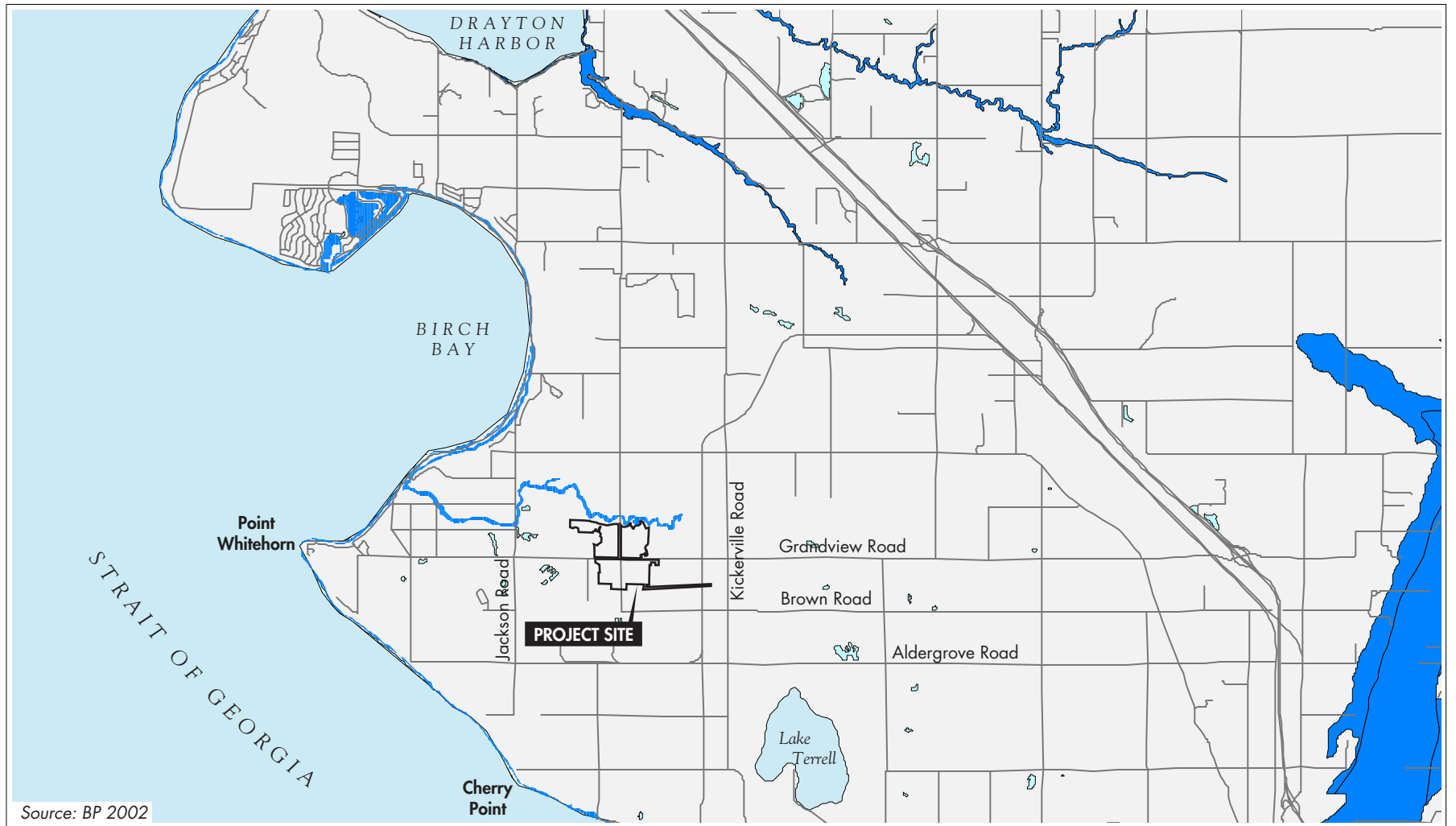


- CMA 2 site boundary
- direction of shallow groundwater flow
- direction of semi-concentrated flow that becomes pooled
- direction of shallow, semi-concentrated flow

- direction of concentrated flow
- direction of sheet flow
- culvert
- bridge

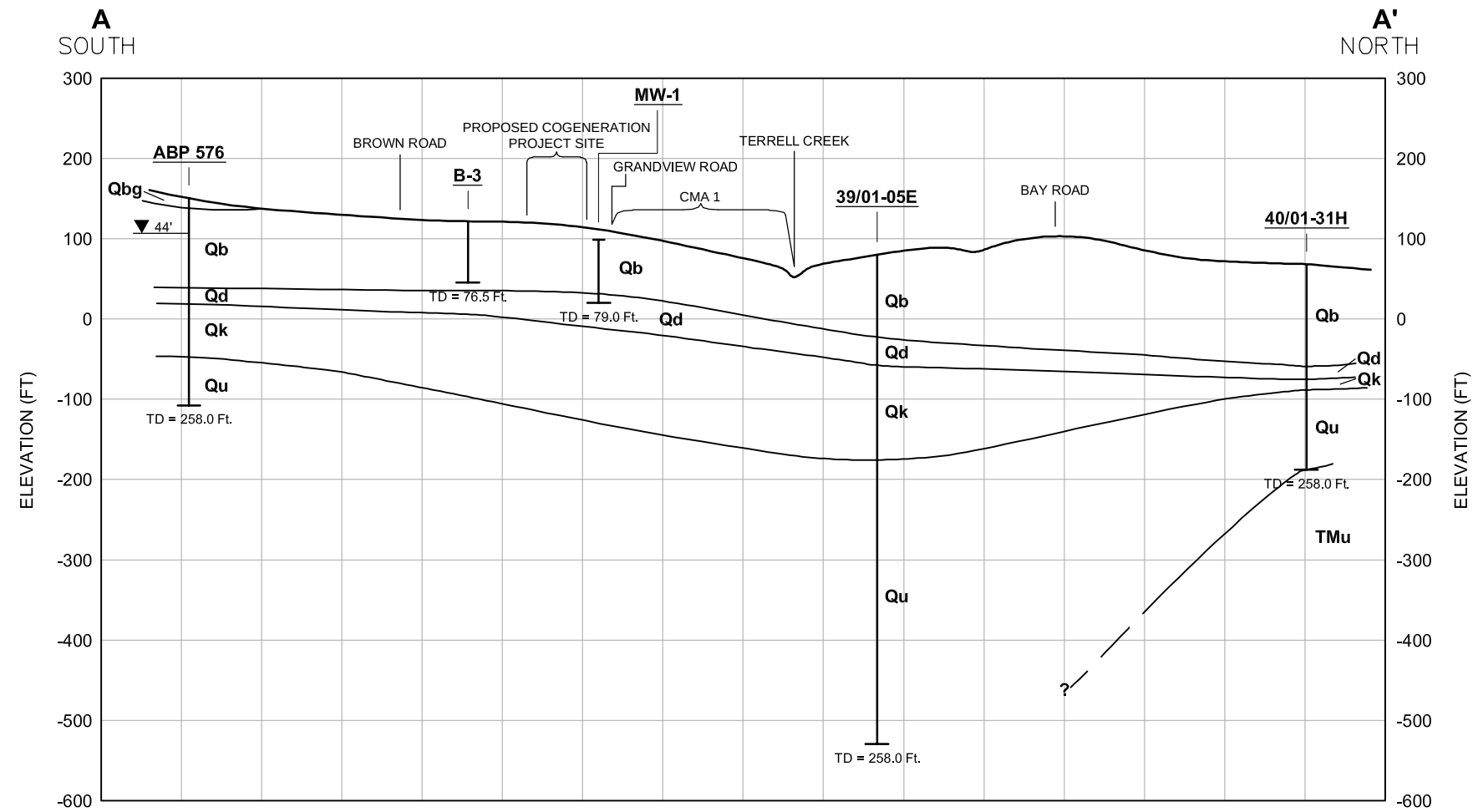
FIGURE 3.3-3

ESTIMATED EXISTING SURFACE AND SUBSURFACE FLOW NEAR CMA 2

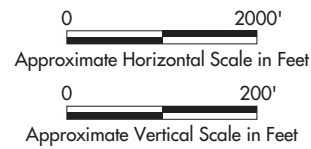


- 100-year floodplain
- Zone C: areas outside 500-year floodplain

FIGURE 3.3-4
FLOODPLAINS

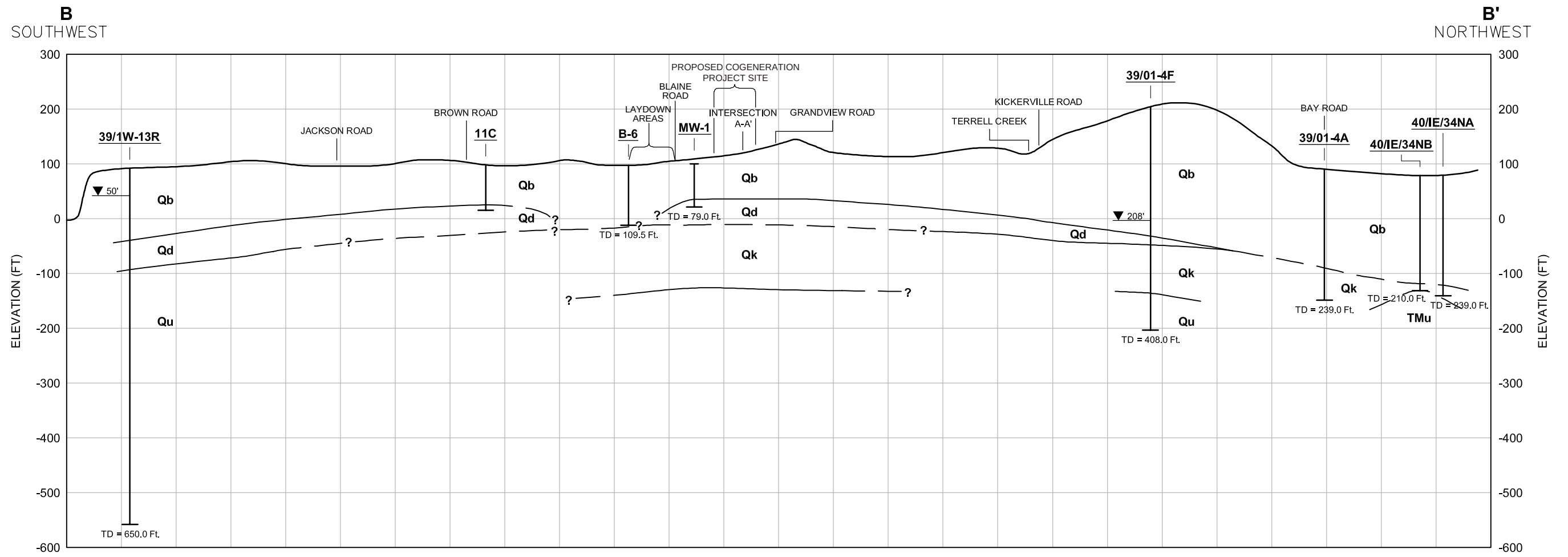


Source: BP 2002

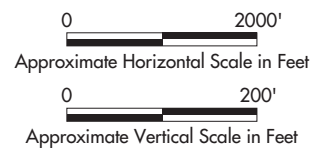


- contact line
- STRATIGRAPHY
- QUATERNARY
- Qbg** sand and gravel overlying Bellingham drift
 - Qb** Bellingham drift
 - Qd** Deming sand
 - Qk** Kulshan drift
 - Qu** undifferentiated sedimentary deposits
- TERTIARY/MESOZOIC
- TMu** undifferentiated sedimentary rock (bedrock)

FIGURE 3.3-5
CROSS SECTION A-A'

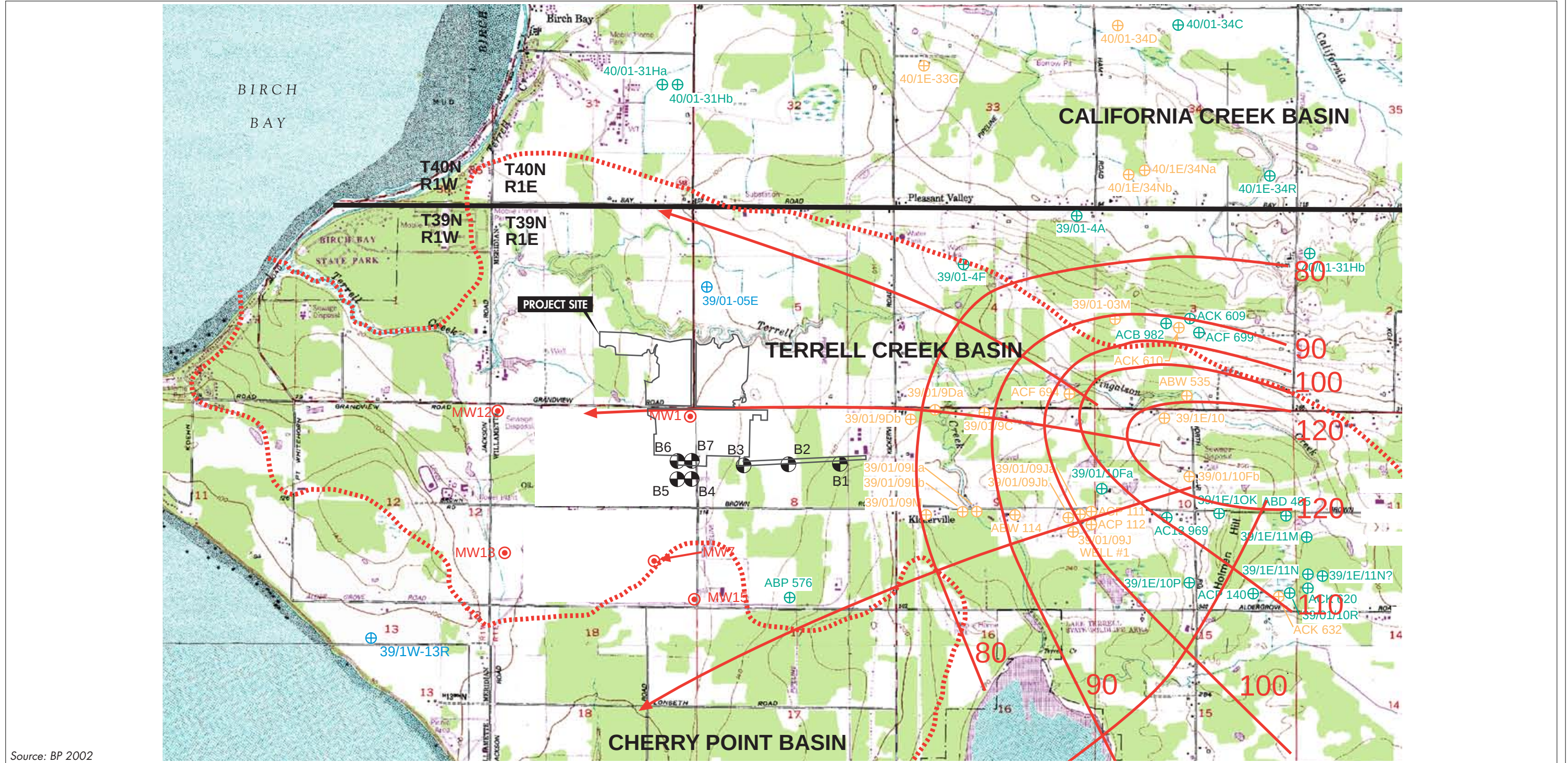


Source: BP 2002

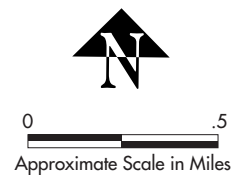


- contact line
▼ groundwater
- STRATIGRAPHY
- QUATERNARY
- Qbg sand and gravel overlying Bellingham drift
 - Qb Bellingham drift
 - Qd Deming sand
 - Qk Kulshan drift
 - Qu undifferentiated sedimentary deposits
- TERTIARY/MESOZOIC
- TMu undifferentiated sedimentary rock (bedrock)

FIGURE 3.3-6
CROSS SECTION B-B'



Source: BP 2002

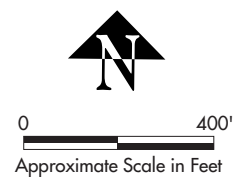
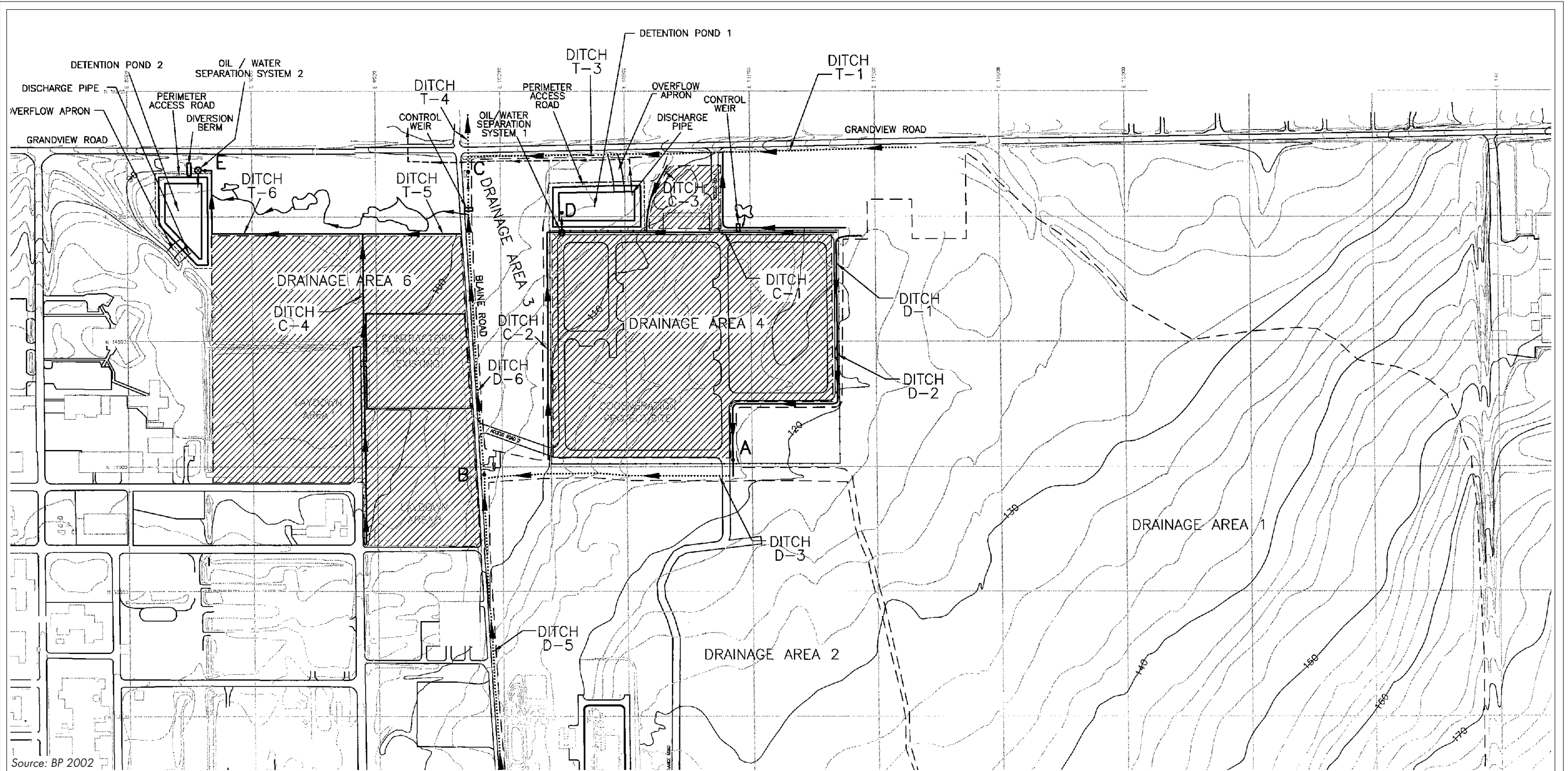


- BP soil boring
- water wells
- BP monitoring well depth = < 100 feet (approximate location)
- well depth = 0-250 feet
- well depth = 251-500 feet
- well depth = 501-750 feet
- well depth = > 750 feet

- range/township boundary and designation
- groundwater flow direction
- water table elevation contour (feet above mean sea level)
- surface water drainage basin boundary

FIGURE 3.3-7

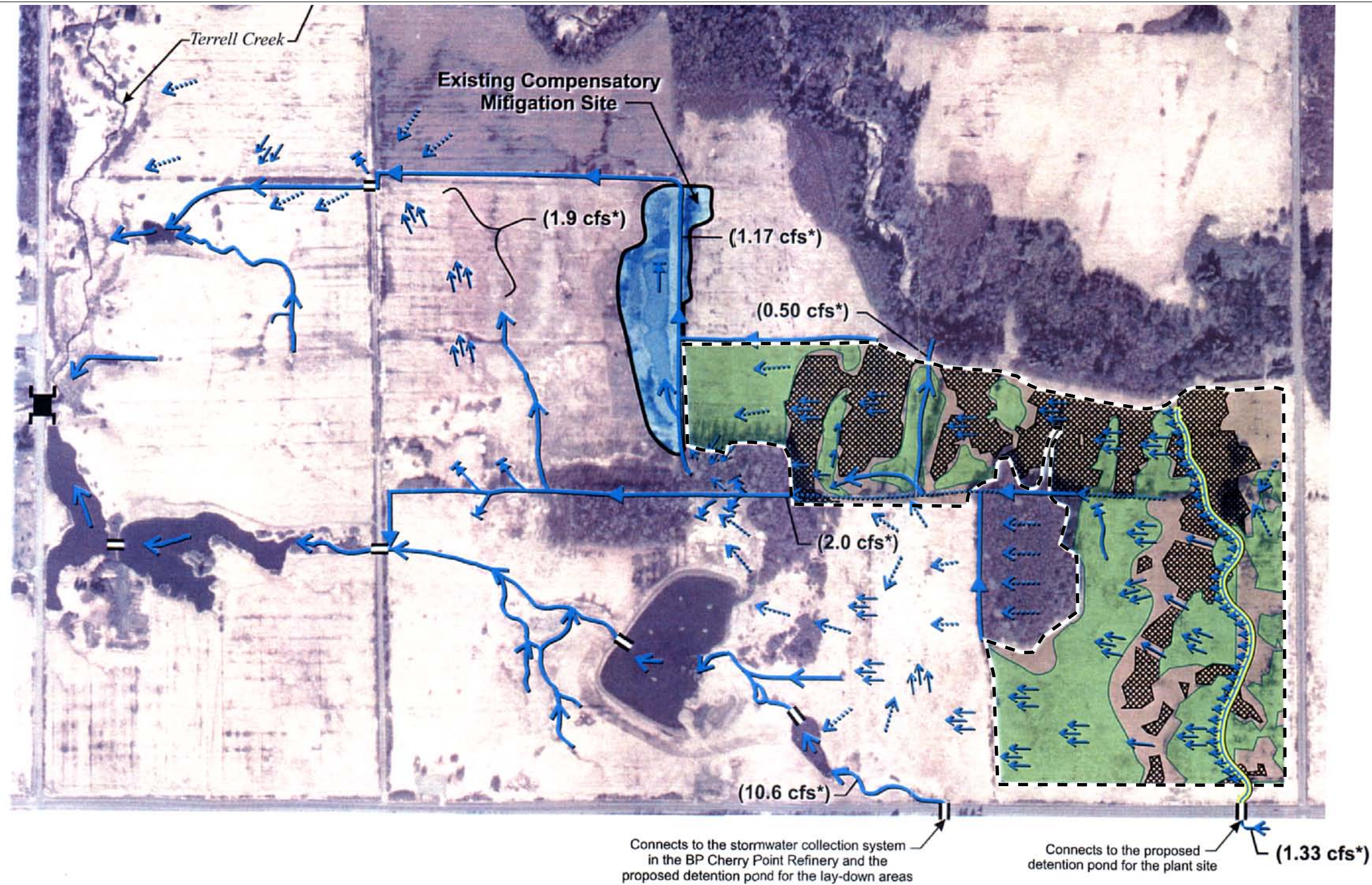
GENERALIZED WATER TABLE SURFACE ELEVATION AND GROUNDWATER FLOW



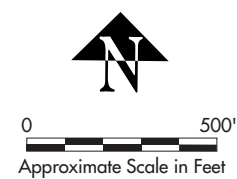
- existing ditch
- new ditch
- diverted runoff
- ▨ collected runoff
- A flow measurement point

FIGURE 3.3-8

**DESIGN BASIS FOR OPERATIONAL
STORMWATER CONTROL SYSTEM**



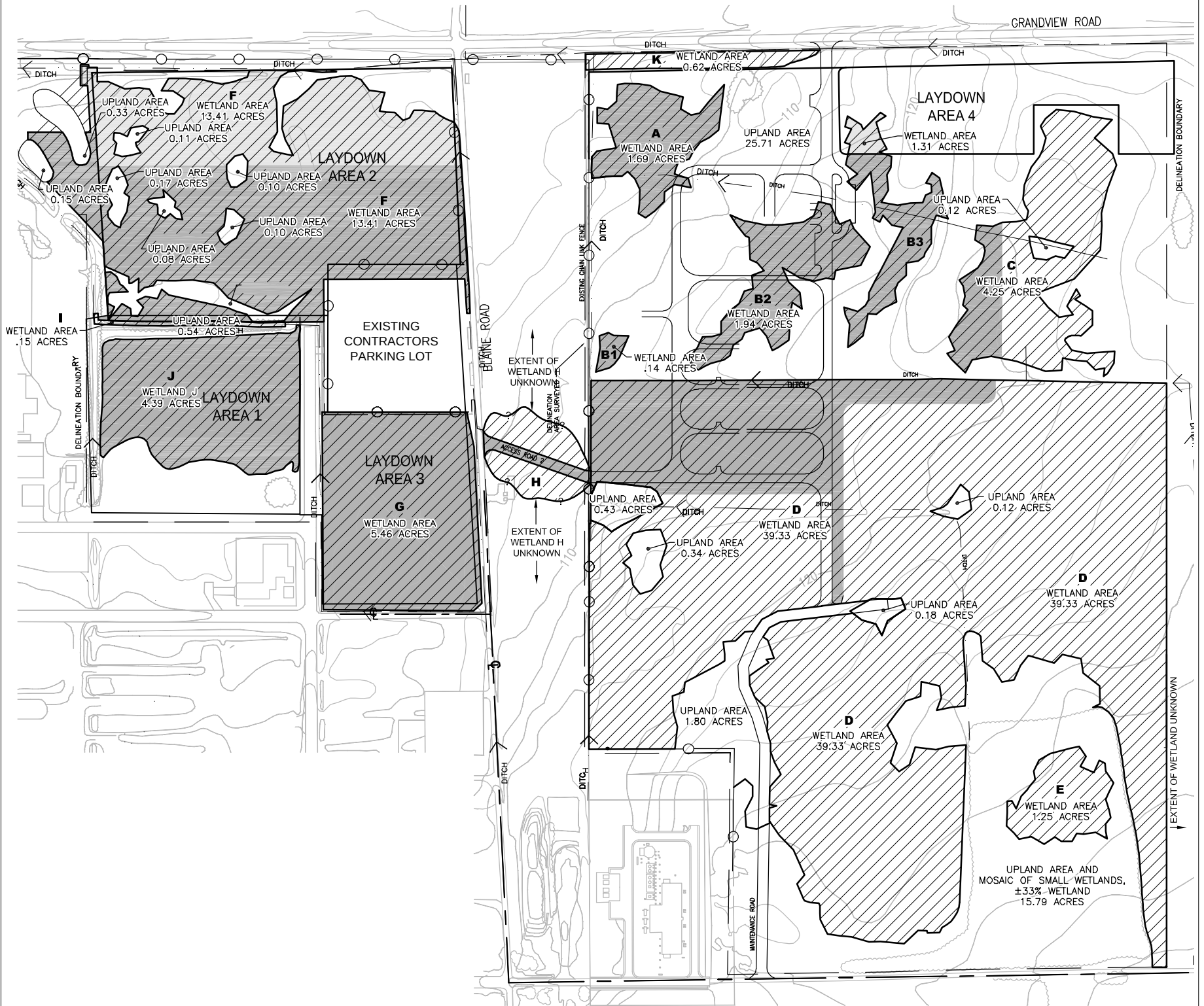
Source: URS 2002



	CMA 2 site boundary		direction of concentrated flow		upland
	direction of shallow groundwater flow		direction of sheet flow		seasonally saturated wetland area
	direction of semi-concentrated flow that becomes pooled		culvert		seasonally inundated wetland area
	direction of shallow, semi-concentrated flow		bridge		
	dispenser outlet				

FIGURE 3.3-9

POST-MITIGATION SURFACE AND SUBSURFACE FLOW NEAR CMA 2



Source: BP 2002

FIGURE 3.5-1

DELINEATED AND AFFECTED WETLANDS

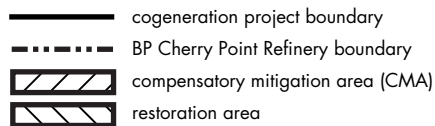
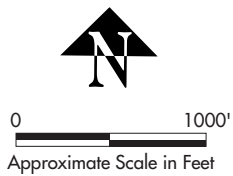
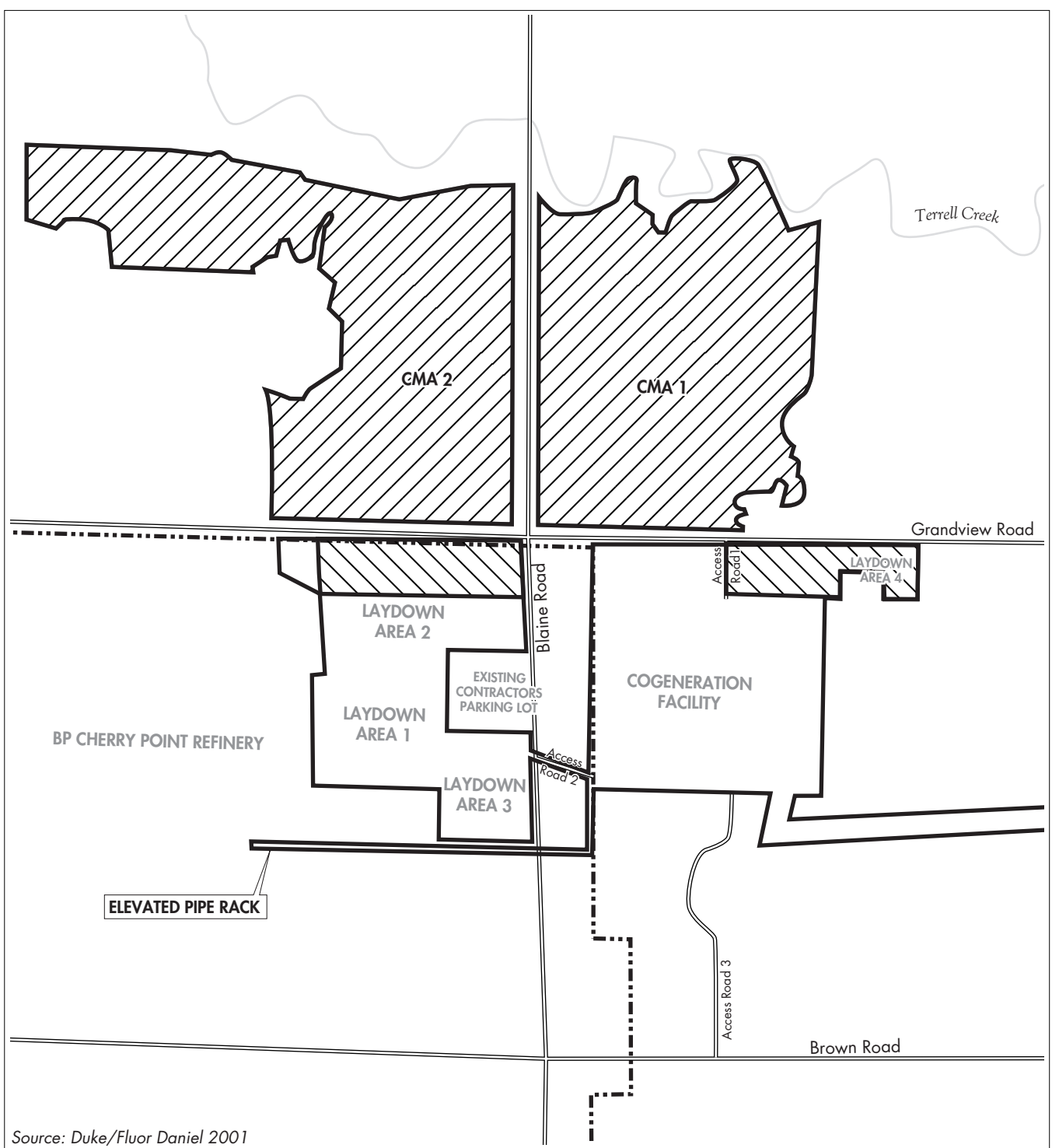


FIGURE 3.5-3

**PROPOSED WETLAND
MITIGATION AREAS**



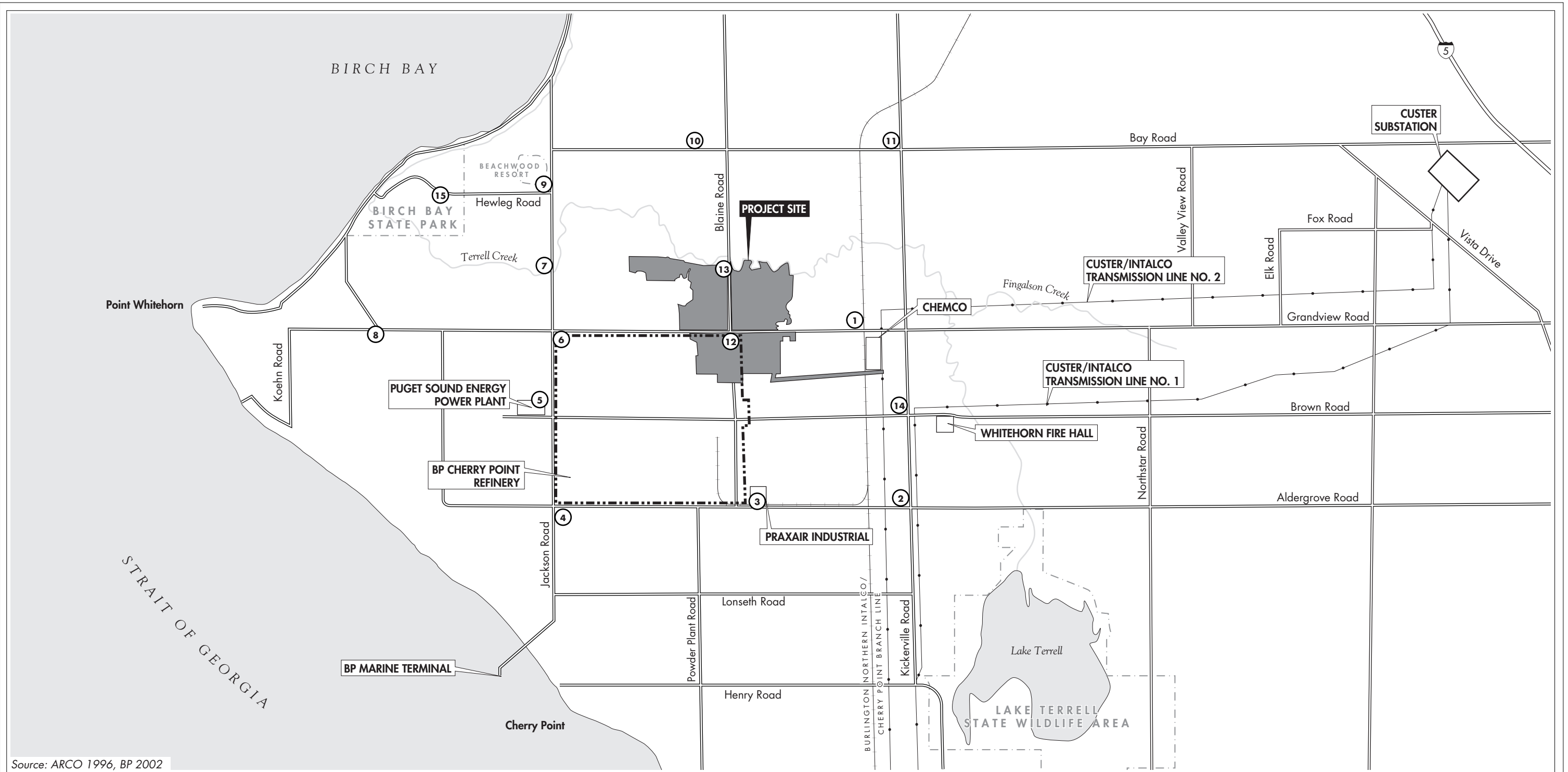


NOT TO SCALE

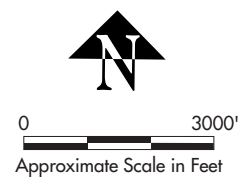
FIGURE 3.7-1

COGENERATION SITE AND SURROUNDING AREA





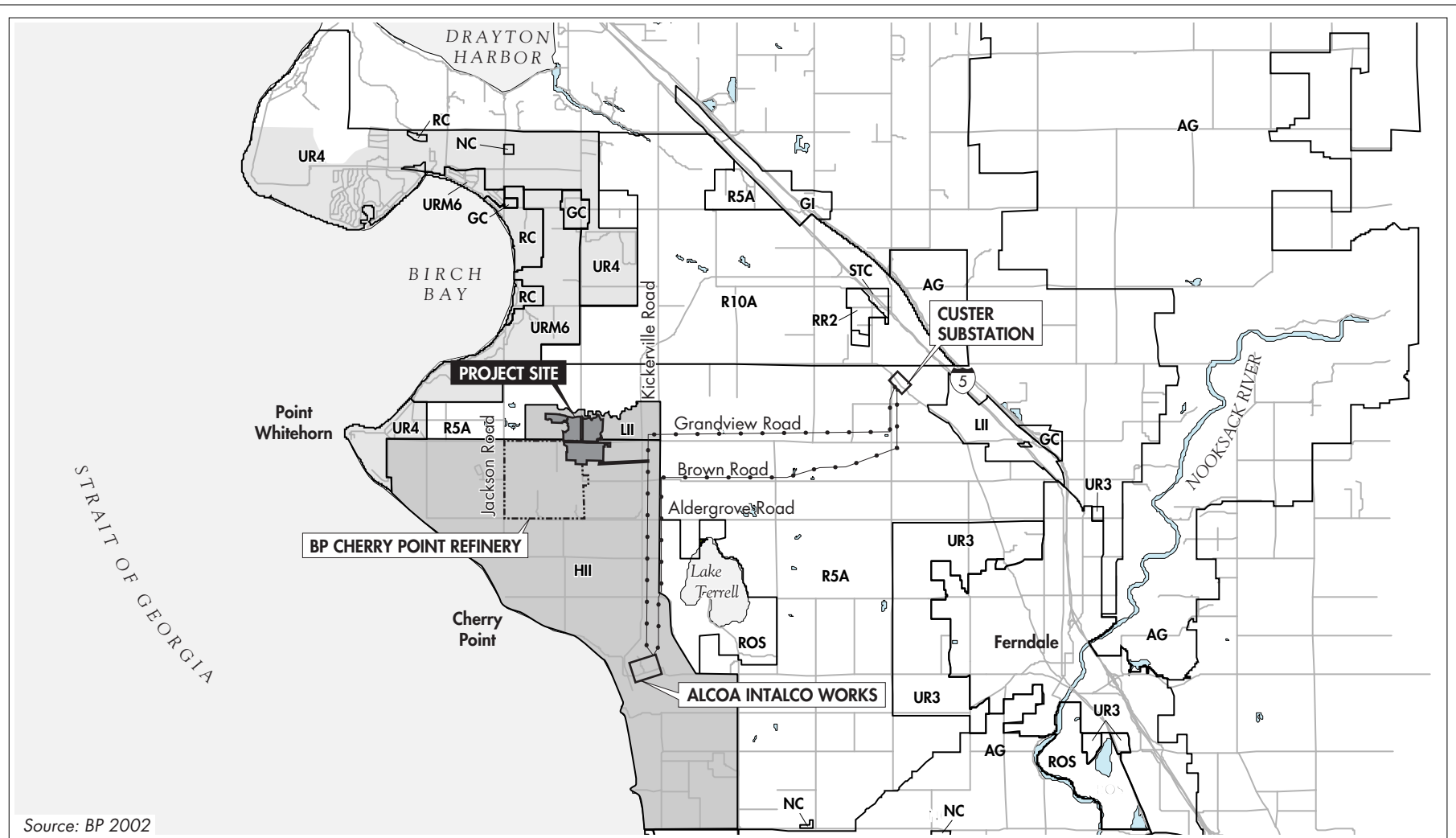
Source: ARCO 1996, BP 2002



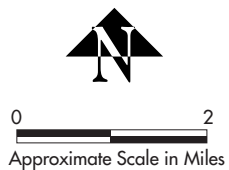
① noise monitoring location

FIGURE 3.9-1

NOISE MONITORING LOCATIONS



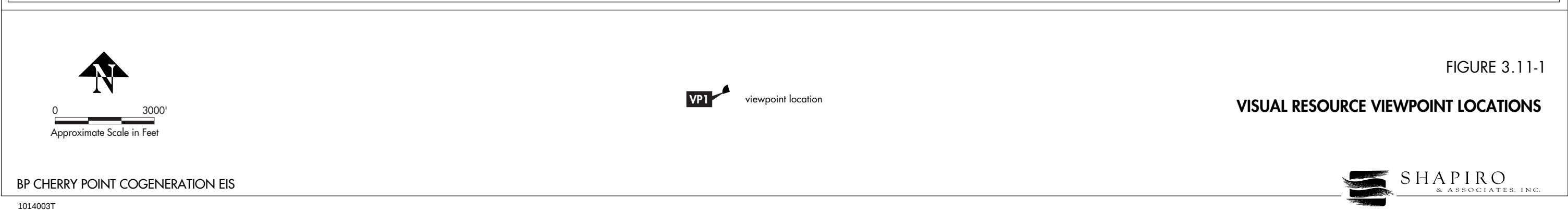
Source: BP 2002



	Birch Bay UGA	R5A	rural 1 unit/5 acres
	Cherry Point Major Industrial UGA	RC	resort commercial
AG	agriculture	ROS	recreation open space
GC	general commercial	RR1	rural residential 1 unit/acre
GI	gateway industrial	RR2	rural residential 2 units/acre
HII	heavy impact industrial	RR3	rural residential 3 units/acre
LII	light impact industrial	STC	small town commercial
NC	neighborhood commercial	UR3	urban residential 3 units/acre
R10A	rural 1 - 10 units/10 acre	UR4	urban residential 4 units/acre
		URM6	urban residential medium density 6 units/acre

FIGURE 3.10-1
ZONING

BP CHERRY POINT COGENERATION EIS





Existing view of the project site from viewpoint 2.



Simulated view of the project site from viewpoint 2.

Source: BP 2002

FIGURE 3.11-2

EXISTING AND SIMULATED VIEWS
VIEWPOINT 2



Existing view of the project site from viewpoint 3.



Simulated view of the project site from viewpoint 3.

Source: BP 2002

FIGURE 3.11-3

EXISTING AND SIMULATED VIEWS
VIEWPOINT 3



Existing view of the proposed cogeneration facility site from viewpoint 4.



Simulated view of the proposed cogeneration facility site from viewpoint 4 (no vegetative buffer).

Source: BP 2002

FIGURE 3.11-4

EXISTING AND SIMULATED VIEWS
VIEWPOINT 4



Existing view of the project site from viewpoint 15.

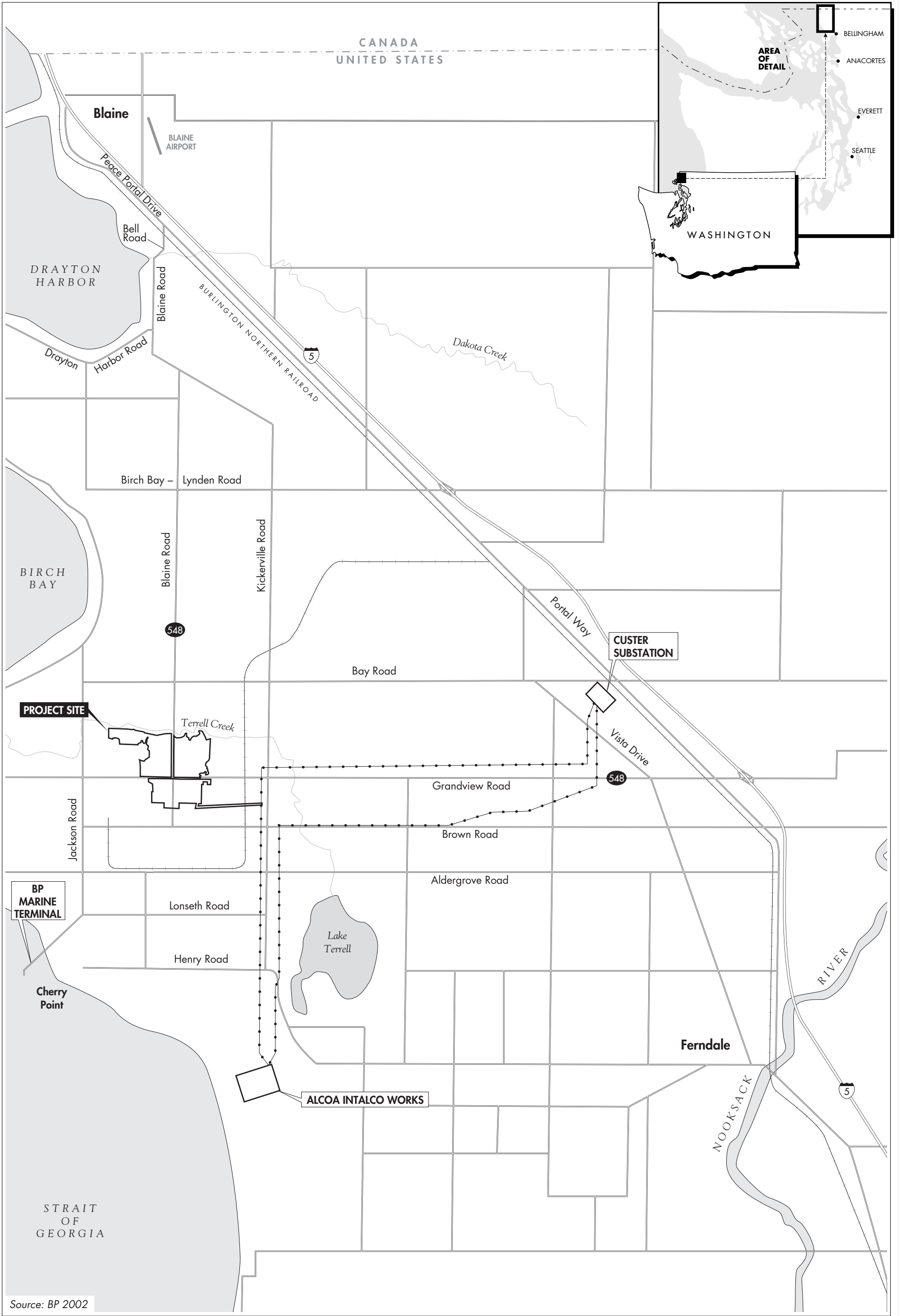


Simulated view of the project site from viewpoint 15.

Source: BP 2002

FIGURE 3.11-5

EXISTING AND SIMULATED VIEWS
VIEWPOINT 15



Source: BP 2002



0 1
Approximate Scale in Miles

— • — • — • — transmission line

FIGURE 3.15-1

TRANSPORTATION NETWORK
IN THE PROJECT VICINITY



SHAPIRO
& ASSOCIATES, INC.

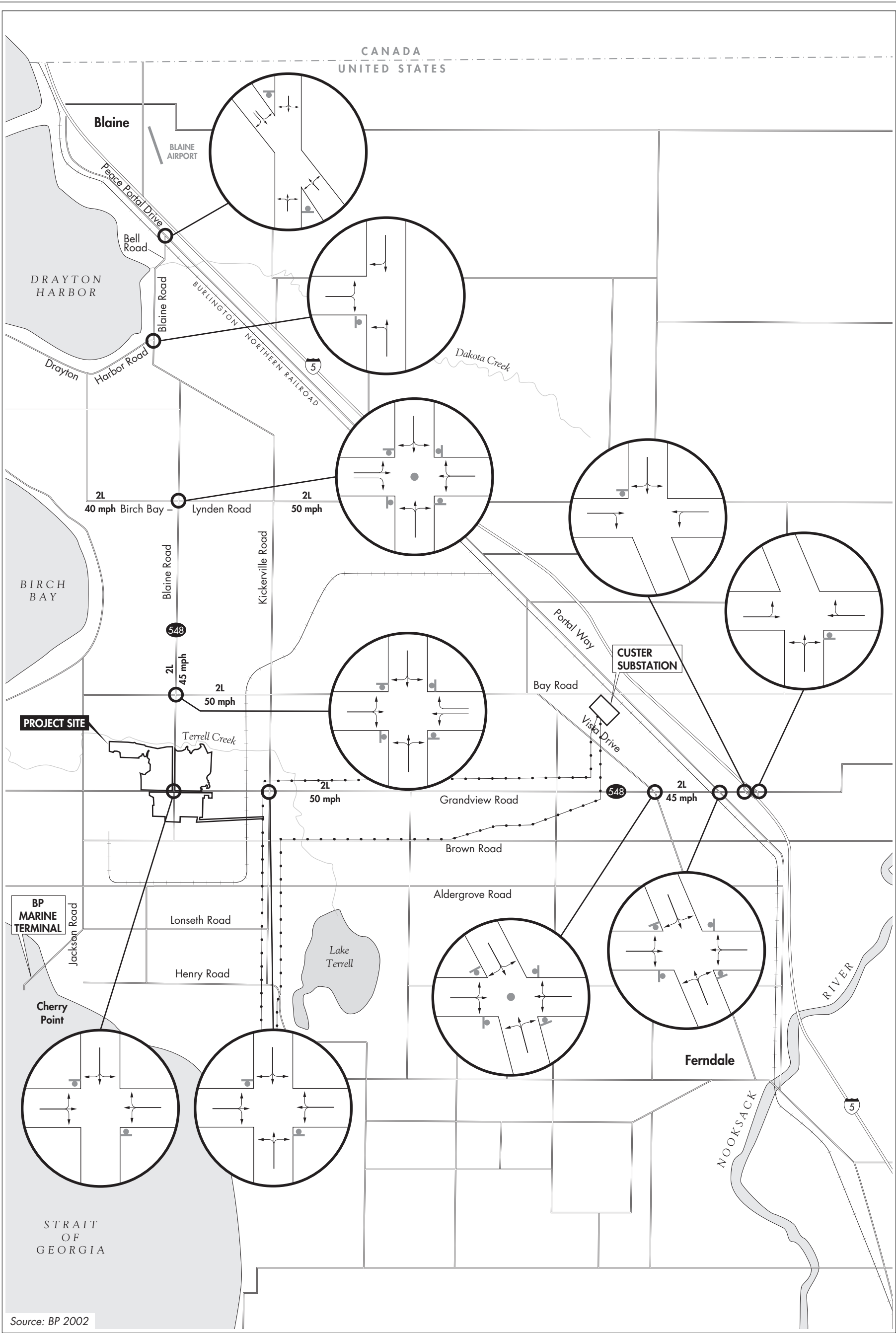


FIGURE 3.15-2

EXISTING ROADWAY CHARACTERISTICS

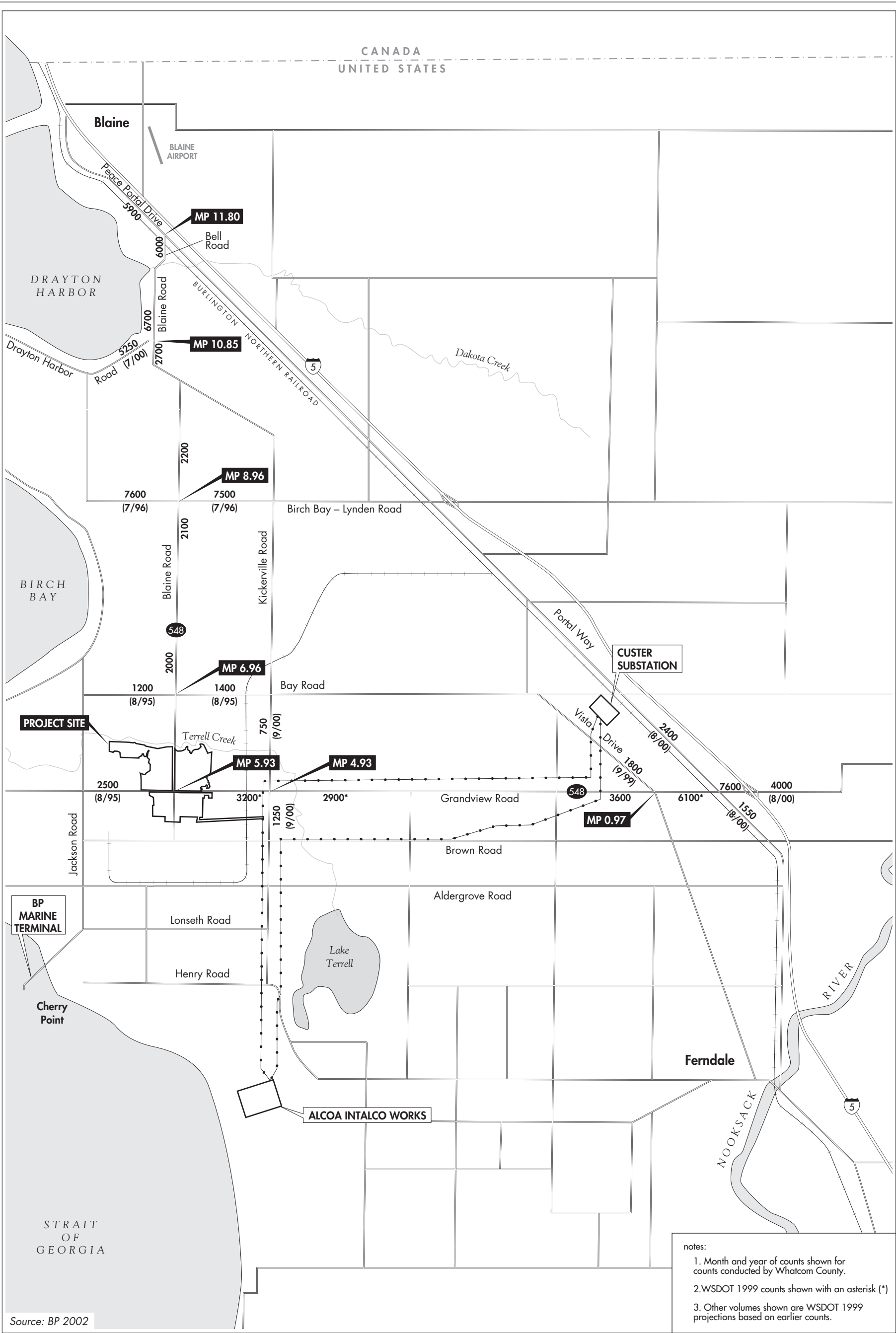
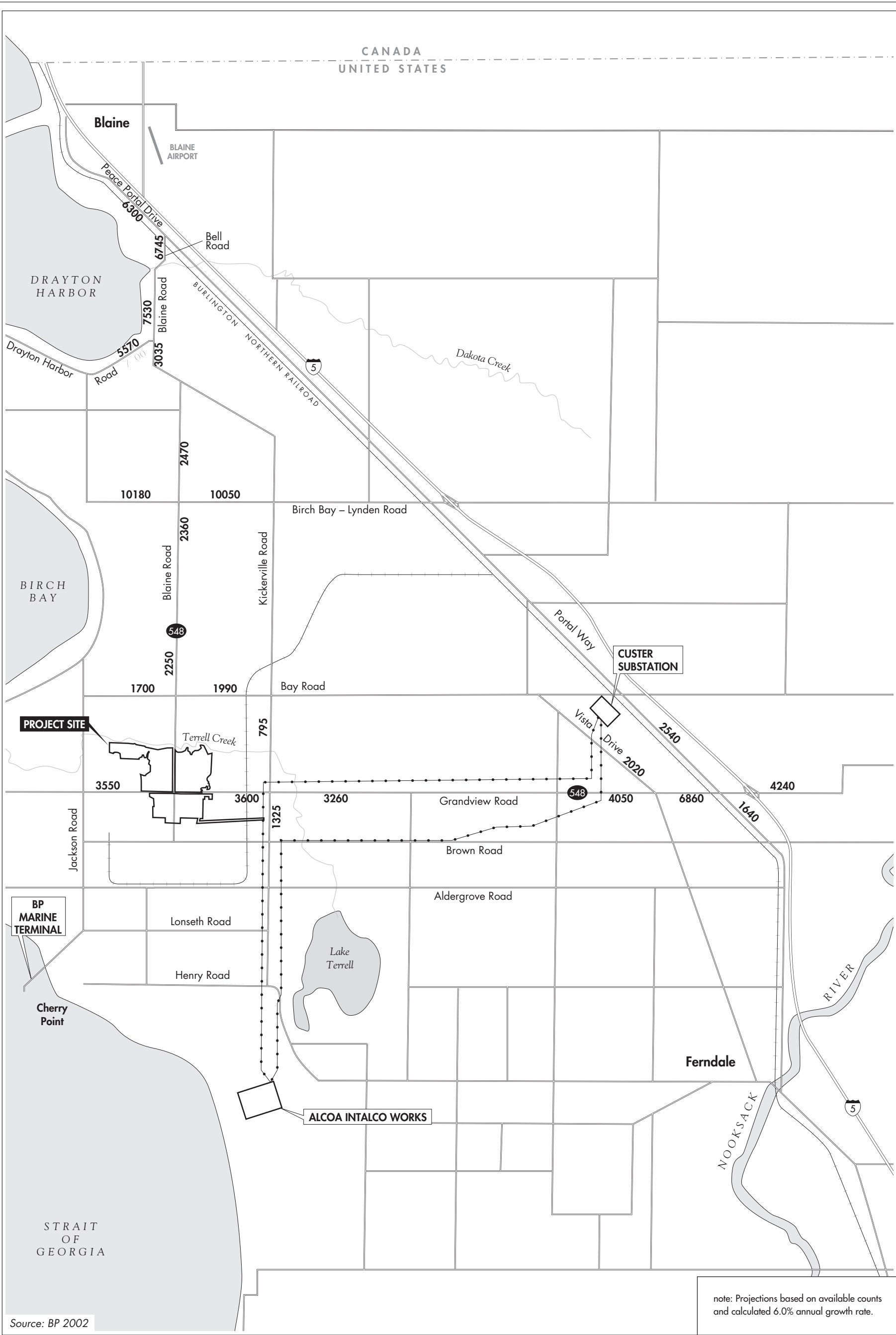


FIGURE 3.15-3

HISTORICAL DAILY TRAFFIC COUNTS



0 1
Approximate Scale in Miles

1200 average daily traffic volume

—•—•— transmission line

FIGURE 3.15-4

2001 AVERAGE DAILY TRAFFIC VOLUMES

2001 WEEKDAY PM PEAK-HOUR TRAFFIC VOLUMES

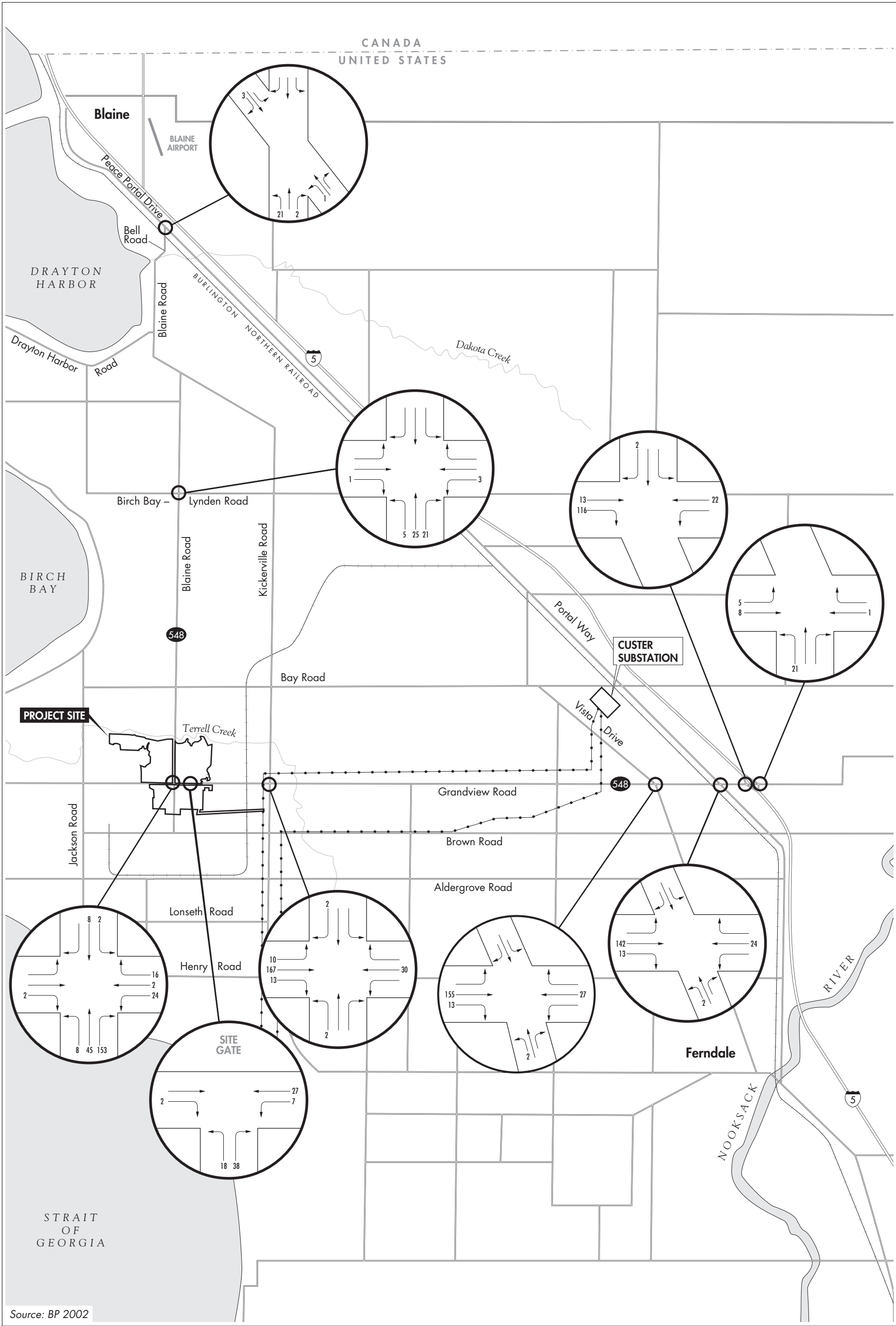
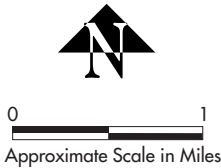


FIGURE 3.15-6



295 → peak construction traffic volume and direction
—•—•— transmission line

PROJECT-GENERATED TRIPS
FOR PEAK CONSTRUCTION CONDITIONS

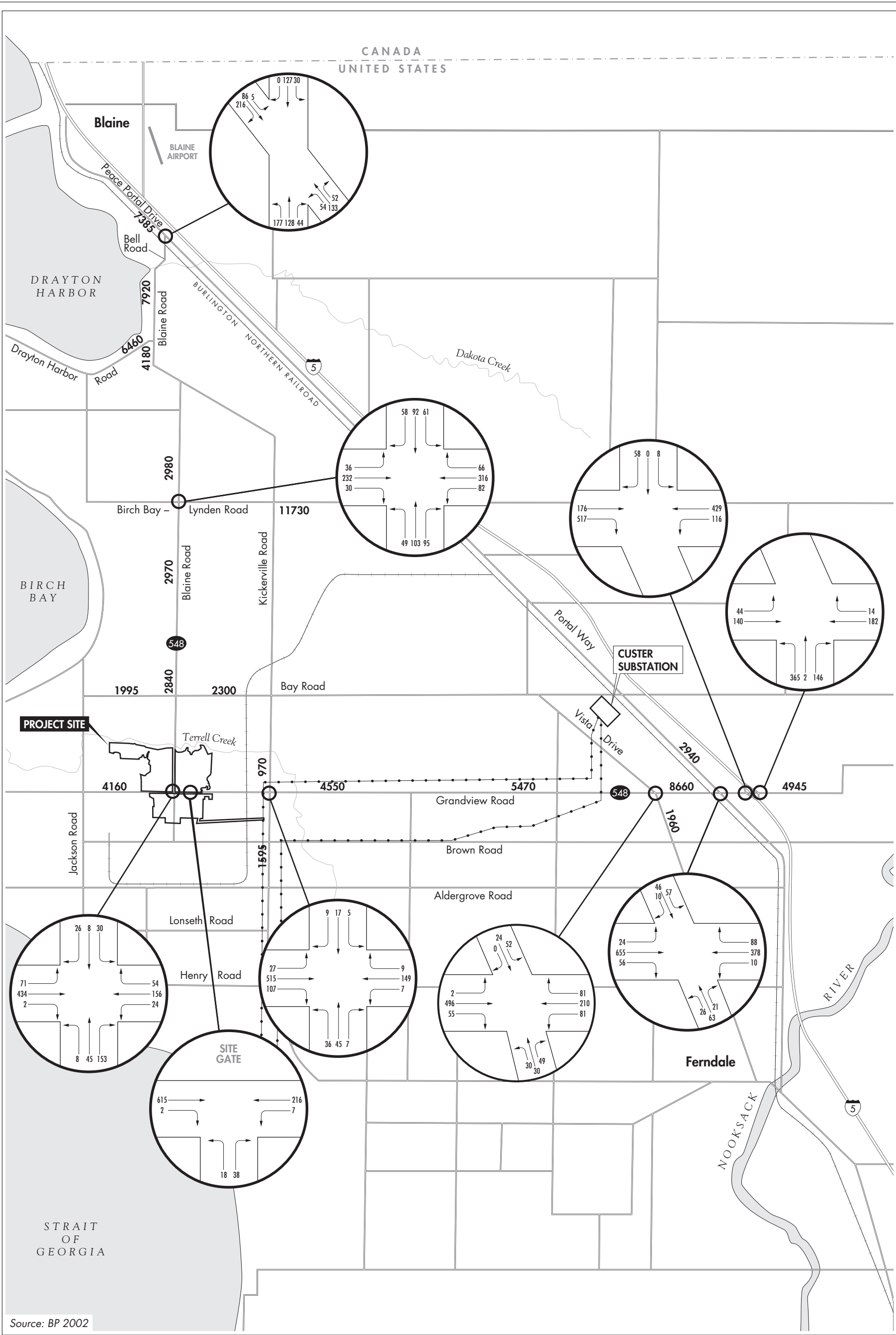


FIGURE 3.15-7

PROJECTED 2004 PM PEAK-HOUR AND AVERAGE
WEEKDAY TRAFFIC VOLUMES WITH PROJECT

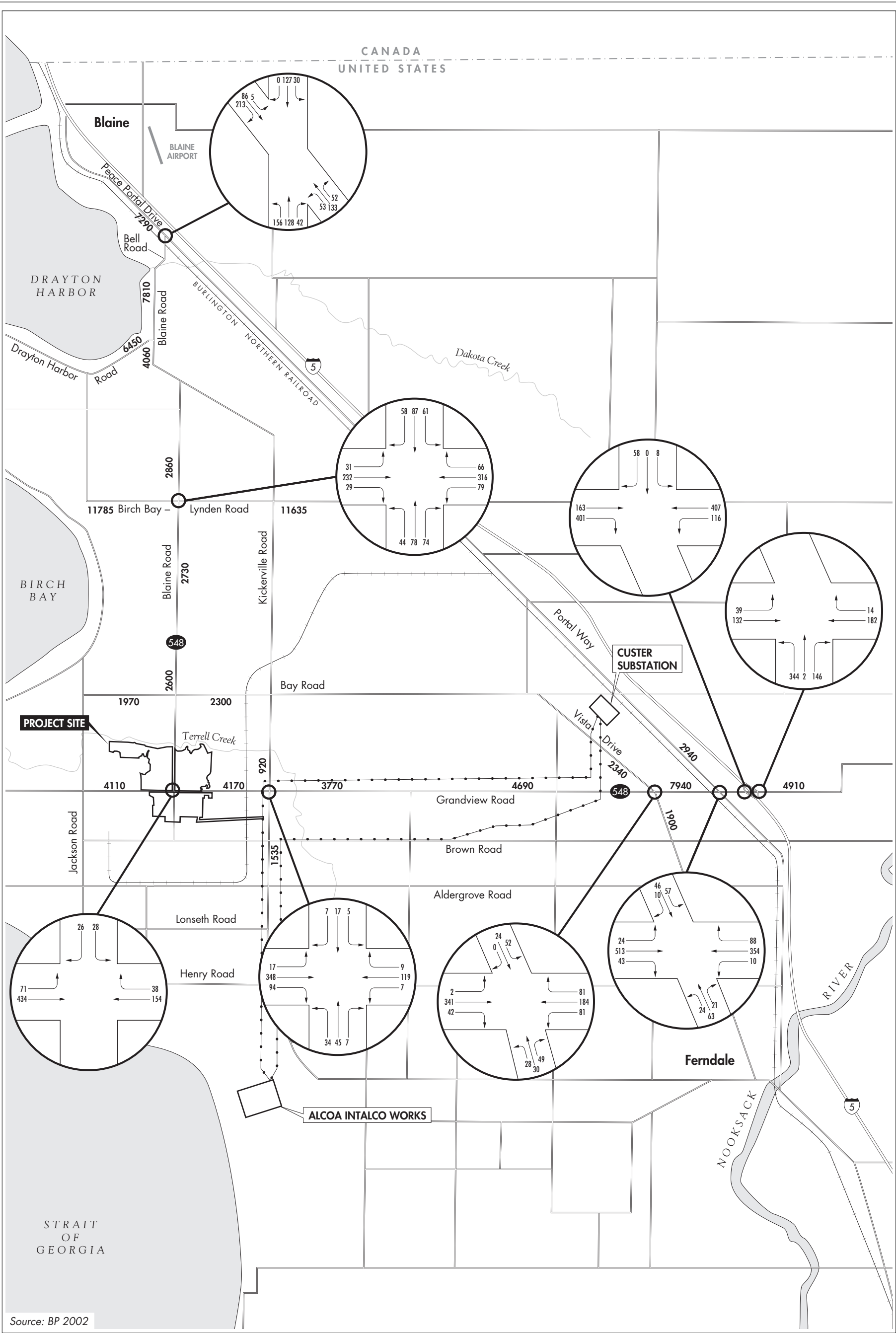
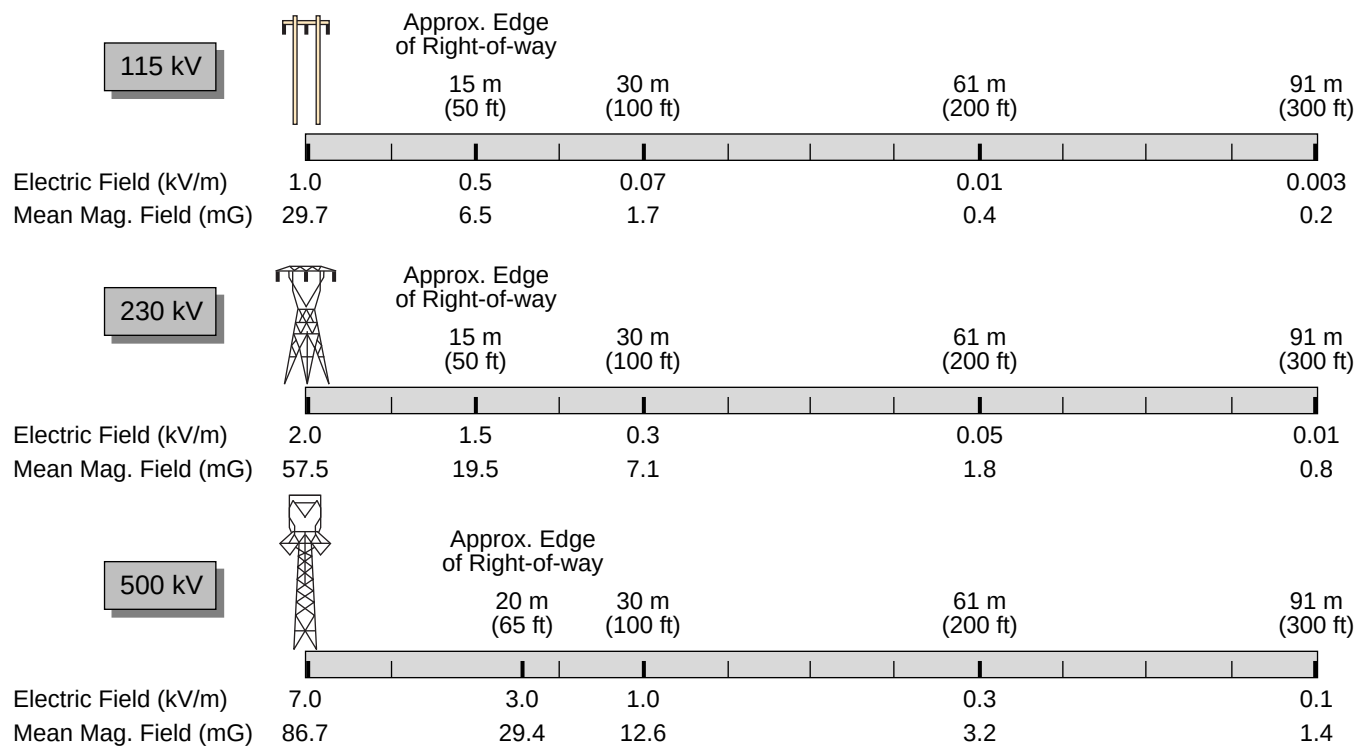


FIGURE 3.15-8

PROJECTED 2004 PM PEAK-HOUR AND AVERAGE WEEKDAY TRAFFIC VOLUMES WITHOUT PROJECT



Source: Bonneville Power Administration

FIGURE 3.16-1

TYPICAL ELECTROMAGNETIC LEVELS FOR TRANSMISSION LINES