## 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*

<u>Alcoa Intalco Works.</u> 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**

<u>Wastewater</u>

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.

<u>Stormwater</u>

Stormwater runoff from the refinery interface area presently drains uncontrolled as described above.

### 3.3.2 Impacts of the Proposed Action

**Construction**

<u>Cogeneration Facility</u>

*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 | Jij 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)
- FP (frost protection)
- IR (irrigation)
- CI (commercial and industrial manufacturing)
- MU (domestic municipal)
- ST (stock watering)
- DM (domestic multiple)

*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 here 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 affect 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 congeneration 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.