# 3.2 Water Resources

## 3.2.1 Sources of Information

Sources of information for this section include the documents cited in the text.

## 3.2.2 Existing Conditions

### *3.2.2.1 Surface Water*

The Sumas area is drained by Sumas Creek, Johnson Creek, Bone Creek, and the Sumas River (Figure 3.2-1). The Sumas River flows northward through the Sumas Valley and discharges to the Fraser River northeast of Abbotsford, British Columbia. Sumas, Johnson, and Bone Creeks are small natural creeks with heavily vegetated banks. These streams are fed by several unnamed creeks as well as an extensive network of roadside ditches, culverts, and subsurface tile drains. The numerous surface drainage ditches and subsurface tile drains were built to remove excess surface and shallow groundwater in order to allow greater agricultural use of the low-lying, poorly drained areas in the Sumas River Valley.

Runoff from the S2GF site flows primarily through a ditch that flows into a 42-inch-diameter storm drain that discharges into an unnamed tributary to Sumas Creek. This tributary enters Sumas Creek in the vicinity of Third Street and Johnson Street to the east of the proposed plant site. Downstream from this confluence, Sumas Creek drains southerly and easterly to its confluence with Johnson Creek, passing below several road crossings through large-diameter culverts.

The proposed natural gas pipeline would cross below Johnson Creek, Bone Creek, and the Sumas River. The proposed overhead transmission lines would cross numerous water bodies. The U.S. portion of the 230 kV transmission line to the Clayburn Station in Canada would cross Sumas Creek north of the proposed plant site. The channel at this location is about 6 feet wide and 1 foot deep.

### *3.2.2.2 Groundwater*

#### *Hydrogeologic Setting*

The Sumas area is underlain by over 1,000 feet of unconsolidated glacial sediments, deposited as a result of repeated glacial advances and retreats during the last million years. Deposits of the last major glacial period are relatively well known from surface exposures and through installation of hundreds of wells in the area. The deposits from this most recent glacial period, between approximately 18,000 and 10,000 years ago,

Figure 3.2-1

form the hydrogeologic units of greatest importance to groundwater occurrence and characteristics in the Sumas area. Little is known about the older and deeper of these deposits because they are not exposed at the surface and few borings or wells extend deep enough to have encountered them.

A conceptual hydrogeologic model of the project vicinity is depicted in Figure 3.2-2. This simplified model portrays the general geologic setting and characteristics of the groundwater flow system in the Sumas Valley, from the primary groundwater recharge area in the uplands to groundwater discharge into local creeks and drains of the lowlands. The following discussion describes the geologic and hydrogeologic characteristics of the Sumas area, with reference to this conceptual model. A more detailed description of the site hydrogeology follows this discussion.

**Hydrostatigraphic Units**

Three hydrostratigraphic units of importance underlie the Sumas area, subdivided, for purpose of discussion, by their stratigraphic position and hydrologic properties. Beginning with the uppermost unit, these are:

- Sumas fine-grained deposits (Qsf), which include a thin sequence of lacustrine silt and clay, local peat deposits, and underlying alluvial sand and silt deposited by post-glacial streams (less than 10,000 years ago) in the Sumas Valley.

- The Sumas advance outwash (Qsa), which consists largely of sands, gravels, and cobbles that were deposited as a broad outwash plain by glacial meltwater streams during the Sumas glaciation, approximately 10,000 to 11,000 years ago. The Sumas aquifer (Qsa) occupies this deposit, glacial moraine deposits laid down at the terminus of the Sumas glacier, and coarse-grained post-glacial alluvial deposits that overlie the outwash plain sediments.

- Everson/Vashon fine-grained deposits (Qevf), consisting of poorly sorted pebbly silt and clay of the Everson glaciomarine drift, and Vashon till, which is typically a poorly sorted mixture of sand, gravels, and cobbles in a silt and clay matrix. These deposits originated during the Everson interglacial period (13,500 to 11,000 years ago) and the Vashon glaciation (18,000 to 13,500 years ago).

The Sumas fine-grained deposits mantle most of the valley floor. These sediments were deposited in low-lying areas by streams and a lake that occupied the Sumas Valley during the last 10,000 years. They are typically about 20 to 40 feet thick, and include pockets of peat and localized channel deposits of alluvial sands. Where present, this group of fine-grained sediments acts as a semi-confining unit or aquitard, retarding infiltration of surface water to the underlying Sumas aquifer. The low permeability of these deposits, combined with the low relief of the valley floor, results in the wet and boggy soil conditions in much of the valley during the rainy season.

Figure 3.2-2

The Sumas aquifer is typically about 40 to 80 feet thick, although it is locally considerably thicker in the uplands northwest of Sumas, where it includes morainal deposits overlying the outwash sands and gravels. The aquifer is widespread in the region, and is a primary source of groundwater for domestic, agricultural, and municipal wells. For the most part, it is unconfined, with the outwash deposits that contain it exposed at the ground surface over much of the region. However, in the Sumas River Valley it is semi-confined below the fine-grained lacustrine and alluvial deposits that mantle the valley floor. It is also locally semi-confined below low-permeability ice-contact deposits in the uplands along the margin of the Sumas River Valley.

Underlying the Sumas aquifer is a sequence of deposits collectively referred to as the Everson/Vashon fine-grained deposit. This group consists primarily of low-permeability deposits including pebbly silts and clays that were deposited as glaciomarine drift during the Everson interglacial period and till that was deposited during the Vashon glaciation. However, this group does contain coarser grained deposits that yield small quantities of groundwater. Few of the wells drilled in the valley are deep enough to have encountered this unit, and none fully penetrate it, so its distribution and variability in composition are not well defined. The Everson/Vashon fine-grained deposit is a semi-confining unit to the overlying Sumas aquifer.

**Groundwater Recharge, Discharge, and Flow**

The Sumas aquifer in the site vicinity is recharged primarily from precipitation in the uplands to the west and northwest of Sumas, where the aquifer is unconfined. To a much lesser extent the aquifer is also recharged in the valley by downward leakage through the overlying fine-grained alluvial and lacustrine deposits. Groundwater flow in the project vicinity is from the uplands in the west and northwest to the creeks in the Sumas River Valley. Discharge occurs at pumped wells, as springs along the eastern edge of the upland (including springs in the vicinity of the City well fields), in the lowland as baseflow to the Sumas River and smaller streams, and as upward leakage to low-lying areas that are drained with ditches and subsurface drain tiles.

Groundwater in the Sumas aquifer flows southeastward from the uplands toward the Sumas River. Figure 3.2-3 depicts the average annual potentiometric head of the confined groundwater in the Sumas aquifer and the southeastward groundwater flow path beneath the site. The potentiometric head is defined as the surface to which water in an aquifer would rise under hydrostatic pressure. The overall horizontal movement of groundwater is perpendicular to the contours shown on this map, from areas of higher head to areas of lower head. The flow gradient is low, about 4 to 6 feet per mile. Water levels in this system are usually 5 to10 feet below land surface, with seasonal groundwater fluctuations of up to about 6 feet in the Sumas Valley (USGS 1999). The water level rises in response to infiltration of precipitation during the winter and spring and drops during the dry months.

Figure 3.2-3

The USGS (1999) indicates that long-term water levels and precipitation records show a close correlation between precipitation and groundwater levels in the Sumas aquifer, with declining water levels during extended periods of below-average precipitation. Kohut (1987) also indicates that long-term declining water levels in some observation wells appear to be related to interference between several high-yield extraction wells in the Sumas-Abbotsford area, and not to mining of the aquifer. Specifically, water levels in the Sumas-Abbotsford area appear to have dropped, beginning in about 1977, in response to withdrawal of large quantities of water from several municipal well fields and the Fraser Valley trout hatchery well field near Abbotsford. The extent to which these declining levels extend away from the pumping centers is uncertain, although up to 5 feet of long-term decline measured in a well 3 miles from the trout hatchery is attributable to pumping at the hatchery. This well field pumps continuously at rates of 1,800 to 2,600 gallons per minute (USGS 1999). It is likely that the aquifer would rise in the vicinity of the Abbotsford water supply wells in response to this significant reduction in pumping.

Well yields from the Sumas aquifer are highly variable, ranging from a few gallons per minute (gpm) up to 1,500 gpm. This variability in yield results from the variability in aquifer thickness, heterogeneity of lithologic materials making up the aquifer, and in the quality and design of the well installation.

**Groundwater Quality**

Based on a regional study by the USGS, groundwater from the Sumas aquifer typically contains calcium or manganese bicarbonate. It is generally dilute, slightly acidic, with low alkalinity, and typically well oxygenated. Chloride concentrations are above the background level throughout the aquifer, suggesting that the effects of land-use activities are widespread. Elevated concentrations of dissolved nitrates are common, and in some areas are sufficiently high to restrict the use of water for human consumption. Groundwater from both of the City of Sumas well fields contains nitrates above background levels, and one of the well fields is used only for industrial water because nitrate levels are slightly above the primary drinking water standard of 10 milligrams per liter. The primary sources of nitrate in the Sumas aquifer include the storage and application of barnyard manures, application of nitrogen fertilizers to crops, and the use of domestic septic systems.

The USGS indicates that the available data show nitrate concentrations in the Sumas aquifer are highly variable over time and by location, and that no long-term trend can be discerned. More apparent are seasonal trends, with the highest nitrate concentrations in a given well commonly occurring in the winter and spring, when rainfall and recharge are the greatest (USGS 1999). The City of Sumas wells have shown divergent trends; nitrate concentrations in the May Road well field have decreased slightly over the last several years, whereas the Municipal well field concentrations have increased slightly over the same time period.

### *Site Hydrogeology*

The S2GF site is situated on the floodplain of the Sumas River Valley. It is underlain by low-permeability surface soils, as evidenced by the presence of wetlands and a network of drainage ditches and drains that have been installed to remove excess surface water and shallow groundwater. Geologic profiles (Figures 3.2-4a, b, and c), based on borings drilled onsite by GeoEngineers (1995), indicate that the Sumas fine-grained deposits are at least 60 to 100 feet thick below the site. The sediments observed in the borings consist of a heterogeneous mixture of silt, sandy silt, and sand. In the site vicinity, they include surface soils, local peat deposits, and Holocene lacustrine deposits in the upper 20 to 30 feet, and fine-grained alluvial floodplain deposits below that.

The soils encountered in the borings were wet below depths of a few feet, although their fine grain size would preclude their use for groundwater extraction. Occasional lenses of sand or sand and gravel within the alluvial deposits are interpreted as splay deposits that are likely limited in width and length. These lenses may supply minor amounts of groundwater but they are not regionally significant as a groundwater resource.

The onsite borings were not deep enough to encounter the coarser grained alluvial deposits and outwash sand and gravel of the Sumas aquifer. However, based on regional studies by the USGS, the Sumas aquifer is interpreted to be approximately 100 feet thick in the site vicinity and to have an average potentiometric surface of about 5 to 8 feet below the site ground surface (USGS 1999).

The shallow hydrogeology of the site is a simple system. Rain falling on the ground either runs off as surface discharge, infiltrates and is drained by artificial drains, or deeply infiltrates the underlying Sumas aquifer. The amount of aquifer recharge at the site is controlled by the amount and rate of rainfall; the site vegetation; the density, grain-size distribution, and thickness of the low-permeability fine grained deposits; and by the head difference between the annual infiltrating rainfall front in the soils and the potentiometric surface of the aquifer. The rate of recharge varies spatially across the site depending upon the variability of the soil properties, and seasonally as water levels change in response to precipitation.

Site vegetation includes grasses, shrubs, and occasional trees that are suited to the high water table conditions of the floodplain environment. This vegetation retains some of the rainfall that falls on the site and returns it to the atmosphere by transpiration or direct evaporation. This process can be expected to prevent up to half of the annual precipitation from reaching the surface water or groundwater systems. Much of the water that does infiltrate the soil column is captured in the tile drains that underlie the site. Based on a wetland delineation report dated June 26, 2000, the drain tile consists of 4-inch-diameter pipe laid in 4-foot sections at a depth of 20 to 36 inches (Bexar Environmental Consulting 1999).

Figure 3.2-4a

Figure 3.2-4b

Figure 3.2-4c

Early in the rainy season, most of the precipitation that reaches the ground infiltrates the site soils. The low relief of the site reduces the ability of water to run off as stream flow, and increases the opportunity for the water to infiltrate into the ground. As the wet season progresses (October to April), the soil becomes saturated by infiltration of precipitation and by upward leaking groundwater from the underlying Sumas aquifer. After saturation has occurred, the majority of the precipitation that reaches the soil either ponds, runs off as surface flow, or is captured by the artificial drains and is discharged to surface water bodies. The remainder of the infiltrating precipitation travels vertically through the low-permeability surface sediments until it reaches the Sumas aquifer. Water that reaches the aquifer then follows the gradient of that groundwater flow, discharging to wells and springs, and as baseflow along stream courses. During the dry months, the potentiometric surface of the aquifer is expected to drop several feet in elevation. During this period the aquifer would likely be too low in elevation to contribute to baseflow on or near the site.

The USGS (1999) estimates that the mean annual groundwater recharge through the Sumas fine-grained sediments is a relatively low 16 to 20 inches per year, out of a total of about 60 inches of rainfall per year that falls on the site. However, this recharge estimate is probably high for the site because it does not account for a significant reduction of recharge that can be expected in the winter months as a result of artificial drainage of the site.

#### *3.2.2.3 Floodplains*

The S2GF site, transmission line route, and much of the natural gas pipeline route would be located within the 100-year floodplain of the Sumas River. The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps depict the 100-year recurrence base flood levels in the region that comprised the incorporated City limits in 1984 (Figure 3.2-5). In the industrial area where the S2GF would be constructed, the 100-year flood elevation is approximately 4 to 5 feet higher than existing natural ground.

The City of Sumas authorized a study of the floodplain and floodway with respect to anticipated development in its industrial zones. The study concluded that filling the floodplain areas within the City's industrial zone would not significantly impact the floodway, and thus filling by industry in the project area is allowable. Although floodwaters might increase due to development of the industrial area, increased flood depth would be at or below 1 foot.

A drainage channel traverses the S2GF site from the southwest corner to the east-central portion of the site. Currently, surface water run-on is delivered to this channel via a 42-inch culvert. This channel would be filled and a new channel constructed around the south and southeast portion of the site. In addition, a retention pond would be constructed to retain and control the rate of site runoff.

Figure 3.2-5

Before final preparation of construction plans, the 100-year flood elevation would be verified with Whatcom County and the City of Sumas. The FEMA flood insurance maps for the County and City jurisdictions do not show equivalent flood elevations in the site area. Specifically, the County map shows a flood elevation of 46 feet at the site whereas the City map shows a flood elevation of 42 feet. In 1997, the City of Sumas engaged KCM, Inc. to model the 100-year flood elevation and provide advice on flood elevations, and the impacts of allowing fill in the industrial zones west of Bob Mitchell Avenue. The KCM, Inc. Technical Memoranda (dated June 19 and July 8, 1997) indicate a highest modeled 100-year flood elevation of 43.5 feet (Appendix A). The ASC assumed a 100-year flood elevation of 44 feet (Sumas Energy 2 et al. 2000). Rigorous verification of the best available 100-year flood data should be completed prior to finalizing site design.

### *3.2.2.4 Public Water Supply*

The S2GF project would require a relatively large and continuous supply of water for cooling during plant operations. SE2 has arranged with the City of Sumas to obtain that water from the City well fields, and has adjusted the design of the facility to limit use to the amount that is available to them. Because the project would use relatively large quantities of water on a continuous basis, a description of the existing water supply system is provided in this section.

The City of Sumas provides water service to approximately 1,500 customers in the cities of Sumas and Nooksack, and the Sumas Rural Water Association (SRWA) and Nooksack Valley Water Association (NVWA). The City's source of water is the Sumas aquifer, which is tapped by two city-owned well fields, known as the May Road well field and the municipal (or Sumas) well field. The May Road well field provides industrial-quality raw water while the municipal well supplies potable-quality raw water. These well fields, located in the northwest corner of Sumas, are currently used to satisfy all water demands on the City's system. The City could legally withdraw more water from these fields since each pumps less water than is currently allowed by their respective water rights.

#### *Water Rights*

Sumas holds two water rights for the May Road well field, G1-23698P and G1-26398P, through the State of Washington Department of Ecology. A *Report of Examination for the May Road Well Field* by the Department of Ecology (Oct. 24, 1991) is provided in the ASC. The report of examination concludes that "there is water available for the amount requested" and that "existing water rights will not be adversely affected by the withdrawal as authorized." The report also concludes that the "water has been determined to be available for the requested industrial quantities…" as described below.

Water right G1-23698P authorizes a maximum instantaneous withdrawal rate of 800 gpm and an annual withdrawal rate of 449.0 acre-feet per year (1 acre-foot is equivalent to 325,851 gallons). Water right G1-26398P was issued supplemental to G1-23698, and authorizes a maximum instantaneous withdrawal rate of 299 gpm and an annual withdrawal rate of 422.2 acre-feet per year for mitigation and 561 gpm and 953.8 acre-feet per year for industrial supply. Although this second water right is termed supplemental, it contains no conditions that restrict the use of the right to times when the primary right is unavailable. Rather, the certificate contains language to the effect that quantities withdrawn under the two certificates combined shall not exceed the sum of the quantities authorized under each certificate independently, stated as 1,660 gpm and 1,825 acre-feet per year.

These two water rights have not been certified; both are in permit status. The City of Sumas has submitted a Proof of Appropriation of Water form for G1-23698P. Upon final inspection by the Department of Ecology, if the permitted quantities have been perfected and all provisions have been abided by, a final certificate of water right would be issued. The water authorized by G1-23698P has not been fully developed, and a certificate for the permit would not be issued until full perfection.

Sumas holds a series of water rights for the “Sumas well field” or municipal well field. These are summed up in water right certificate G1-25171C, which specifies a cumulative maximum instantaneous withdrawal rate of 2,250 gpm and a cumulative annual withdrawal of 1,919 acre-feet.

**May Road Well Field**

The May Road well field is comprised of three production wells and three observation wells. Taking into account well interference from simultaneous pumping, the maximum pumping rate from the three wells combined is estimated to be 1,030 gpm even though the combined water right after mitigation is 1,361 gpm.

The mitigation restriction is prescribed under G1-26398 to augment a spring-fed creek at a rate of 18 gpm for every 100 gpm withdrawal from the May Road well field, or 18 percent of the instantaneous well withdrawal rate, up to 422.2 acre-feet per year. This mitigation water is not available for the discretionary use of the City of Sumas, leaving a combined 1,361 gpm of water available through the water right after mitigation (1,660 x 0.82), although the wells cannot deliver this much. After adjusting for limitations on pumping imposed by well interference, the City of Sumas currently has a total water supply available for use from the May Road well field of 1,030 gpm and 1,402.8 acre-feet per year (Table 3.2-1).

The May Road well field currently is used to supply industrial quality water to the existing SCCLP power generation facility. Historically, when operated year-round, this facility has consumed an average of 728 acre-feet of water per year, with a peak annual consumption in 1994 of 748 acre-feet per year. Based on these data, the City of Sumas Water System Comprehensive Plan (October 1999 revision) allocates 751 acre-feet per year for the SCCLP facility.

Water consumption by the SCCLP facility is relatively constant from month to month, with average monthly usage varying between a low of 0.59 million gallons per day (MGD), equivalent to 410 gpm in December, to a high of 0.71 MGD, equivalent to 493 gpm in September. Review of historical data indicates that peak summer monthly usage can be conservatively estimated at 540 gpm. Daily water demand for this facility is also relatively constant during operation. Assuming a peaking factor of 1.2 for estimating peak hourly rates during the high use periods, the maximum instantaneous demand ranges between 410 gpm (during the off-peak months) to 650 gpm. This is well below the instantaneous water right limitation of 1,361 gpm and the pumping limitation of 1,030 gpm for the May Road well field. Thus, the unused portion of the May Road well field water rights ranges from 711 gpm (peak) to 951 gpm (off-peak).

**Table 3.2-1: Water Rights, Current Consumption, and Availability (a)**

| Water Source | Sumas Municipal Well Field | May Road Well Field | Total |
|---|---|---|---|
| Water Quality | Potable | Industrial | |
| Number of Production Wells | 5 | 3 | |
| **Water Rights** | | | |
| Certificate Number | G1-25171C | G1-23698P<br>G1-26398P | |
| Max. Instantaneous Rate | 2,250 gpm | 1,660 gpm | 3,910 gpm |
| Max. Annual Rate | 1,919 af/y | 1,825 af/y | 3,744 af/y |
| Max. Instantaneous After Mitigation (b) | 2,250 gpm | 1,361 gpm | 3,611 gpm |
| Max. Annual After Mitigation | 1,919 af/y | 1,403 af/y | 3,322 af/y |
| **Consumption** | | | |
| Demand: est. peak daily rate | 1,530 gpm | 540 gpm | 2,070 gpm |
| Est. maximum hourly rate | 2,004 gpm | 650 gpm (c) | 2,654 gpm |
| Est. minimum hourly rate | 415 gpm | 410 gpm | 825 gpm |
| Average Annual Demand | 1,259 af/y | 728 af/y | 1,987 af/y |
| **Unused Portion of Water Right** | | | |
| Supply Rate: Est. peak period rate | 720 gpm | 821 gpm | 1,541 gpm |
| Est. peak hourly rate | 246 gpm | 711 gpm | 957 gpm |
| Off-peak period hourly rate | 1,835 gpm | 951 gpm | 2,786 gpm |
| Average Annual Available Supply Rate | 660 af/y | 675 af/y | 1,335 af/y |

gpm – gallons per minute
af/y – acre-feet per year
1 acre-foot equals approximately 325,851 gallons.

(a) This table is based on water rights and potential supplies. Current instantaneous delivery capacity of the well fields is much less than shown here.

(b) May Road well field has a stream mitigation requirement of 18% of the instantaneous withdrawal rate with 422.2 acre-feet per year reserved for mitigation.

(c) Peaking factor of 1.2 is assumed.

**Municipal Well Field**

Sumas' municipal well field has an existing water right allocating a maximum annual withdrawal rate of 1,919 acre-feet per year and a maximum instantaneous water rate of 2,250 gpm (Table 3.2-1). The well field presently has five production wells (including one replacement well) and one inoperative well. Although the well field is estimated to be capable of providing the full annual quantity allocated in the City of Sumas water rights (1,919 acre-feet), the existing pumps do not have the capacity to pump the full instantaneous water right of 2,250 gpm. The maximum instantaneous capacity of all pumps is estimated at about 1,200 gpm (which equates to an annual quantity of 1,936 acre-feet). The municipal well field is currently used to supply potable water to the cities of Sumas and Nooksack, the SRWA, and the NVWA. Over the past five years the total water consumption of these four groups has ranged from 1,000 to 1,050 acre-feet per year.

The Sumas Water System Comprehensive Plan (1999) provides information on the present water consumption of Sumas and its wholesale suppliers. The Plan uses historic maximum usage to calculate a conservative estimate of the existing system demand. It identifies the collective demand by Sumas, Nooksack, the SRWA, the NVWA, and water pumped from the wells but not billed at 1,259 acre-feet per year. Based on this current demand, Sumas has an estimated water surplus of 660 acre-feet per year from the Sumas municipal well field.

The current maximum potable water demand is reached during the month of August, with an average monthly usage of 855 gpm. The minimum demand occurs in March, with an average monthly usage of 546 gpm. Review of historical data indicates that a conservative estimate of use on peak summer days is 1,530 gpm, which is greater than pumping capacity. Based on hourly water use patterns from this well field, a peaking factor of 1.31 is used to estimate the maximum hourly withdrawal rate of 2,004 gpm, almost double existing pumping capacity. The estimated minimum withdrawal rate (using a peaking factor of 0.76) is 415 gpm. Based on these demand rates, the water supply from the municipal well field would be inadequate. However, because the unused portion of the water right is estimated at 246 gpm during peak demand periods and 1,835 gpm during off-peak periods, pump improvements at the well field should meet these need in the short term, and a new high-capacity well could provide for projected future requirements.

### *3.2.2.5 Water System Infrastructure*

The May Road well field is currently used to supply industrial-quality water to the existing SCCLP power generation facility. A 10-inch-diameter pipe along Halverstick Road/SR 9 connects the well field and the SCCLP facility. The City of Sumas does not provide any storage facilities for this system.

The municipal well field currently provides potable water to the cities of Sumas and Nooksack, and to the SRWA and the NVWA. Wells 1, 2, and 3 provide water to Nooksack and the NVWA through an 8-inch main. Wells 4 and 5 provide water to Sumas and the SRWA through a 10-inch main. The two systems are operated independently but have interties that are used in summer months when water from the Sumas-SRWA system is needed to supplement the Nooksack-NVWA system.

The Sumas-SRWA system presently uses an existing 500,000-gallon storage tank to provide standby, equalizing, and fire response storage. Two 100,000-gallon reservoirs are connected to the Nooksack-NVWA system, and a new 500,000-gallon reservoir is under construction. These reservoirs are used during periods of peak daily demand to minimize fluctuations in the well field pumping rate. This allows the well pumps to operate at a more constant rate, similar to the rate required to supply water for average daily usage.

## 3.2.3 Environmental Impacts of Proposed Action

### *3.2.3.1 Construction*

*Surface Water*

The primary impacts to surface water that could result from construction of the project include increased sedimentation and stormwater turbidity resulting from earth work and site traffic, and contamination resulting from a release of deleterious materials. These potential impacts would be minimized by implementation of best management practices (BMPs) and a sediment control plan as prescribed in the construction stormwater National Pollutant Discharge Elimination System (NPDES) permit to be issued by EFSEC (described in Section 2.10 of the ASC [Sumas Energy 2 et al. 2000]). Consequently, no significant construction-related impacts to surface water runoff quality during construction of the plant site are expected. The site grading would be accomplished during the dry season which would avoid clearing and site loading during winter/spring (wet) conditions. A lined detention pond and drainage channel would be constructed on the site during the early phases of the project. After its completion, construction-phase runoff control at the plant site should be routine and manageable.

At the creek crossings, where horizontal directional drilling would be used to place the pipeline below the creek beds, substantial setbacks of the bore pits from the creek banks would be used to preserve the creek channel, floodplain, and riparian vegetation. Therefore, impacts to current surface water runoff conditions during construction in the pipeline corridor are not expected.

Improvements to the water supply system would entail pipeline replacement along an existing roadway, new gate valves, modifications to the existing well pumps to accommodate the increased water requirements for plant operation, and eventually installation of new wells. As there are no surface water bodies in the immediate vicinity of where these modifications are planned, no construction-related impacts to surface water are expected from these activities.

### Surface Water Quality

No significant construction-related impacts to surface water quality are anticipated. The highest risk of construction-related impacts to surface water quality at the plant site would occur during the initial stages of construction when native soils are stripped to allow placement of surcharge piles and permanent fill material. At the onset of this activity, measures would be taken to minimize siltation of runoff that could occur prior to and during construction of the detention/wet pond. After the detention pond has been constructed and silt fencing is in place, construction-phase erosion control should be routine and manageable.

During project construction, the potential increased surface erosion would be minimized by implementation of an erosion and sediment control plan. Construction-phase erosion and sedimentation control BMPs from *the Stormwater Management Manual for the Puget Sound* (Ecology 1992, or as revised) would be implemented as required by law to mitigate the expected impacts of soil disturbance. These measures include chemical source control, silt fencing, cobbled construction entrances, street sweeping, straw bale check dams, rock cobble check dams (for velocity dissipation), and a siltation pond (the permanent detention/wet pond). There are also restrictions on clearing and planting at certain times of the year that would be followed. Assuming these erosion control measures are put in place before construction and are effective during construction, and planned hydroseeding is effective in providing ground cover, stormwater runoff should be in compliance with Washington State water quality standards (Chapter 173-201A WAC).

Water for hydrostatic testing of the natural gas pipeline would be acquired from the City of Sumas municipal water system. After use, the test water would be discharged to a POTW for treatment prior to discharge. This water would be tested prior to discharge to the POTW to ascertain that it meets the applicable standards of the facility.

### Stream and Wetland Crossings

The natural gas pipeline crossings of all wetlands and Sumas, Johnson, and Bone Creeks would be accomplished by using horizontal directional drilling (HDD) to install the gas pipeline under the water bodies. With HDD, 100-foot setbacks of the bore pits from the creek banks would be used to preserve riparian vegetation and provide a buffer in the event of a release of drilling mud. Care would be taken to prevent the release of drilling fluids from the mud pits, and once the bores are completed all drilling mud would either be removed from the pits and buried in an excavated pit away from the shoreline or properly disposed of in an approved landfill. Additional measures that could be implemented to protect surface water resources include use of drilling mud that contains no oil or toxic substances, and monitoring of drilling mud pressures and recovery during drilling to prevent hydrofracturing of the soil and release of drilling fluids to the stream or wetland. If a release of drilling mud to a stream were to occur through fracture of overlying sediment during the drilling process, the operator would immediately cease operations, notify EFSEC and the Department of Ecology, and take necessary steps to clean up the release.

Construction of the electrical transmission lines, which would cross several creeks and wetlands, is not expected to have a significant impact to surface water or wetland water quality. Construction activities and access would largely be restricted to upland areas, and care would be taken to limit disturbance of soil or ground covering vegetation in the vicinity of streams.

Silt fences would be employed to minimize sedimentation into water bodies resulting from construction activities, and excavated soils would be placed in upland areas and stabilized to prevent entry into streams and wetlands.

### *Groundwater*

No significant impacts to groundwater movement, quantity, or quality at the site or vicinity are expected to occur due to construction. The proposed project's construction water requirements would be supplied from offsite municipal groundwater sources, and the effluent from the plant would be exported to the JAMES treatment plant in Abbotsford. Therefore, no net changes to the onsite groundwater would occur as a result of plant construction.

Potential impacts to groundwater quality could occur if contaminants were released at the surface and were able to infiltrate to the groundwater. Contaminant migration to groundwater could occur by means of surface water or by direct infiltration. The risk of a release via surface water would be minimized through application of BMPs and stormwater management. The risk of groundwater contamination by direct infiltration of contaminants is expected to be minimal because the low-permeability sediments underlying the site and the impervious cap, once in place, would impede contaminant migration. With proper site management, cleanup of any release could be accomplished before any significant amount of contamination could reach groundwater.

### *Floodplains*

The S2GF plant would be located within the 100-year floodplain. Since fill would be placed to raise the facility above the 100-year flood level, the plant would have a minor effect on floodwater storage and flow in the area. More discussion on this issue is included in Section 3.2.3.2.

### *Public Water Supplies*

Water required during construction of the S2GF would be purchased from the City of Sumas. It would be supplied from the existing well fields using unused portions of Sumas water rights. Water demands during construction are well within the capacity of the existing water system infrastructure, and no system modifications would be required other than new connections to the City's existing system to deliver water to the site. No adverse impacts to the existing Sumas water system resulting from supplying water to meet these construction demands are expected. Industrial and potable quality water would be conveyed to the site through the same pipelines that bring water to the SCCLP facility, just south of the proposed S2GF site.

The construction of the permanent water supply system to S2GF is also not expected to have any significant environmental impacts. The City would replace some existing pipes and new pipes installed along existing roads, within existing ROW. New valves and pumps may also be required to increase pumping capacity, but they are not expected to have any environmental impact.

#### *3.2.3.2 Operation*

*Surface Water*

No significant environmental impacts to surface water are anticipated from the operation of S2GF.

Runoff impacts would be minimal, and comparable to other large non-industrial, impervious site uses such as warehouses, retail centers, or office buildings.

With permanent stormwater BMPs in place, operation-related impacts to stormwater would be minimized by operation of the detention/wet pond. The only risk to surface water quality would be an accidental chemical spill (e.g., gasoline), during rainfall, in an area that drains to the lined detention/wet pond. Normal hazardous material cleanup techniques would be used to remove the product from the lined detention pond and other areas where it had accumulated.

Permanent BMPs would be employed to treat runoff from the 6-month, 24-hour storm for the site area. The stormwater runoff treatment would comply with appropriate BMPs identified in the *Stormwater Management Manual for the Puget Sound* (Ecology 1992). Although these BMPs do not typically remove 100 percent of the pollutants in road and parking lot runoff, they would likely minimize any degradation of water quality that could result from runoff.

During permanent operation of the facility, precipitation falling on impervious surfaces, including pavements, roofs, and compacted surfaces, would be collected and detained. Runoff would be treated in an oil-water separator, pond, and/or bioswales before being discharged through a pipe to the unnamed tributary of Sumas Creek east of the site.

Permanent operations-phase runoff control and water quality enhancement BMPs from the Department of Ecology *Stormwater Management Manual for the Puget Sound* (1992) would be implemented as required by law to mitigate the expected impacts of the increased runoff rate and pollution from vehicle traffic. These BMPs would include chemical source control, stabilized landscaped areas, stabilized paved areas, catch basins and underground storm sewers, a combination detention pond /wet pond, and a grassy discharge channel. Sludge resulting from maintenance of stormwater facilities would be tested and disposed of in accordance with state regulations.

It is expected that adhering to the required BMPs would result in runoff water quality suitable for discharge to a Class A water (the non-specific designation of Sumas and Johnson Creeks).

The storage of 2.5 million gallons[1] of diesel fuel onsite as a backup fuel source could pose a considerable threat to surface water if a large quantity of the fuel was released to the ground surface. However, the potential for such a release is considered unlikely. The tank would be confined within a bermed area lined with an impermeable barrier and having a capacity greater than the tank volume. The tank would be designed and constructed to withstand the design earthquake. A monitoring system would be employed to detect leakage, and emergency spill cleanup protocols would be established to provide rapid response to any release.

Potential surface water impacts that could result from groundwater extraction are discussed in the following section.

### *Groundwater*

Potential groundwater impacts resulting from this project are of two types: those that could occur as a result of onsite activities or modifications, and those that could result from a substantial increase in groundwater extraction from the City of Sumas well fields in order to supply the project with a source of operational water. These two types of impacts are discussed in the following subsections.

#### Site Impacts to Groundwater

Potential onsite impacts to the aquifer that could result from the operation of the S2GF include: (a) a reduction in the amount of recharge as a result of placing an impervious cover over the site, and (b) the possibility that groundwater quality could be adversely impacted as result of a release of hazardous or toxic substances onsite.

The foundation pad for the site would consist of a 17-acre impervious cover, which would prevent precipitation that falls directly on the site from infiltrating into the groundwater system. The actual amount of recharge water that would be lost by placement of the impermeable cover would equal the total rainfall less the amount of water that is currently lost to evapotranspiration, runoff, and artificial drainage.

1 In its final briefing to the Energy Facility Site Evaluation Council (September 5, 2000) the applicant proposed to reduce the diesel storage tank size to 1.5 million gallons. The environmental impact of this proposed design modification has not been analyzed in this FEIS.

A reliable calculation of the site-specific average annual loss of recharge would require an extensive effort which would require long-term measurement of each of the above parameters. However, such an effort would not be needed to evaluate significance. Based on regional recharge estimates by the USGS (1999), the volume of lost recharge would be insignificant relative to the volume of water in the aquifer and the amount of recharge that occurs regionally. The impervious cap would constitute a very small surface area relative to the total recharge area of the aquifer (approximately 150 square miles), and would be located in an area where recharge is already significantly impeded by the presence of a thick, semi-confining soil zone. Also, the area that would be covered by the plant is currently artificially drained by drain tiles and ditches, which reduces the amount of water that would otherwise be available for infiltration during the rainy season. Given the overall size and widespread distribution of the aquifer recharge area, it is not expected that the reduction in recharge resulting from construction of the project would have a measurable impact on the groundwater system.

The potential for groundwater contamination always exists where hazardous or toxic substances are used. Site operations could adversely affect the quality of groundwater if contaminants were accidentally released onsite and allowed to infiltrate the low-permeability sediments to the aquifer. The potential for impacts to groundwater quality from site operations would be minimized by the impervious cover and by implementation of site BMPs and the stormwater drainage plan. Protection of surface water would be achieved through implementation of BMPs related to handling of storm drainage and the storage and handling of any deleterious materials associated with the plant. Chemical releases resulting from accidental spills would be contained by the impervious surfaces and the stormwater detention system, and cleanup of any releases would be accomplished so as to minimize the potential for migration to groundwater. Accidental releases during fueling would be contained in a paved bermed area, and the fuel tank would be enclosed in a dike and spill retention pond of sufficient size to accommodate the full tank volume (with additional capacity as a safety margin) as required by regulation. Similarly, other tanks containing hazardous materials would be situated within bermed or enclosed areas to contain any leaks and to facilitate cleanup.

With regard to risks to groundwater from a catastrophic failure (though unlikely) of the 2.5-million-gallon diesel storage tank, the pavement, fill pad, and low-permeability soils underlying the plant and surrounding area would provide protection of the Sumas aquifer. In addition to the low-permeability soils, the upward gradient of the aquifer and the tendency for fuels to float on water would further impede downward migration of the diesel to the aquifer. Even if the aquifer did become contaminated, the City's water supply wells would not be affected since they are all located on substantially higher ground and are hydraulically upgradient of the proposed plant.

It is unknown if there are any private wells that could be affected by such a release.

With appropriate management practices, there would be very little potential for contamination of groundwater. It is expected that the likelihood and magnitude of groundwater contamination would be minimal, given the combination of the engineering controls planned for the facility, implementation of BMPs, and the low-permeability soils and artificial fill underlying the site.

### Impacts from Groundwater Extraction

Potential indirect project impacts to groundwater that could result from the increased pumping of the City's water supply wells include: (a) lowering of the potentiometric surface in the Sumas aquifer, (b) potentially increasing nitrate concentrations in the City water supply wells and other private wells, and (c) reducing the quantity and quality of groundwater discharge to nearby springs. No data was available regarding private wells. Given the City's intent to perfect (put to beneficial use) its full water rights, these potential impacts would be as likely to occur without the development of the S2GF. However, it is expected that the City's water right would be perfected more rapidly if this facility were built; thus any resultant impacts would be likely to occur sooner than they would if the project were not built.

The increased water demands on the City's wells would result in higher pumping rates on a more continuous basis than is currently required. This would result in an increase in the drawdown of the potentiometric surface (the level at which water stands in a well as a result of hydrostatic pressure) in the immediate vicinity of the City well fields. Robinson & Noble (2000) analyzed the potential effect of the municipal well field and May Road well field pumping on the potentiometric surface (Appendix J). Based on their calculations, they predicted a radial distance beyond which less than 1 foot of drawdown in the potentiometric surface would theoretically occur in response to the combined maximum pumping of the well fields. This theoretical zone of drawdown, shown in Figure 3.2-6, would extend approximately 1 mile outward from the municipal well field. Lesser drawdown would extend a short distance outside of this zone, and greater drawdown could be expected closer to the well fields, especially where the drawdowns from the two well fields overlap. Although this approach provides an overall indication of the area that could be affected by pumping, it should be recognized that groundwater response to pumping is strongly dependent on the hydrologic properties of the aquifer. Consequently, there could be considerable geographic and local variability in water levels that can't be fully predicted using remote pumping test data.

Robinson & Noble (2000) identified one irrigation well and five domestic wells in Washington within the zone of theoretical drawdown (Figure 3.2-6); several other wells are believed to be within this 1-mile radius to the north of the U.S./Canadian border. These wells could experience a drawdown in their operating water levels, especially during the dry months, as a consequence of increased pumping at the City's well fields. Similarly, any new wells and pumps installed in the vicinity would need to be designed to accommodate the locally depressed water level (e.g., somewhat deeper wells and greater pumping requirements). Although the water level in these wells would rebound when the water supply wells were shut off, the City's wells probably would not be shut off often or for long periods because of the increased demands on the water supply system.

Figure 3.2-6

There is a potential that increased extraction of groundwater from the City well fields, combined with sustained or increasing extraction from other wells in the area, could have an incremental long-term effect of lowering the water level in the Sumas aquifer. Such lowering of the water table could be accompanied by incremental reductions of baseflow to local streams and water levels in existing wells. Kohut (1987) and the USGS (1999) reported evidence to suggest that localized lowering of the water level of the aquifer was observed in the mid-1980s, apparently in response to long-term operation of several large groundwater production facilities in the Abbotsford/Sumas area. However, at that time, Kohut (1987) indicated that this localized lowering of the water levels in observation wells was likely due to pumping well interference rather than to groundwater mining (withdrawals exceeding recharge).

In spite of an extensive groundwater investigation by the USGS (1999), data are not available to indicate whether localized lowering of the water table has continued since the mid-1980s. Nor is there sufficient data to substantiate the cause of this trend or to evaluate the potential magnitude of impact that additional pumping of the City wells might have. However, the increase in groundwater extraction that would be required from the Sumas well fields to supply this project would be more than offset by recent, major reductions in groundwater extraction at nearby wells operated by the City of Abbotsford. Specifically, the City of Abbotsford has recently ceased pumping from their municipal water-supply wells at Farmer Road, approximately 0.5 mile north of the City of Sumas municipal well field, except during periods of peak summer demand. These wells have historically been used to extract over 5,000 gpm from the Sumas aquifer, which is well in excess of the amount of water that would be withdrawn from the Sumas wells for this project. According to a letter from the City of Abbotsford to the City of Sumas (Appendix J), Abbotsford's long-term plan is to further reduce their reliance on groundwater for drinking water from these wells because of water quality problems.

It is also possible that an increase in pumping by the City could result in drawing water with greater nitrate concentrations to the City's well fields. Water quality monitoring by the City has shown a gradual increase in nitrate levels in the municipal well field, with higher nitrate concentrations in the upgradient wells. This information, combined with the existence of numerous likely sources for nitrate contamination in the capture zone of these wells, suggests the possibility that increased pumping could accelerate nitrate intrusion into the well field. In contrast, there appears to be a trend of reduced nitrate concentrations in the May Road well field, which could be interpreted to indicate that increased pumping might improve water quality in those wells.

A similar impact on nitrate levels in private wells that may be affected by an increase in pumping of City wells was not analyzed, because data on private wells were not available.

While the monitoring results from the Sumas wells provide useful information on nitrate concentrations, these data are not sufficient to predict long-term trends or to evaluate whether increased pumping would result in an increase of nitrate concentrations in the Sumas well fields. Although the USGS reports that nitrate concentrations in the Sumas aquifer appear to be generally increasing in some areas, this trend is attributed to nitrate loading rather than groundwater use. The USGS report indicates that nitrate concentrations tend to vary seasonally in response to nitrate loading rather than in response to pumping (USGS 1999).

There is no clear indication that increased groundwater extraction would result in any change in nitrate levels in the City wells or other affected private wells. If groundwater quality was to deteriorate as a result of, or coincident with, the proposed increase in pumping, the City would likely have fewer options available from among its own wells to provide potable water to its consumers. Considering the potential loss of the City potable water supply, without mitigation, this would amount to a potentially significant impact. However, it should be recognized that increased nitrate levels might occur over time with or without this project as the City finds other uses for its groundwater resource.

Based on stream measurements taken during pumping tests (Robinson & Noble 1992), pumping from the May Road well field results in a reduction in flow from a nearby spring, which in turn reduces stream flow in the small creek that the spring feeds. As a requirement of the well field permit, this reduction in flow is being mitigated by spontaneous discharge of 18 percent of the well yield into the stream. However, it is not known whether the increased pumping and spring flow mitigation could result in increased nitrate levels in the creek. As a condition of its permit, the City is required to periodically test the stream water for nitrates to evaluate this possible impact. Since the City is required to comply with surface water quality regulations, it would necessarily have to revise its strategy for groundwater extraction if pumping and discharge result in nitrate levels that would degrade water quality conditions for any designated beneficial use, including fish habitat.

Fish habitat can be affected by increased nitrates if nitrogen is a limiting nutrient and the increase causes excessive algal growth. Generally, phosphorus is the limiting nutrient in fresh waters, not nitrogen. Agricultural sources of biologically available nitrogen (nitrate, nitrite, and ammonia) are expected to be higher in the Johnson Creek drainage than the nitrate in well water. Agricultural runoff typically contains up to 70 milligrams per liter of nitrogen, whereas the well water discharge would be less than 10 milligrams per liter. Therefore, the increase in nitrates in well water released to surface water resulting from the cumulative effect of all groundwater extraction is not expected to cause a significant change in the nutrient dynamics of Johnson Creek.

### *Floodplains*

The buildings and all equipment of the S2GF facility would be constructed on a fill pad designed to place the finished floor of all structures at least 1 foot above 100-year floodplain elevation. Similar construction methods have been used for other industrial developments in this floodplain. Raising the site grade has a potential to raise the 100-year floodplain elevation on adjacent properties. However, given the relatively small area of the floodplain to be raised and other stormwater control measures, the impact is expected to be minimal.

The proposed project would be an impediment to flood flow, and result in redirecting flood flow and increasing flood water velocity toward a nearby building to the southeast (KCM Hydraulic Modeling Technical Memorandum [Appendix A]). However, such an increase in velocity is not expected to be significant because this site is not in a floodway, or within the Special Flood Risk Zone, which is the designation in the City code that is similar to a floodway.

The proposed site design incorporates a diversion channel around the south and southeast portion of the facility (Figure 3.2-7). A combination of 42-inch culverts and large open ditches would be provided to convey the water around the site and to prevent the concentration of floodwaters along ditches. The site would be graded so that in the event that any of the large culverts within the project were blocked, the floodwater would remain in an "overflow" alignment that would keep flood flows within the project boundaries and avoid damage to adjoining property.

The onsite stormwater detention basin would hold excess stormwater to control runoff to pre-development levels. Excess stormwater captured on the site would be detained and released at the predevelopment rate by means of a flow-control orifice at the detention pond outlet. As stipulated in the settlement agreement between Ecology and SE2 (Appendix G, Exhibit 6), the stormwater system would be designed to provide sufficient detention and runoff control from the developed site based on consideration of the 2-year, the 10-year and 100-year recurrence storms. The planned runoff control standards are based on the project design criteria developed in accordance with the State of Washington Department of Ecology *Stormwater Management Manual for the Puget Sound* (Ecology 1992).

The site itself would contribute its share of overall flood level increase caused by development of the industrially zoned area. If the entire City of Sumas industrial zoned area is completely built out, increased flood levels might increase by up to approximately 10 inches. This is more an impact of the industrial zoning and filling than from the S2GF project itself. KCM (1997) determined that the cumulative effect of filling essentially all of the zoned industrial area, which is about eight times the area of the proposed S2GF site, would result in an increase in flood elevation of up to 10 inches which would occur in a small area immediately southwest of the Sumas 1 plant (see Appendix A). The second study, by David Evans and Associates (1996), examined flood impacts for the proposed Boundary Paper Manufacturing site, which was slightly north of the proposed S2GF site. That study indicated that flood elevations would increase by no more than 2 inches as a result of their project. A comparison of these previous studies suggests that the S2GF fill pad would result in a flood elevation increase of between 2 and 10 inches.

Because most of the Sumas sewer collection system is not sealed against the 100-year flood, when flooding occurs, the pump stations to Canada would not be operated until flood waters recede. Onsite sanitary sewer and stormwater designs would consider the backwater conditions with no free outlet available during 100-year flood events. Depending on the duration of flooding, plant operations might need to be curtailed until flood waters receded.

Figure 3.2-7

The natural gas pipeline construction is designed to withstand burial in saturated ground. Flooding in the Sumas area would not impact the buried pipeline or the transmission lines, but could impact above-ground appurtenances such as tower foundations, metering stations and monitors.

### *Public Water Supplies*

Water required for the operation of the S2GF would be purchased from the City of Sumas and supplied from the City's existing well fields. In order to satisfy both the project's required water demand and the City's existing system demand, some modifications to the existing pumping and distribution system would be required. These modifications are not expected to result in any significant adverse impacts to the Sumas system or existing public water users. However, the increased water demand from this project could reduce the City's flexibility in fully meeting its consumers' water needs if one or more wells became inoperable. This issue is addressed further in Section 3.2.6.3, as a potential cumulative impact. Also discussed in that section as a potential cumulative impact is the possibility that increased pumping to meet future consumer needs and the needs of this project could result in deterioration of the water quality in the City's wells.

The S2GF would require a water supply of 1,025 acre-feet per year from Sumas, with a peak instantaneous demand of 849 gpm. Since the S2GF requires only industrial-grade water, it could be supplied from either well field. However, water from both well fields would be required to meet the plant's operational demand. Based on water consumption information presented in the Sumas Water System Comprehensive Plan and discussed earlier, the combined unused portion of the May Road and municipal water rights is currently 1,335 acre-feet per year. The maximum instantaneous water demand surplus ranges from 2,786 gpm (off-peak) to 957 gpm (peak) based on water rights alone. Based on existing water delivery capacity, with peak hourly demand at 3,414 gpm (760 gpm plus 2,654 gpm), this is 197 gpm less than is available without improvements. These amounts are sufficient to supply both the annual average requirement of 1,025 acre-feet per year and the peak demand of approximately 760 gpm.

As Sumas and its dependent water associations continue to grow, the unused allocation of its municipal and May Road well fields water rights would be used to meet the increased demand. Twenty-year growth projections indicate that the increased demand during this period would not exceed the water rights allocated to these two well fields (Table 3.2-2).

**Table 3.2-2: Twenty-Year Forecast – Water Supply, Consumption, and Availability**

| Water Source | Sumas Municipal Well Field | Sumas May Road Well Field | Total |
|---|---|---|---|
| Water Quality | Potable | Industrial | |
| Number of Production Wells | 5 | 3 | |
| **Water Rights** | | | |
| Certificate Number | G1-25171C | G1-23698P<br>G1-26398P | |
| Max. Instantaneous Rate | 2,250 gpm | 1,660 gpm | 3,910 gpm |
| Max. Annual Rate | 1,919 af/y | 1,825 af/y | 3,744 af/y |
| Max. Instantaneous After Mitigation (a) | 2,250 gpm | 1,361 gpm | 3,611 gpm |
| Max. Annual After Mitigation (af/y) | 1,919 af/y | 1,403 af/y | 3,322 af/y |
| **Consumption** | | | |
| Demand: est. peak daily rate | 1,900 gpm | 540 gpm | 2,440 gpm |
| Est. maximum hourly rate | 2,550 gpm | 650 gpm(b) | 3,200 gpm |
| Est. minimum hourly rate | 520 gpm | 410 gpm | 930 gpm |
| Average Annual Demand | 1,494 af/y | 750 af/y | 2,244 af/y |
| **Unused Portion of Water Right** | | | |
| Supply Rate: est. peak daily rate | 350 gpm | 821 gpm | 1,171 gpm |
| Est. peak hourly rate | (300) gpm(c) | 711 gpm | 411 gpm(c) |
| Off-peak period hourly rate | 1,730 gpm | 951 gpm | 2,681 gpm |
| Average Annual Available Supply Rate | 425 af/y | 653 af/y | 1,078 af/y |
| **S2GF Water Demands** | | | |
| Max. Instantaneous Rate | | | 849 gpm |
| Total Annual Average Rate | | | 1,025 af/y |

gpm – gallons per minute; af/y – acre-feet per year

(a) May Road well field has a stream mitigation requirement of 18% of the instantaneous withdrawal rate with 422.2 acre-feet per year reserved for mitigation.

(b) Peaking factor of 1.2 is assumed.

(c) Peak rates limited to an eight-hour period. A minimum of 200,000-gallon storage tank would be required to provide storage during this peak period.

The Sumas Water System Comprehensive Plan has conservatively estimated a 26 percent increase in water demand for the cities of Sumas and Nooksack, the SRWA, and the NVWA over the next 20 years. In this estimate, the water demand for the SCCLP facility is assumed to remain constant. In order to accommodate this increase in water demand, the Comprehensive Plan reserves 2,269 acre-feet per year for the cities of Sumas and Nooksack, the SRWA and NVWA, the SCCLP facility, and non-billed water. Considering this projected annual water demand and the combined water right for both well fields of 3,322 acre-feet per year, Sumas would have an estimated water surplus of 1,078 acre-feet per year in 20 years. The total annual average demand of 1,025 acre-feet per year requested for the S2GF is less than this projected surplus, is a designated use in the Comprehensive Plan, and would be available to the project based on the available water rights.

Based on the anticipated 26 percent growth rate, the 20-year projected average daily peak demand for the cities of Sumas and Nooksack, the SRWA, and NVWA, and the SCCLP facility is 2,440 gpm. With its combined water right of 3,611 gpm, Sumas has an estimated daily average water surplus of 1,171 gpm during peak days. This water surplus indicates that on a daily basis Sumas has a sufficient water supply to meet the S2GF's maximum peak water instantaneous consumption of approximately 760 gpm over the next 20 years.

During the afternoon of the peak days, the water demand would exceed the average daily demand. The estimated maximum hourly demand for the cities of Sumas and Nooksack, the SRWA, and NVWA, and the SCCLP facility is 3,200 gpm. With a combined water right of 3,611 gpm, an instantaneous water rate of 411 gpm would be available to S2GF during periods of peak water use. With an estimated peak water consumption of 760 gpm, the S2GF demand would exceed the water available as stipulated by Sumas' water right during these peak hour periods. An equalizing storage tank would be required to bridge the periods of the day when the system demand exceeds 2,851 gpm (3,611 gpm minus 760 gpm). SE2 would construct a 500,000-gallon water storage tank to provide for its demand when the system experiences its peak day and peak hourly demand under these future conditions. The storage tank would be filled during off-peak times (for example, at midnight and the early morning hours) when the system demand is reduced.

In order to provide the water supply flow rates that would be required by S2GF, the City of Sumas would need to upgrade existing pumps at the municipal well field and install one or two new wells at the May Road well field. In addition, pump and meter flow rate recording instrumentation would need to be upgraded by the City to more accurately monitor the well field production rates so as to comply with the water rights. Because Sumas would be responsible for delivering water to the project site, the City would also need to modify their existing piping system to provide appropriate interties, cross connection controls, distribution system modifications, and pressure regulation. Approximately 1,000 feet of existing 6-inch-diameter pipe would need to be upgraded to 10-inch-diameter pipe and an additional 300 feet of new 10-inch-diameter pipe would be required.

Sumas' 20-year projected water demand forecast (Table 3.2-2) estimates the unused portion of its water rights at 1,078 acre-feet per year with a maximum instantaneous water demand surplus ranging from 2,681 gpm (during off-peak months) to 445 gpm (during peak hourly demands). As discussed in the Sumas Water System Comprehensive

Plan, based on its own potable water needs the City would require 15,000 gallons of equalizing storage to satisfy its peak hourly demand anticipated in its 20-year forecast. The proposed S2GF would also require 200,000 gallons of equalizing storage during this peak period. This peak period is estimated to last eight hours during peak days of peak months. The S2GF would meet this need with 500,000 gallon storage tank, which would be used for both equalizing and standby storage. The S2GF storage tank would have capacity to provide the facility's full water requirements during peak demands.

The Sumas public water supply system appears to have sufficient groundwater, using its own well fields, to meet current and 20-year future projection needs of the City and its dependent water associations, with no anticipated significant environmental impacts. Under the Sumas Comprehensive Plan 20-year forecast, the City could adapt its water supply system to supply the full water demands of S2GF at its request rate of 1,025 acre-feet per year with a maximum instantaneous rate of approximately 760 gpm, assuming the storage capacity described above is available.

The Washington Department of Ecology analyzes the effect of withdrawing the full quantity of water certificated when it grants a water right. Ecology's investigation considers impacts to other water rights and, at times, sets appropriate mitigation prior to issuing a water right certificate. Mitigation requirements specified for the May Road well field (as described above) have been incorporated in calculating the total withdrawal rate. Based on Ecology's findings, the actual withdrawal and beneficial use of water to the full extent of the City's water rights are expected to have a negligible environmental impact on any senior water rights and, after mitigation, on the stream that is fed by a spring that is in hydraulic connection to the wells. This should be confirmed with monitoring of groundwater levels and nitrate concentrations.

## 3.2.4 Environmental Impacts of No Action

### *3.2.4.1 Surface Water, Groundwater and Floodplains*

No impacts to surface water, groundwater, or floodplains are associated with the No Action Alternative.

### *3.2.4.2 Public Water Supplies*

The City of Sumas appears to have sufficient groundwater available through its water rights to meet current and 20-year future projection needs of the City and its dependent water associations, using its own well fields.

If the S2GF were not built, the presently undeveloped portion of the City's May Road and municipal well field water rights may not be put to beneficial use. In 1998, the Washington State Supreme Court ruled that state statutory and common law does not allow for a final certificate of water right to be issued based upon system capacity (*Department of Ecology v. George Theodoratus*). Therefore, the unused portion Sumas' water rights would not be perfected (put to beneficial use) by supplying the S2GF and could be exposed to loss, or at the Department of Ecology's discretion, could be reinstated to an active permit status.

However, if Ecology does not enforce against the Sumas water rights, the City would remain one of the few areas in Whatcom County with certificated water rights that exceed present consumption. In that case, Sumas may continue to attract industrial and commercial enterprises that can use this resource in accordance with the City's long-term goal to encourage growth. As water-consuming customers locate in Sumas, unused water rights would diminish until water consumption reaches the limit of the City's water rights.

## 3.2.5 Mitigation Measures

### *3.2.5.1 Surface Water*

A Storm Water Pollution Prevention Plan (SWPPP) would be developed to address construction activities and handling of hazardous substances associated with the construction of the power plant, the gas, water, and wastewater pipelines, and the transmission line. The plan would address structural controls (silt fences, straw bale barriers, etc.), vegetation practices (temporary and permanent cover practices), and site management of solid, liquid, and hazardous materials and wastes.

The SWPPP would include notification procedures for spills and emergency response actions. Guidelines for spill reporting, SWPPP modification procedures, and cleanup equipment types and availability would be included in the SWPPP. Employees would have access to the SWPPP and be responsible for following it.

In addition, in accordance with the stipulation between the applicant and the Washington State Department of Ecology (Appendix G), the SWPPP would be submitted for review and comment to Ecology, and for approval to EFSEC. The SWPPP would include source control Best Management Practices that were selected and identified during the detailed design of the plant.

Recommended measures to further protect surface water quality include:

- The diesel tank containment structure should be monitored electronically and visually to ensure that the capacity of the containment is not consumed by precipitation to a significant (10 percent or more) degree.
- Stormwater detention systems, silt fences, and related water quality control measures should be installed first before other construction clearing and site loading activities occur.
- SWPPP compliance should be monitored frequently during the annual wet period.

### 3.2.5.2 Groundwater

The increased pumping from the City of Sumas well fields would likely result in increased drawdown of nearby wells, although the magnitude of the potential impact is not known with certainty. To the extent that existing wells are impaired as a result of the increased groundwater extraction associated with the S2GF, appropriate mitigation should be provided. This could involve lowering pumps, deepening wells, or providing an alternative source of water to owners of impaired wells. It is recommended that wells within at least a mile of the City well fields be monitored for at least two years before project startup to establish baseline conditions, and that the monitoring program be continued until the extent of any impact can be established.

No mitigation was proposed for impacts to water quality in private wells that may be affected by this proposal.

### 3.2.5.3 Floodplains

Detailed advance planning would be required for the plant to continue to operate during 100-year flood events. Since severe flooding can be anticipated from weather forecasts, it is reasonable to predict that the necessary adjustments can be made. These include the following:

- Portable chemical toilets could be secured onsite for employee waste.
- The cooling tower schedule could be adjusted to waste all concentrated blowdown and replenish all with fresh makeup water, in advance of anticipated flooding.
- Cooling tower blowdown could be successfully recycled to outlast the storm.
- Blowdown could also be trucked to another Publicly Owned Treatment Works if the roads became passable before the sewer system was again in operation.
- Other process waste cycles and vessels could be similarly micro-managed during flood events.

Project-specific unsteady-state modeling of the 100-year floodplain is recommended to more fully evaluate potential impacts of increasing flood elevations on adjoining and nearby properties. This information should be used to evaluate whether any mitigation measures are appropriate to compensate for loss of storage or flood routing.

### 3.2.5.4 Public Water Supplies

There is a potential that increased pumping for this project could result in an increase in nitrate levels in the City well fields. In the event that water quality deteriorates or a water supply well becomes inoperable, the City's Comprehensive Plan specifies that the City's first priority is to serve its citizens, and that industrial water users may be required to cease or reduce their water consumption until the situation can be remedied. Currently, the City samples the wells monthly for nitrate; this sampling schedule should be maintained, considering the significant increase of pumping that would be required to meet water demands.

Because of the potential for a loss of potable water, the applicant has agreed that if nitrate concentrations in the City's potable water supply exceed applicable federal, state, or local drinking water quality standards, at any date subsequent to the project's start of operation, they would reimburse the City for purchase and installation of a water treatment system to remove nitrates. The settlement agreement between the applicant and the City is presented in Appendix G, Exhibit 4. It is not clear, however, that this mitigation measure provides adequate protection in the event that there is a time lag between the time when nitrate exceedances first occur, and when the treatment facility can be operational. Therefore, it is recommended in the Final EIS that a suitable water quality monitoring program be established to provide ample warning for the treatment system to be purchased and installed as soon as possible after an exceedance occurs. Furthermore, provisions should be made for the applicant to provide an alternate source of potable water until such time as the treatment system is operational.

As part of its Water System Comprehensive Plan, the City of Sumas has implemented a public awareness program to educate residents and businesses about the causes of groundwater contamination and methods that can be employed by citizens to prevent contamination. Although this program is sponsored by the City and would not be a mitigation measure directly related to the S2GF, it should result in a long-term reduction in groundwater contamination and improved water quality in the City well fields.

## 3.2.6 Cumulative Impacts

### *3.2.6.1 Surface Water*

Cumulative effects to surface water would result from the filling of wetlands on the site, the collection and redirection of stormwater, and the drainage to area creeks, tributaries, and the Sumas River. The wetland enhancement and replacement proposed for the site is intended to make up for the loss of onsite cropped wetlands and the wetland ditch. The cumulative effects to the vicinity wetlands would be minor, and may be improved over time due to the replacement of existing wetlands with wetlands of a higher value. The drainage systems have been designed to remove sediment and other materials from the stormwater before it leaves the site, thereby minimizing any cumulative effects on increased chemical or sediment loading in area creeks, tributaries, or rivers. The cumulative effects would be minor.

### 3.2.6.2 Groundwater

As discussed earlier, there is a possibility that an increase in the City's groundwater extraction to meet the needs of this project would contribute to a long-term lowering of groundwater in the Sumas aquifer. However, such an impact can only be speculated at this point because there are not sufficient long-term data to relate water levels to water use. Nevertheless, it is reasonable to expect that as the population and water use increase in Sumas and the adjoining areas, there would be increasing demands on a diminishing groundwater resource. If built, this project would contribute incrementally to those demands. If not built, the City might apply its allocated water right to other comparable uses; if so, the long-term result would be the same.

### 3.2.6.3 Public Water Supplies

A cumulative effect of supplying water to the S2GF would be to bring the City of Sumas closer to the full perfection of its certificated water right. This would make water relatively less available for other, new industrial and municipal water uses that may arrive later. However, the City of Sumas Water System Comprehensive Plan anticipates both residential and industrial/commercial growth in the City, along with the water needed to meet such growth. Based on the Plan and 20-year forecast, the City's existing well fields and water rights would be expected to provide adequate water supplies to meet both its future growth and the needs of this project.

Assuming the water quality and availability of water from the City well fields does not significantly diminish over time, no cumulative impact to the City's system is anticipated for the following reasons:

1. The City of Sumas Water System Comprehensive Plan allocates annual water use to the City and each of its wholesale customers. The existing system allocations are based on the historic peak usage of each of the individual users over the past ten years. For example, the Sumas peak usage was in 1992 at 155 acre-feet per year, while the SRWA peak usage was in 1995 at 1,070 acre-feet per year. By combining individual peak usages, the Water Plan allocates 2,010 acre-feet per year (without S2GF) versus the actual annual peak historic usage of 1,807 acre-feet per year in 1995. Each user bases future growth and water usage on anticipated growth estimates. The Water Plan allocation for S2GF is compatible with the other users' projected demand, and the combined demand is within the City's water rights.

2. SE2 is not requesting that Sumas provide water to meet maximum hourly demand during peak summer conditions. Instead, the S2GF must operate within the 1,025 acre-feet per year allocation that the City has agreed to provide. SE2 also understands that the City must operate within its water rights limits, that the City's and its wholesale customers' water demands are met prior to those for the S2GF, and that the plant's water supply would be curtailed if this limit is reached. SE2 is aware that its facility may have to modify its operating performance during extreme peak conditions in order to comply with these water supply requirements.

3. The existing water rights satisfy the anticipated water demand including the proposed project for the next 20 years, and the existing well fields are believed to be capable of supplying the full water right. The City of Sumas is aware that it would need to obtain additional water sources to meet its long-term (50- to100-year) needs. When the demand starts nearing the water right limitations, the City can seek to acquire existing water rights or petition the Department of Ecology, requesting additional water rights.

As described in Section 3.2.5.4, there is a possibility that if the City increases pumping rates in its wells to meet the demands of this project and other users, it could draw groundwater with higher nitrate concentrations to the wells. The City maintains a monitoring program at both well fields to track changes in nitrate concentrations in the water from each of its wells. This monitoring suggests that nitrate concentrations may be gradually increasing in the municipal well field and gradually decreasing in the May Road well field. However, these data do not provide sufficient information to make accurate, long-range trend forecasts. According to the USGS "the available data for nitrate concentrations in ground water throughout the Sumas aquifer are highly variable in both space and time and are not sufficient to support definitive statements of whether nitrate concentrations generally are increasing or decreasing over the long term" (USGS 1999).

The distribution, water chemistry, and migration of nitrates in the Sumas aquifer are not understood sufficiently to determine what effect, if any, increased pumping to meet the water demands of this project would have on water quality in the City's wells. However, based on the available regional data, the USGS indicates that changes in nitrate concentrations can be expected to follow from patterns of land use and seasonal recharge conditions, rather than from well use. In any case, it is expected that well use would increase, with or without this project, to consume the full capacity of the City's water rights. Thus, the only difference in possible cumulative effects would be in timing; this project would be expected to come on line sooner than other large water users.

Currently, in the event that nitrate (or other contaminant) concentrations rise to levels of concern in one of the wells at the municipal well field, the City could continue to provide service with minimal disruption to its customers, except in periods of peak demand, by adjusting its pumping. However, as water use increases, the problem would be more difficult to resolve since the City's flexibility in meeting water demands through adjusting pumping from its wells would decrease. The large S2GF water demand (requiring pumping from both well fields), combined with increasing water supply demands from other users, may expedite the need for the City to develop contingency plans for meeting its water demands in the event of a loss of one or more wells. Presumably, this need would arise eventually, with or without this project, as the City increases its customer base to meet the full capacity of its water rights.

If the S2GF project is certified and built, SE2 has agreed that if nitrate levels in the City's potable water supply increase to exceed applicable federal, state, or local water quality standards, they would fully compensate the City for the cost of installing a water treatment system to remove the nitrate. They have also agreed to pay the City $25,000 per year of operation to be used solely for the purposes of aquifer protection and research and analysis to support future water right applications.

### 3.2.7 Significant Unavoidable Adverse Impacts

Given the uncertainties surrounding groundwater and flooding impacts resulting from the construction and operation of S2GF, a conclusion regarding the significance of adverse impacts upon water resources is not possible. If the project were built, S2GF should provide for compensation for any groundwater depletion, decrease in water quality or possible flood damage resulting from its construction and operation.