

Responses to Comments in Letter CF1 from Kirk Johnstone, Environment Canada

Note: The responses listed below are numbered to correspond to the numbers shown in the right-hand margin of the preceding comment letter.

1. This comment is outside the scope of this SEIS.
2. Section 3.1 has been revised to indicate that there is broad consensus among atmospheric scientists that global warming is actually occurring.

Note that after the Draft SEIS was published, SE2 updated the specific provisions of its proposed greenhouse gas mitigation program. The updated program would provide less funding than was indicated in the Draft SEIS. Section 3.1 has been revised to address the updated proposal. In addition, Section 3.1 has been revised to compare SE2's proposed mitigation program to other greenhouse gas offset programs that currently operate in the region.

3. The radius of interference calculations for the 1-foot drawdown are meaningful, necessary, and theoretical. They provide only an estimate of the area that could potentially be affected by extraction of the groundwater required to operate the S2GF. In reality, only through monitoring during actual pumping would it be possible to improve an understanding of the distribution of drawdown. The applicant's proposed groundwater monitoring program would be designed to provide an evaluation of the actual effects of pumping. Through initial studies in the year before startup of the facility, this monitoring program would be refined, as necessary, to better evaluate where impacts could occur and the area of interference would be adjusted.

A large percentage of the water that would be extracted from the city of Sumas wells is derived ultimately from precipitation falling on Canadian soil. This is also the case currently, and is a function of the natural groundwater flow direction rather than groundwater withdrawal from the city of Sumas wells. The groundwater in the Sumas-Abbotsford aquifer naturally flows southeastward from the uplands northwest of Sumas toward the Sumas River valley, and would continue to do so even without any wells on the Washington side of the border. However, this groundwater flow pattern does not imply that groundwater drawdown would be greater in Canada, nor does it indicate that the range of interference would be greater in Canada. As stated in the SEIS, the groundwater response to pumping is strongly dependent on the hydrologic properties of the aquifer. Since recharge is largely from the northwest and the groundwater gradient is moderately steep, all other things being equal, the water table drawdown would be expected to be somewhat less on the upgradient side of the well (toward Canada) than toward the southeast (Washington).

4. Robinson and Noble prepared the map showing the theoretical zone of interference based on the proposed pumping from the city of Sumas well fields. The zone of interference is based upon relatively short-term pumping tests and an understanding of the overall hydrogeologic conditions of the aquifer. The results provide a credible estimate of the area within which drawdown of this magnitude could be expected. While this interference map could be refined to provide a somewhat better estimate, it would require an extensive hydrogeologic study involving subsurface geologic investigations, installation of numerous monitoring wells, and a substantially longer pumping test. Although such a study would likely improve the estimated area of drawdown, it would not preclude the need to perform the proposed monitoring before and during plant operation to determine what the real impacts of the increased pumping would be. In weighing the benefits of such a study, it should be noted that it is unlikely that a foot of drawdown would impair the use of any private or commercial wells unless they are very shallow. In that event, the impact could be mitigated by simply deepening the affected wells, as the applicant has proposed to do.
5. The SEIS has been revised to clarify that the applicant would provide monitoring and mitigation, as necessary, for wells in both Canada and Washington, and that the specific wells to be monitored would be identified as a first step in the monitoring program. The commitment from the applicant for monitoring and mitigation would be included in the SCA if the certificate is recommended to the Governor. As indicated in the SEIS, groundwater monitoring would be performed quarterly in all wells (where access is granted) within the predicted zone of interference for 1 year before project startup, and monthly for a year thereafter. The frequency of monitoring would be adjusted as warranted thereafter, and would be subject to EFSEC review and approval.
6. Based on the predicted limited extent of drawdown in response to the increased pumping that would be required to meet the needs of the S2GF, the area that could potentially be affected by a perceptible reduction in baseflow is very small. Due to the depth of groundwater and the distribution of streams in the area, this potential is further restricted to a very limited set of conditions under which surface discharge could actually occur. Specifically, the only place where discharge to surface waters is occurring in the area of potential interference is along the bluff on the northwestern edge of the Sumas valley. Upgradient of the bluff the water table is too deep to contribute to base flow and downgradient from it the aquifer is confined below a sequence of fine-grained sediments.

This natural surface discharge along the bluff is reduced by pumping from the city's wells. Consequently, as a condition of its water right, the city is required to mitigate this loss of discharge in proportion to the amount of water withdrawn from the aquifer in that area. The terms of the water right require that 18% of the water pumped must be returned to Johnson Creek. This percentage was established based on monitoring of the spring discharge during an aquifer pumping test in which the city's well was drawn down in stages.

7. Figure 3.2-1 shows the groundwater capture zone for all water entering the Sumas wells. The 1-mile radius shown in Figure 3.3-1 represents the theoretical drawdown if all flows toward the wells were equal. Actual drawdown at any location is not known and can only be determined through further testing.

The approximate location of the geologic profile shown in Figure 3.2-2 is shown in Figure 3.2-1 of this Final SEIS.

Figure 3.3-1 has been revised to show the theoretical zone of interference as it extends above the international border and a scale has been added to the figure.