Ministry of the Environment and Climate Change
West Central Region

119 King Street West
12th Floor
Hamilton, Ontario L8P 4Y7
Tel.: 905 521-7640
Fax: 905 521-7820

Ministère de l'Environnement et de l'Action en matière climatique
Direction régionale du Centre-

119 rue King ouest
12e étage
Hamilton (Ontario) L8P 4Y7
Tél. : 905 521-7640
Téléc. : 905 521-7820

September 18, 2017

MEMORANDUM

TO: Belinda Koblik
Director, OWRA Section 34
West Central Region

FROM: Sarah Day
Surface Water Specialist
Technical Support Section, West Central Region

RE: Nestle Waters Canada Aberfoyle 2016 Annual Monitoring Report

I have reviewed the following documents for surface water issues with regard to the permitted pumping by Nestle Waters Canada in Aberfoyle, Township of Puslinch:

- *2016 Annual Monitoring Report Nestle Waters Canada Aberfoyle Site*, Golder Associates Ltd. (March 2017)
- *Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006-2016*, C. Portt and Associates (March 2017)
- *2016 Biological Monitoring Program Nestle Waters Canada Aberfoyle Property*, Beacon Environmental Limited and C. Portt and Associates (March 2017)

I have also referred to information in the surface water file AP 28 PU NE and PTTW 1381-95ATPY.

Comments and Recommendations

1. Multi-level piezometer water levels in 2016 at the new reference location (MP1-16) began decreasing in May until it reached a low in July. After July water levels in the shallow piezometer remained consistent until November after which water levels increased slightly (similar to water level trends in MP11), with the exception of increases due to precipitation events, while water levels in the deep piezometer began increasing in mid-July until September after which it remained consistent for the

remainder of the year. It is unclear why there is a difference in water level trends between the shallow and deep piezometers but the shallow piezometer trends follow changes in climatic conditions (e.g. above average precipitation in March and below average precipitation from May to November, except August). Consideration should be given to the influence of pumping by Aberfoyle Meadows on the deep piezometer of MP1-16. The magnitude of water level change in 2016 at MP1-16 (shallow) was ~0.65 m. Water levels in 2016 at MP16, MP6, MP12, MP14, MP8, MP17 and MP18 experienced the same type of climatic trends as MP1 (shallow) with an increase in water levels in March due to the above average precipitation received, a decrease in water levels from May to November due to the below average precipitation received with the exception of August which experienced an increase in water levels due to the large amount of precipitation received in that month, followed by an slight increase from November to December. MP19 followed a similar trend until August after which water levels slowly increased from September to December. Water level change ranged from 0.75 to 1.1 m at MP16, MP6, MP12, MP14 and MP19 which is greater than that experienced at MP1 but was similar to MP1 at MP8, MP17 and MP18 with water level changes ranging from 0.6 to 0.7 m. The decrease in water levels experienced over the summer appear to be directly related to the below average precipitation received and not to pumping however the increase in water level in November and December coincide with both an increase in precipitation as well as a decrease in pumping rates.

2. Vertical hydraulic gradients in 2016 at MP1 were upward and experienced an increase in the upward gradient in early July which continued until mid-September. This pattern appears to be driven by the changes in water level in the deep piezometer noted in comment #1. The vertical hydraulic gradient trend at MP1 is not similar to the trend noted at MP11 which showed an increase in the upward gradient in April followed by a decline, then another increase in the upward gradient in mid-June followed by a decrease in mid-July another small increase in mid-August and fairly steady gradient conditions from September to December.

   There were very minor upward (March-June) to no gradient at MP16 in 2016 for the majority of the year and a very weak downward gradient in late October to December. There continued to be no real trend to the vertical hydraulic gradient data (i.e. essentially constant or flat line). This condition at MP16 may be a result of the influence of Aberfoyle Mill Pond on maintaining consistent water levels between the shallow and deep depths.

   Vertical hydraulic gradients in 2016 in the middle portion of Aberfoyle Creek (MP6, MP12, MP14) experienced similar trends between MP6 and MP14 from January to mid-July after which MP6 and MP12 experienced similar trends from August to December. MP6 and MP14 generally followed similar trends to MP11 however MP12 followed a similar pattern to MP1 but with large increases in vertical hydraulic gradient occurring at differing times (e.g. July to August at MP1 vs May to June at MP12). MP6 and MP14 experienced weak upward to no gradient for the majority of

the year with the exception of a weak downward gradient at MP14 in mid-July to mid-August and at MP6 from October to December. MP12 experienced weak downward to no gradient over the year. Between May and August during dry conditions, the magnitude of vertical hydraulic gradient change at MP6 (0.03 m/m), MP12 (0.08 m/m) and MP14 (0.07m/m) were similar to changes noted at MP1 (0.12 m/m) and MP11 (0.07 m/m) suggesting that the changes seen are related to climatic influences more so than influences of pumping.

Vertical hydraulic gradients in 2016 in the lower portion of Aberfoyle Creek (MP8, MP17, MP18 and MP19) were unique at MP8 and MP19 while MP17 and MP18 followed a similar trend as MP14 and MP11. MP8 experienced a weak to strong upward gradient throughout the year while MP19 experienced mainly a weak upward gradient. Both MP17 and MP18 experienced a weak downward gradient over the year with the exception in April likely related to the increased precipitation in late March. Between May and August during dry conditions, the magnitude of vertical hydraulic gradient change at MP17 (0.07 m/m), MP18 (0.07 m/m) and MP19 (0.06 m/m) were similar to changes noted at MP1 and MP11 suggesting that the changes seen are related to climatic influences more so than any influence from pumping. However, vertical hydraulic gradient changes at MP8 experienced a much larger change between May and August of ~0.34 m/m which appears to be driven by the large decrease in water level experienced in the shallow piezometer during this time. As this water level change is greater in the shallow piezometer compared to the deeper piezometer, it is likely that climatic conditions, rather than pumping conditions, is strongly influencing the water level at this location and thus the magnitude of the vertical hydraulic gradient change.

3. Flows in 2016 were generally higher downstream compared to upstream. Pumping by Nestle was fairly consistent March through to November and overlaps with periods of minimal precipitation (i.e. May to November, except August). A comparison of 2016 flow data to historical data (2012-2015) does not indicate that there is a declining trend in flow. Therefore, there does not appear to be a significant impact to flows in Aberfoyle Creek as a result of pumping by Nestle during 2016.

4. Air and surface water temperatures were higher in 2016 compared to the previous years sampled (2006-2015). The consultant has indicated that surface water temperatures decrease as the water moves downstream however water temperatures in Figure G1b show that from June to August, Stn 3, Stn 4 and Stn 5 (which are located in the lower reach of Aberfoyle Creek) were warmer than Stn 6, Stn 1 and Stn 2 (upstream) and differs from previous years. Further explanation should be provided for this occurrence (e.g. discharge of process or Nestle pond water to the creek). Overall, water temperature in Aberfoyle Creek continues to be dominated by air temperature and Aberfoyle Mill Pond and that any potential impact to water temperature as a result of pumping is not apparent.

5. Surface water temperature in the Nestle Waters stretch of Aberfoyle Creek continue to show that water temperature is too warm for cold-water species, such as brook and brown trout, and is most favourable for intermediate species such as the common shiner.

6. The above noted biological monitoring report satisfies condition 4.4 of PTTW 1381-95ATPY. No evidence was found of salmonid spawning in the Nestle reach of Aberfoyle Creek and is consistent with data from 2007-2015. I do not have an objection to the recommended biological monitoring for 2017. Condition 4.4 from PTTW 1381-95ATPY should be included in the renewed PTTW.

7. I am in agreement that MP11 and MP1 continue to be monitored in 2017 and that the surface water monitoring program should continue as outlined in PTTW 1381-95ATPY.

8. The renewed Permit should be updated to reflect the correct identification of MP17 and MP18 which are as follows: MP17S/D-11 and MP18S/D-11.

Should you have any questions or comments or require additional information, please feel free to contact me at (905) 521-7304 or Sarah.Day@ontario.ca.

Regards,

Sarah Day, M.Sc.

Cc Belinda Koblik, Supervisor, Water Resources Unit
Michael Spencer, Surface Water Group Leader