3.3 Groundwater Quantity

3.3.1 Existing Conditions

The hydrogeologic setting of the project area and the city of Sumas public water supply are discussed in detail in Sections 3.2.2.2 and 3.2.2.4, respectively, of the FEIS. The following discussion focuses on those aspects of the aquifer and city well fields proposed to provide sufficient water for this project.

The city of Sumas obtains its water supply from two well fields: potable water is obtained from the Sumas municipal well field, and water for industrial purposes is obtained from the May Road well field. Both well fields extract groundwater from the Sumas-Abbotsford aquifer, which occupies a near-surface sand and gravel deposit that underlies much of the surrounding region (see Figure 3.2-2). Currently, the combined maximum hourly consumption rate from the city's well fields is 2,654 gpm, with a peak daily rate of 2,070 gpm. The average annual demand is 1,987 acre-feet.

The Sumas-Abbotsford aquifer supplies water not only to the city of Sumas wells, but also to municipal wells in Abbotsford and to hundreds of private and commercial wells in the Sumas and Abbotsford area. Wells in this aquifer tend to be relatively shallow – most are less than about 100 feet deep, and the water table ranges from less than 10 to over 50 feet deep, with seasonal fluctuations of several feet. Residential wells tend to be considerably shallower because of the relatively low volume water supply requirements for residential use. Yields from wells in this aquifer can vary from over 1,000 gpm to as little as a 5 to 10 gpm, depending on the local characteristics of the aquifer and the well installation. The higher-yield wells are typically commercial or municipal wells, or farm wells that are used to irrigate croplands.

SE2 has received a commitment from the city of Sumas to supply industrial-quality water for the S2GF at a maximum instantaneous rate of 802 gpm, up to a total of 1,025 acre-feet per year. To meet this commitment, the city plans to supply water to the S2GF from its two city well fields. Based on the 1999 city of Sumas Comprehensive Water Plan, the water supply that is available from these well fields is adequate to meet SE2's and the city's 20-year projected requirements. However, SE2 would provide a 500,000-gallon equalizing and standby storage tank that can be filled during nonpeak hours and used if peak demands are higher than anticipated and exceed the limitations imposed by the city's water rights.

3.3.2 Changes Related to Groundwater Quantity

The water supply requirement for the S2GF, as reported in the Second Revised ASC, has been reduced from that previously indicated in the FEIS and Revised ASC of January 2000. Specifically, the maximum demand for the proposed facility has been reduced

from 849 gpm to 802 gpm, and the total annual usage has been reduced from 1,053 acre-feet to 1,025 acre-feet.

In addition to the reduction in groundwater usage, the applicant has committed to providing mitigation for any nearby private wells where the current groundwater use is impaired by increased drawdown resulting from the additional pumping related to the S2GF from the Sumas well fields. This proposed mitigation measure is described more fully in Section 3.3.4.

3.3.3 Environmental Impacts

The large volume of groundwater that would be extracted from the Sumas well fields to supply the S2GF would result in increased drawdown in the immediate area surrounding the well fields. Although this drawdown would likely result from pumping interference rather than aquifer depletion, it would be, in effect, a permanent condition because the well fields would be pumped continuously at high rates.

To evaluate the extent of the area that the increased pumping could affect, Robinson & Noble (2000) calculated a radius where 1 foot of drawdown would theoretically occur in response to pumping the city well fields at their full allocation (which would actually not be needed for several years). From this analysis, they concluded that a drawdown of 1 foot or more theoretically would be limited to an area within approximately 1 mile of the Sumas municipal well field, as shown in Figure 3.3-1. In their analysis, Robinson & Noble also identified five residential wells and one water right within this radius on the Washington side of the border. Numerous additional wells are believed to be located within this radius to the north of the border. The actual number of Washington wells has not been confirmed, nor is it known how many wells exist within this 1-mile radius in Canada.

Although the hydrologic analysis performed by Robinson & Noble indicates the magnitude of the potential impact of increased pumping, SE2 has not yet obtained sufficient hydrogeologic information to determine how much additional drawdown would occur in any particular location. Likewise, SE2 has not yet obtained sufficient information to evaluate what the impact of a given amount of drawdown would have on the availability of groundwater to nearby wells, or to what extent the uses of any existing wells would be impaired by the increased pumping. Much of the needed information may be provided in the studies associated with the mitigation plan proposed by SE2 (see Section 3.3.4).

The actual impact that the increased pumping would have on any nearby private or commercial well would depend on several factors. These include the amount of drawdown of the water table; local hydrogeologic conditions; the depth of the well, position of the pump intake and length of the screen relative to the water table; and the amount of groundwater that is currently extracted from the well. For shallow wells, drawdown is more likely to result in a reduction or loss of currently available well water.

Figure 3.3-1

It would be much less likely that deeper wells that obtain groundwater from far below the shallow water table would be affected appreciably.

The increased pumping rate from the May Road well field would reduce the natural discharge of groundwater to Johnson Creek in the immediate vicinity of the well field. This reduction would be mitigated in compliance with a condition of the city's water right, which requires that 18% of the water extracted be returned directly to the stream. Because of this mitigation, any reduction to baseflow in Johnson Creek is not likely to be significant. Similarly, because there are no surface water bodies other than Johnson Creek within the theoretical zone of drawdown interference from both of the city's well fields, there is not likely to be any significant impact to other nearby streams. Although there would likely be a small reduction of groundwater available for baseflow discharge to the Sumas River, considering the distance from the city's well fields to the river and the large area that provides recharge to that system, the impact is not likely to be perceptible.

3.3.4 Mitigation Measures

Although SE2 maintains that adverse impacts to private or commercial water wells are unlikely, it has agreed to perform pre- and post-operation monitoring to evaluate the impacts to wells, both in Washington and in Canada, that could result from the increase in pumping of city of Sumas well fields. SE2 has also agreed to provide mitigation for wells that are determined to be adversely affected as a result of the city's increased rate of water withdrawals to supply water for the S2GF.

At least 12 months prior to operation, SE2 would install a set of dedicated monitoring wells for the city of Sumas municipal and May Road well fields. These monitoring wells would be outfitted with pressure transducers and data loggers to provide continual monitoring of the water level response resulting from well field production. The monitoring well locations would be selected to provide both near and distant water level responses, according to the well field characteristics. These monitoring wells would be used during a controlled test of the two city well fields to confirm the zone of interference from withdrawals for the S2GF. Any additional areas of potential interference identified through this testing would be added to the pre- and post-operation monitoring network.

The applicant's proposed pre-operation monitoring would also begin at least 12 months prior to operation. At that time, a baseline survey of all wells within a 1-mile radius of the Sumas municipal well field would be conducted. The actual area that would be included in this survey would be adjusted based on the results of a controlled aquifer test, described above. Accordingly, the theoretical 1-mile radius shown in Figure 3.3-1 would be adjusted to provide monitoring of any well that potentially would have at least 1 foot of drawdown as a result of the increased pumping. The survey would seek to identify and characterize all wells that could be affected on both sides of the international border. Pertinent information on each well would be documented, including approximate elevation, current and historic usage, and the distance from each of these wells to the city of Sumas municipal and May Road well fields. Where information on subsurface geologic conditions and well construction is available for individual wells, such

information would also be collected. With the consent of the well owners, the depth to water and total well depth in each well surveyed would be measured at least quarterly to determine background conditions.

The continuous measurement of the monitoring wells, combined with the quarterly measurements from wells identified during the baseline survey, would be used to define the site-specific water level changes that are occurring over time due to seasonal fluctuations. These measurements would also be used to determine water use patterns prior to operation of the S2GF.

After the S2GF commences operation, monitoring of all of the wells within the updated potential zone of interference whose owners consented to pre-operational monitoring would be performed monthly for the first year of plant operation. SE2 would provide an interim report to EFSEC at the end of 60 days, providing an evaluation of any short-term impacts to wells that had resulted from the increased pumping. At the end of the S2GF's first operational year, SE2 would also submit a report providing EFSEC with the results of the first year of monitoring. If any of these wells are adversely affected by the city's increased water withdrawals, SE2 would submit, for the Council's review and approval, a mitigation plan to replace lost well production capacity and prevent further loss.

Mitigation measures could include lowering the pump intake in the well to restore yield; increasing pump motor horsepower; well redevelopment or rehabilitation to improve efficiency of production; installing a replacement well to tap a deeper aquifer system (where present) or relocation of a well to tap an area of the same aquifer with higher yield; providing additional water reserve; or paying for hook-up to public water, as warranted and appropriate. In the event that a well owner suffered adverse impacts as a result of the increased pumping, regardless of the timing, SE2 would respond immediately to evaluate these problems and implement an appropriate mitigation measure.

After the initial year of operation, monitoring would be performed semi-annually except for areas of concern noted in the initial annual summary, which would be monitored more frequently. Annual summaries would be provided to EFSEC for the following 4 years of plant operation, and any necessary mitigation measures would be proposed, consistent with the procedures established for the first year of operation.

3.3.5 Significant Unavoidable Adverse Impacts

Groundwater extraction for consumptive use would necessarily result in a reduction of the amount of groundwater available for wells. The use of that groundwater for this facility would essentially preclude other new commercial, municipal, or industrial water users from being able to obtain large quantities of water from the city of Sumas unless the city is able to increase the water rights that are available to it. It may also limit groundwater use from new private wells in the immediate vicinity of the city's well fields. Currently, obtaining water rights for large quantities of water in the Sumas area would likely be difficult to accomplish. Given the limited quantity of water currently

available to the city, the lack of water available to other large water users as a consequence of providing water to this project (as specified in the city of Sumas Comprehensive Water Plan) is a significant unavoidable adverse impact to future development potential.

Groundwater extraction for consumptive use would also result in a reduction of the groundwater resource that is available for baseflow discharge to surface water, particularly during the dry months of the year. This impact would likely have a small effect on the Sumas River but not the smaller tributary streams. However, given the relatively small amount of water that would be used for this facility relative to the amount of recharge and water in the aquifer as a whole, the impact of this additional withdrawal would be unavoidable but not likely significant.