TOWNSHIP OF
PUSLINCH
EST. 1850

Ministry of the Environment, Conservation and Parks
Environmental Registry of Ontario

Permit To Take Water No. 1381-95ATPY for Triton Water Canada Holdings, Inc. for bottling water purposes

Township of Puslinch
7404 Wellington Road 34
Puslinch, ON N0B 2J0
www.puslinch.ca

June 22, 2021

RE: Report ADM-2021-042 Triton Water Permit to Take Water Renewal

Please be advised that Township of Puslinch Council, at its meeting held on June 16, 2021 considered the aforementioned topic and subsequent to discussion, the following was resolved:

Resolution No. 2021-185: Moved by Councillor Sepulis and Seconded by Councillor Goyda

That report ADM-2021-042 Triton Water Permit to Take Water Renewal be received: and

Whereas the Township of Puslinch is in receipt of and endorses the following:

(i) Report ADM-2021-042 Triton Water Canada Holdings, Inc. (formerly Nestle Canada) Permit to Take Water Application by Kyle Davis, Risk Management Official dated June 9, 2021, as revised; and

(ii) Report NWC Waters Canada – 2020 Monitoring Report and 2019 PTTW Application Review by Stan Denhoed of Harden Environmental Services Ltd. Dated June 9, 2021 subject to a supporting supplementary report to be provided by Stan Denhoed of Harden Environmental Services Ltd.

That the report, including the revisions as discussed by Council and the supporting supplementary report, be provided as the Township's formal comments to the ERO No. 019-3531 Permit Take Water No. 1381-95ATPY for Triton Water Canada Holdings, Inc. for bottling water purpose by June 22, 2021.

CARRIED

TOWNSHIP OF
PUSLINCH
EST. 1850

As per the above resolution, please accept a copy of this correspondence for your information and consideration.

Sincerely,
Courtenay Hoytfox
Municipal Clerk

Enc:

1. Report ADM-2021-042 Triton Water Canada Holdings, Inc. Revised June 17, 2021
2. Harden Environmental Report dated June 9, 2021
3. Figures – Vulnerable Areas Mapping
4. Permit to Take Water – Nestle Canada (Triton Water)
5. Low Water Response Conditions from Nestle Canada (Triton Water) Erin PTTW
6. Supporting Supplementary Report prepared by Stan Denhoed of Harden Environmental Services Ltd. June 21, 2021

REPORT ADM-2021-042 - REVISED

TO: Mayor and Members of Council

FROM: Kyle Davis, Risk Management Official

MEETING DATE: June 16, 2021

SUBJECT: Triton Water Canada Holdings, Inc. (formerly Nestle Canada) Permit to Take Water Application

RECOMMENDATION

That Report ADM-2021-042 regarding "Triton Water Canada Holdings, Inc. (formerly Nestle Canada) Permit to Take Water Application" be received for information; and

THAT Council direct staff to submit comments to the Province by the commenting deadline incorporating all comments from Kyle Davis' Report as well as the following comments from the Harden Environmental Report _____.

Summary

Triton Water Canada (formerly Nestle) is applying to renew their existing Permit to Take Water for 10 years. There is no expansion of the water taking, therefore no Council resolution is required. It is recommended that comments be provided to the Ministry of Environment, Conservation and Parks for their consideration in issuance of the Permit to Take Water.

Background

On April 23, 2021, the Ontario Ministry of the Environment, Conservation and Parks (Ministry) posted on the Environmental Registry of Ontario website, an application to renew the Permit to Take Water (PTTW) for Triton Water Canada Holdings, Inc., formerly Nestle Canada, (Triton Water) at their well located in Aberfoyle in the Township of Puslinch. Concurrently, an application to renew the Triton PTTW for Hillsburgh in the Town of Erin was also posted. Both postings were originally set to expire on June 10, 2021, however, were extended by the Province until June 22, 2021 (a 60 day posting). Both applications are to renew existing PTTWs, at existing permitted rates, for 10 years. The Triton Puslinch PTTW application is available on the Environmental Registry of Ontario website at https://ero.ontario.ca/notice/019-3531

In 2020, the Province of Ontario amended the Ontario Water Resources Act and associated regulations to require a resolution of support from municipal Councils for new or expanded bottled water taking PTTWs greater than 379,000 litres per day. Although the Triton Puslinch PTTW application is for a maximum volume of approximately 3.6 million litres per day (3,600,000 litres per day), this application is a renewal of the existing PTTW and therefore no municipal Council resolution is required to be submitted to the Province.

The Triton Puslinch well (TW3-80) has been operating since 1980, although originally for an aquaculture (fish farming) operation. Nestle Canada (now Triton Water) have held PTTWs for this well since 2001. A second supply well (TW2-11) is also present on the property, however, Triton Water does not propose to take water for water bottling from TW2-11 and instead lists it for miscellaneous uses such as fire protection under the current PTTW and this application. Under the current PTTW, the Ministry requires annual groundwater and surface water monitoring reports and a well interference protocol. In 2009, the Township of Puslinch established a Well Protection Agreement and Committee with Nestle Canada to address any well interference complaints. According to the PTTW application and supporting report, annual water takings for Triton Water (formerly Nestle) have averaged 1.8 million litres (1,810,470 litres) daily between 2009 and 2018. The annual water takings since 2002 have ranged between 43 to 67% of the current annual maximum permitted taking of 1.3 billion litres (1,314,000,000 litres), however, there are monthly periods when water takings are at a higher percentage.

The following report provides staff comments for Council's information and discussion regarding the Triton Puslinch PTTW application. The staff comments provided are not a technical review of the hydrogeological, engineering or ecological aspects of the application, however, the application and the supporting report were referenced in the development of these comments. The supporting report is entitled Nestle Waters Canada – Aberfoyle – Technical Study for Permit to Take Water Renewal Application dated June 2019 by Golder Associates Ltd and includes a modelling report by Matrix Solutions Inc. The supporting report is dated 2019 because the Ministry's consideration of the application was delayed due to the water bottling moratorium. A technical review of the Triton Puslinch application, supporting documents and modelling results was conducted by the Township hydrogeologist, Harden Environmental and is included in Attachment 1.

The Triton Puslinch well and property are located near the hamlet of Aberfoyle and just north of the Aberfoyle / Highway 401 industrial park. As the Township of Puslinch is not municipally serviced, there are a large number of private wells for residential, commercial, institutional and industrial purposes in close proximity to the Triton Puslinch property. These private wells service a range of land uses from individual residences (ie domestic use), non-municipal residential drinking water systems to elementary schools, commercial businesses and industrial operations including manufacturing, warehousing and aggregate. A number of the non-municipal residential

drinking water systems, commercial and industrial uses also have PTTWs and this is discussed in Triton Water's PTTW application.

The Triton Water property is approximately 7 kilometres south east of the nearest City of Guelph municipal well (Burke well) and 3.2 kilometres south east and east of the edge of the City of Guelph municipal wellhead protection areas for quality. The Triton Puslinch property is not located within any municipal wellhead protection areas for quality. The Triton Puslinch well is also approximately 4.5 kilometres from the approximate location of a proposed future City of Guelph municipal well (proposed in the vicinity of Maltby Road and Victoria Road South). The Triton Puslinch property is completely located within a Significant Groundwater Recharge Area (SGRA) and a draft Wellhead Protection Area – Quantity (WHPA-Q) as identified pursuant to the Clean Water Act. It is not located in an identified Highly Vulnerable Aquifer. Please see Attachment 2 for further detail. The applicable source protection plan is the Grand River Source Protection Plan – Wellington County Chapter.

As part of the PTTW application process mandated by the Province, Triton Water was required to update and run a hydrogeological model to estimate potential impacts from the water taking. To achieve this, Triton Water updated the Guelph / Guelph / Eramosa Tier 3 model as the property and well are located in the Wellhead Protection Area – Quantity for the City of Guelph. Modelling scenarios were run to estimate the potential drawdown at the nearest City of Guelph municipal well (Burke well) during average and drought climate conditions. Climate change scenarios were also modelled. Results presented in the Triton Water application indicated no impact to the Burke well if pumping was increased from current rates to maximum permitted rates, a 3% reduction in groundwater discharge to surface water and greater amounts of groundwater recharge under the climate change scenarios.

Comments and Recommendations

The following section has been revised from the report presented in the June 16, 2021 Puslinch Council agenda package to reflect Council's comments and direction given during the June 16, 2021 Council meeting.

Staff note that the application is for a 10 year renewal. Council discussed this matter and have directed staff to ask the Ministry for a 5 year PTTW renewal. This is in line with previous Council direction on this matter and ensures some stability for Triton Water while ensuring there is another opportunity for Council to comment on the PTTW in the near future.

It is recommended that the Township forward Harden Environmental' s report to the Ministry and request that the Ministry consider and incorporate those comments in their review of the Triton Puslinch application and to add appropriate terms and conditions to the PTTW.

It is further recommended that the Ministry ensure they consider all of the vulnerable areas identified pursuant to the Clean Water Act that the Triton Puslinch property is located within. In particular, this includes a Significant Groundwater Recharge Area (SGRA) and a draft Wellhead Protection Area – Quantity (WHPA-Q). The Wellhead Protection Area – Quantity is currently draft and a project is ongoing, led by the Grand River Conservation Authority, to develop water quantity policies that would apply in the draft Wellhead Protection Area – Quantity. However, draft water quantity policies are already publicly available within the Wellington County Chapter of the Grand River Source Protection Plan as it pertains to the Centre Wellington Wellhead Protection Area – Quantity. Draft policy WC-MC-22.1 in the Wellington County Chapter of the Grand River Source Protection Plan pertains to existing PTTWs.

It is recommended that the Ministry consider the draft policy text referenced below and add terms and conditions to the PTTW, where appropriate. The Ministry should also consider the location of the Triton Puslinch well in proximity to SGRA and add appropriate terms and conditions as required.

For reference, please see the draft PTTW policy wording WC-MC-22.1 below:

"To ensure that any Consumptive Water Taking ceases to be a significant drinking water threat, where this activity is a significant drinking water threat as prescribed by the CWA, the MECP shall review and, if necessary, amend existing PTTWs and / or Drinking Water Works Permits to ensure that the Municipal Supply will not be adversely impacted, taking into consideration Tier 3 Study results / recommendations, water supply requirements for planned growth and prolonged drought outlined in Water Supply Master Plans and available data, reports and / or recommendations from monitoring programs established pursuant to policies in the County of Wellington Chapter of the Grand River Source Protection Plan. The MECP, where appropriate, shall consider establishing conditions in PTTWs and Drinking Water Works Permits to achieve this objective including but not limited to conditions which require:

a) groundwater and surface water monitoring related to municipal drinking water supplies;
b) assessment of demand management: water needs assessment (review of permitted maximum takings) and water efficiency measures;
c) a phased approach to assess impacts;
d) information sharing with the MECP, Municipalities and conservation authorities including a condition of approval for permit holders to provide Municipalities and conservation authorities technical reports and monitoring data gathered pursuant to a condition of the PTTW (as per bullet a.) above);
e) measures to increase the optimization of the municipal water supply system where appropriate; and
f) drought management planning for drought sensitive wells/systems

The MECP shall circulate Environmental Registry notices for proposed new or amended PTTWs and Drinking Water Works Permits to the Municipalities and GRCA and have due regard for comments from the GRCA and the Municipalities regarding proposed new or amended PTTWs and Drinking Water Works Permits and new or revised conditions of approvals related thereto."

Regarding existing PTTW conditions in the Triton Puslinch PTTW (Attachment 3), staff are supportive of retaining detailed monitoring, annual reporting and complaint conditions in the PTTW. It is noted that the current Well Protection Protocol between Nestle and the Township is not explicitly referenced in the PTTW conditions. Additionally, it is noted that the Township is not listed as receiving a copy of the annual report in the PTTW. It is understood that both the Well Protection Protocol and the annual report being submitted to the Township are voluntary actions by Nestle (now Triton Water) not required by the PTTW. The current PTTW conditions require response to well interference complaints but not explicitly the Well Protection Protocol and submission of the annual report to the Ministry, not the Township. The Township, however, does receive the annual report from Nestle (now Triton Water) promptly. Regarding the Well Protection Protocol, Council directed staff that they do not wish to see this protocol listed as a PTTW condition as it is a voluntary, good will program by the applicant and Council feels the well interference conditions are sufficient. Council did direct staff, given the ownership change, to request the Ministry make submission of the annual report to the Township a condition of the PTTW.

Additionally, it is noted the Nestle (Triton Water) PTTW for their Erin well includes conditions 3.4 and 3.5 that require a reduction of water takings in accordance with Grand River Low Water Response Team declarations of Level 1, 2 or 3 drought (Attachment 4). These PTTW conditions are not present in the current Nestle (Triton Water) PTTW. It is understood that Harden has provided some recommendations in this regard, specifically adding similar conditions to the Triton Puslinch PTTW and basing those conditions not on the maximum taken per day but the Province's 2017 interim guidance for water bottling permits (now revoked) which recommended a reduction based on the previous three month water taking. Staff agree with the Harden Environmental recommendation that the Ministry be requested to insert PTTW conditions related to Grand River Low Water Response Team declarations and that the reductions in water taking be in line with the 2017 interim water bottling guidance. Council discussed this at length and discussed the Harden Environmental recommendations related to this. Council directed staff to leave this recommendation as is in both this report and the Harden Environmental report.

Council further directed staff to comment to the Ministry that for low water response reductions to be meaningful, the reductions should start from a different threshold than maximum permitted taking as most takers, including Triton Water, do not reach their maximum permitted taking. It is recommended the Ministry consider this in their decision regarding the permit conditions for this PTTW. Council has directed staff to begin making a comment on other PTTWs in the Township that recommends to the Ministry that low water response conditions be considered, where appropriate. The decision would be for the Ministry and they could consider

site specific situations for each PTTW in case low water response conditions were not appropriate for certain PTTWs.

At this time, the Province has not indicated whether they will consider an area water management strategy under the Ontario Water Quantity Management Framework that was recently approved in April 2021. Although linked to this PTTW application, an area water management strategy is a separate issue. It should be noted that staff level working group or information sharing policies are drafted for the draft Wellhead Protection Area for Quantity that includes the Township and this and other PTTW locations. Those policies include Township, County, adjoining municipalities (including the City of Guelph and Region of Waterloo) and the Ministry and are likely a good starting point for area management discussions as well as implementation of Source Protection Plan policies. However, as those policies are draft there is no timeline for when that would begin. It is anticipated there will be draft versions of these policies presented to the Lake Erie Source Protection Committee shortly.

Summary of Recommendations

It is recommended that Ministry staff consider the following in the issuance of the Triton Water Puslinch Permit to Take Water.

1. The renewal period for the PTTW be 5 years.

2. Ministry consider and incorporate the recommendations and comments from the attached Harden Environmental report plus supporting documentation and add appropriate terms and conditions to the PTTW.

3. Ministry ensure they consider all of the vulnerable areas identified pursuant to the Clean Water Act that the Triton Puslinch property is located within. In particular, this includes a Significant Groundwater Recharge Area (SGRA) and a draft Wellhead Protection Area – Quantity (WHPA-Q).

4. Ministry consider the draft policy text referenced above (draft policy WC_MC-22.1) and add terms and conditions to the PTTW, where appropriate.

5. The Township is supportive of retaining detailed monitoring, annual reporting and complaint conditions in the PTTW.

6. Given the ownership change, it is requested the Ministry make submission of the annual report to the Township a condition of the PTTW.

7. The Township agrees with the Harden Environmental recommendation that the Ministry insert conditions in this PTTW related to Grand River Low Water Response Team

declarations and that the reductions in water taking be in line with the 2017 interim water bottling guidance.

8. It is the Township's position that for low water response reductions to be meaningful, the reductions should start from a different threshold than maximum permitted taking as most takers, including Triton Water, do not reach their maximum permitted taking. It is recommended the Ministry consider this in their decision regarding the permit conditions for this PTTW.

9. Council has directed staff to begin making a comment on other PTTWs in the Township that recommends to the Ministry that low water response conditions be considered, where appropriate.

Financial Implications
Not applicable

Applicable Legislation and Requirements
Clean Water Act

Attachments
Attachment #1: Harden Environmental Report dated June 9, 2021
Attachment #2: Figures – Vulnerable Areas Mapping
Attachment #3: Permit to Take Water – Nestle Canada (Triton Water)
Attachment #4: Low Water Response Conditions from Nestle Canada (Triton Water) Erin PTTW

Harden Environmental Services Ltd.
4622 Nassagaweya-Puslinch Townline
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Phone: (519) 826-0099 Fax: (519) 826-9099

Groundwater Studies
Geochemistry
Phase I / II
Regional Flow Studies
Contaminant Investigations
OMB Hearings
Water Quality Sampling
Monitoring
Groundwater Protection Studies
Groundwater Modeling
Groundwater Mapping
Permits to Take Water
Environmental Compliance Approvals

Our File: 0215

June 9, 2021

Township of Puslinch
7404 Wellington Road 34
Guelph, ON, N1H 6H9

Attention: Mr. Glenn Schwendinger
CAO

Dear Glenn;

Re: NWC Waters Canada – 2020 Monitoring Report and 2019 PTTW Application Review

1.0 Introduction

We are pleased to submit our comments on both the 2020 NWC Waters Monitoring Report and the 2019 Technical Study for the Permit to Take Water Renewal Application. Nestle Waters Canada was purchased by One Rock Capital Partners in 2021, however, our report will continue to refer to the applicant as Nestlé Waters Canada (NWC). The following is our review, and our recommendations are included in bold type. As part of our review, we reference the following documents;

1. *Golder Associates Ltd, March 2021, NWC Waters Canada Aberfoyle Site, 2020 Annual Monitoring Report.*

2. *Beacon Environmental L|TD and C. Portt and Ass., February 2021, 2020 Biological Monitoring Program NWC Waters Canada Aberfoyle Property.*

3. *C. Portt and Associates, February 2021, Examination of the Temperature Suitability of Aberfoyle Creek for Resident Fishes: 2006 -2020.*

4. *Golder Associates Ltd., S.S Papadopulos and Associates, Inc., C. Portt and Associates, Beacon Environmental, June 2019. NWC Waters Canada – Aberfoyle, Technical Study for Permit to Take Water Renewal Application.*

5. *Matrix Solutions Inc., February 2019, Groundwater Modelling Report for Renewal of the Permit to Take Water for the NWC Waters Canada Aberfoyle and Erin Facilities.*

6. *Ministry of the Environment and Climate Change, April 2017. Interim Procedural and Technical Guidance Document for Bottled Water Renewals: Permit to Take Water Applications and Hydrogeological Study Requirements*

7. *Email correspondence between NWC and Harden Environmental (attached)*

8. *Guidance to support area-based water quantity management* and *Guidance to support priorities of water use, available on MECP website.*

TW3-80, the water supply well used to produce NWC products from groundwater obtained from the aquifer beneath Aberfoyle Ontario, was drilled in 1980 for a fish farming operation. The property was purchased by NWC in 2000 for use as a bottled water facility. Since that time six permits to take water have been issued. NWC continues to undertake a comprehensive monitoring program, including additional studies when required, to show that their operation has not adversely affected the environment or other water users. Previous reviews by Harden Environmental Services of the permit applications have concluded that although there are small water level changes in the shallow groundwater system from the NWC taking, the surface water flow volumes and associated natural heritage features associated with surface waters have not been significantly impacted. In addition, although local wells experience some decrease in water levels because of the water taking, the aquifer provides sufficient water such that no residences, businesses or other permitted water takers experience reduced well yields.

1.1 Hydrogeological Setting

A brief introduction to the hydrogeological setting is warranted as the supporting documents and this letter refer to geological units not familiar to everyone.

Table 1 below provides a generalize view of the geology in the area. Note that the extraction well TW3-80 is screened over a very short interval at the top of the Lower Bedrock Aquifer.

Geological Unit	Generalized Geology	Approximate Thickness	Description
Overburden	glacial outwash sand and gravel deposits and stony, sandy glacial till)	12 m	This layer is made up of both very permeable sand and gravel layers and lower permeability glacial till layers. Aggregate mining occurs in the outwash sand and gravels. Aberfoyle Creek and local wetlands are situated on top of the lower permeability till layer. Some local domestic wells get water supply from this layer.
Upper Bedrock Aquifer	Guelph Formation , Reformatory and Stone Road members of the Eramosa Formation, dolostone rock	3m	This layer is regionally extensive and is relatively permeable. Most local domestic wells obtain water from this layer.
Middle Bedrock Aquitard	Vinemount member of the Eramosa Formation, dolostone rock	9 m	The Vinemount is considered to be relatively impermeable. It is generally the Vinemount Member that is considered to be the aquitard unit that "protects" the lower bedrock units from anthropogenic impacts.
Lower Bedrock Aquifer	Goat Island and Gasport Formations, dolostone rock	30 m	These layers make up the major high yielding aquifer in this area and the majority of permitted wells obtain water from this layer. The NWC well TW3-80 obtains water from the top of this layer.

Table 1: Generalized Geology in Aberfoyle area

1.2 Permit to Take Water Regulation Information

The permit in effect today was approved in 2013 and expired July 31, 2016. NWC applied for a renewal and in December 2016 the Ministry of the Environment, Conservation and Parks (MECP) issued a moratorium on new Permits to take Water specific to water bottling, to allow further study the effects on Ontario's water resources. A guidance document was subsequently issued by the MECP in 2017 (6) to outline requirements of permit applications and responsibilities of bottled water operators. One of the guiding principles of this document states:

"Water takings shall not cause unacceptable impacts to the natural functions of the ecosystem. This includes, but is not necessarily limited to, any function of the aquifer to provide baseflow to streams, maintain water levels in wetlands or lakes, support habitat and species or provide recharge to other aquifers.

Water takings shall not cause unacceptable impacts with an established pattern of water use. This includes water takings for which a PTTW is required and any uses for which a PTTW is not required." Pg 2

Following a detailed study funded by the MECP and review of the study by a panel of experts, the 2017 guidance document has since been rescinded. The MECP has recently issued *Guidance to support area-based water quantity management* and *Guidance to support priorities of water use.* On a hierarchical basis, water taking for water bottling occurs third out of four water taking priorities. The Director issuing Permits to Take Water can take into account the priority of use when issuing permits or addressing issues that arise such as drought conditions. However, we understand that the priority of use is considered a tool of last resort.

In order to manage a cumulative impact of water taken by permit holders, the Director must have evidence of water quantity stress prior to requiring the development of a water management strategy. According to the guidance, a *ground or surface water source of supply may be considered to be under stress based on evidence of the cumulative impact of water takings on the natural functions of the ecosystem, water availability, uses of water, and other relevant issues. Such impacts could be indicated, for example, by declining trends in water levels, increasing trends in water use, unresolved interferences between water users, recurrent or increasing frequency of drought conditions impacting area water users, or impairment of aquatic ecosystems.*

In the absence of sufficient evidence demonstrating current stress of a ground or surface water source of supply, the Director need take no further action in considering the cumulative impacts of water takings in the area.

A Permit to Take Water details the specific conditions which the permit holder is obligated to follow. Although the Director may decide stress conditions on a cumulative basis, the NWC taking is closest to Aberfoyle Creek and is recognized and measured to have an influence on groundwater levels immediately beneath the creek. **Therefore, we recommend that Permit specific conditions that limit water taking during drought and low flow conditions be considered for this permit renewal.**

2021 is shaping up to be a year of low surface water and low groundwater levels. This is anticipated based on poor recharge during the winter and a dry spring. We encourage

the MECP to consider ways to be proactive in regard to this water taking and others in Puslinch Township. **For the Low Water Response declarations to be effective, a reduction in water taking should follow the 2017 interim guideline for water bottling permits and require a 10% reduction in taking based on the previous three months taking for all permits.** This is not unreasonable as most water takings are not tested under extreme conditions. Presently, during drought conditions permit holders are able to increase taking as long the volume remained below 90% of maximum allowable.

2.0 Summary of Our Findings

Groundwater level monitoring shows that during 2020, Lower Bedrock Aquifer groundwater levels clearly respond to increases and decreases in pumping that occurred throughout the year. Typically, there is an increase in pumping and associated decrease in Lower bedrock Aquifer water levels (known as drawdown) during summer months as seen in 2020. Groundwater levels in most Lower Bedrock Aquifer monitoring wells recovered to early 2020 levels by the end of the year. This is consistent with previous years. Although drawdown effects are greatest close to TW3-80, the presence of similar drawdown effects at MW7-08 located one kilometer north of TW3-80, and not at other wells that are a similar distance from TW3-80, suggests that there may be a north to south trending high conductivity zone in this area. This zone may be the result of variations in hydraulic conductivity, a fracture zone or changes in the nature of the overlying confining layers.

Water level changes in groundwater monitoring wells in the Upper Bedrock Aquifer and overburden in response to pumping in TW3-80 show that a hydraulic connection exists between the Deep Bedrock Aquifer and these shallower groundwater systems particularly on the NWC site and extending toward MW7-08. This shallow response may be also facilitated through private wells that are open to both groundwater systems. There are several of these wells servicing residences in the Hamlet of Aberfoyle.

The water levels in some local domestic wells also have an inverse water level correlation to pumping rates over the past 5 years (Figures D15 and D16 in 2020 annual monitoring report). According to the monitoring reports there have been no well interference complaints and to-date we are not aware of any well interference complaints.

Investigation of the impacts of open domestic wells on the flow regime and specifically how the downward gradients, in these wells, induced by the pumping at TW3-80 can affect the water level in the upper aquifers and water quality in the lower aquifers should be conducted.

It would be valuable to compare data collected at the three new wells MW19-18, MW20-19, MW21-18 to local domestic well hydrographs. This data should be included in subsequent monitoring reports.

The seasonal low stream water levels were observed to be lower at the down stream end of Aberfoyle Creek (station SW2) in 2019 and 2020 than in the previous years. Although precipitation was relatively low in 2020, the lowest stream water levels at the upstream station (SW1) were higher in 2020 than in 2018 and 2016. We understand the stream geometry may have changed in the vicinity of SW2, thereby making correlation to previous years difficult. Nonetheless water levels upstream and downstream do not have a similar response to precipitation as is expected.

The field measured surface water flows in Aberfoyle Creek downgradient of TW3-80, at SW2, were lower than upstream flows at SW1 for six months in 2020 compared to two or less months in previous years. The lowest measured flow at SW2 was 29.5 l/s, approaching the lowest measured at this location in over twenty years of monitoring.

The simulated continuous (Figure F3b) flow graph developed from the stage-discharge relationship does not reflect the measured conditions accurately in 2020.

Improved accuracy and repeatability of streamflow monitoring is necessary, particularly during low flow conditions. If data loggers are to be used as a surrogate for flow monitoring, then improved stage discharge relationships are required.

The groundwater model includes a zone of higher relative permeability around TW3-80 extending northward. The inclusion of this zone in the model is necessary to simulate water level changes occurring in the shallower groundwater system and observed extension of drawdown north of TW3-80.

We recommend that hydrographs of the discrete monitoring zones in the new wells MW19-18, MW20-19, MW21-18 be presented and ask NWC to indicate if the three new wells corroborate the extent of the high conductivity zone as presented in the model.

Groundwater modelling conducted for the new PTTW application concludes that increasing the permitted pumping rates from average pumping rates to maximum permitted rates will result in an additional reduction of 3% in groundwater discharge to Mill Creek. This reduction is realized at the gauge station at Concession 10 (2GAC19), located 7.5 km from the NWC site. There is a closer gauge station at Sideroad 7 (3AQ131) which is only 1.3 km from the site. Using a station closer to the site would provide a more meaningful estimate of the change in groundwater discharge to the creek where the greatest impact occurs. This analysis is also based on long term average conditions which is not the most sensitive scenario.

The groundwater model was calibrated on calculated minimum baseflows at SW1 and SW2 of 65 l/s and 78 l/s respectively. Minimum measured flows in 2020 were 41.8 and 29.5 l/s respectively.

Given the measured loss of streamflow for several months, we recommend that the that the groundwater model include a monthly or seasonal analysis of impact to streamflow within the area of influence of the pumping well or at station 3AQ131. The model should be used to predict seasonal changes in groundwater discharge to Aberfoyle Creek as well as total streamflow. The predicted changes by the model, the field measurements and ecological considerations should then be used to establish a minimum streamflow threshold.

3.0 Detailed Comments on Environmental Monitoring, Groundwater Modelling and Reporting by NWC Waters Canada

The annual water taking by NWC is summarized in the following table obtained from the 2020 Monitoring report prepared by Golder Associates and climate data from Kitchener/Waterloo climate station.

Year	Total Volume Pumped (Millions of Liters)	Annual Precipitation Kitchener Waterloo (mm)
2011	568	972
2012	583	673
2013	600	941
2014	678	821
2015	762	668
2016	783	752
2017	767	817
2018	676	796
2019	566	718
2020	582	710

As this table shows, pumping rates in 2019 and 2020 were lower than in previous years, and the highest pumping rate in August 2020 represented 63 % of the permitted monthly withdrawal. This table also summarizes precipitation rates and shows that 2020 was third year with precipitation less than the 30-year average. 2020 had particularly low precipitation in the winter and spring when groundwater recharge is the greatest. The Grand River Low Water Response Team declared a Level 1 Low Water Condition for the

Grand River Watershed between July 9 and October 8, 2020. The Grand River Conservation Authority requested that all water users voluntarily reduce water use by 10%. The guidance from the GRCA and the Ministry of Natural Resources and Forestry websites uses the language of "10% reduced water use". This makes sense as during drought conditions the idea is to limit the potential exacerbation of low water in streams, wetlands and groundwater by reducing water taking. Although NWC maintained a pumping rate of less than 90% of maximum permitted rate they increased pumping to an estimated 130% of the average of the previous three months of extraction. Considering the relative immediacy of water level recovery, even in the upper bedrock and overburden groundwater systems, reduced water taking by NWC is an effective tool to minimize the effects of low flow conditions in Aberfoyle Creek.

The decrease in pumping rates in 2019 and 2020 from higher rates in 2015 to mid-2018 resulted in an overall increase in groundwater levels in 2019 and 2020. The majority of Lower Bedrock Aquifer monitoring well hydrographs show a recovery in groundwater potentials after mid-2018 as the pumping level decreased. In general, the seasonal pattern in pumping rate is low from October to January and increases to peak rates in August. A similar pattern is observed in 2020 except there is a decrease in pumping in April/May. Groundwater levels decline in response to the increased pumping and then recover in the later part of 2020 as pumping again is reduced. Lower Bedrock Aquifer monitoring wells MW6A-08, MW8A-08, MW15A-12, MW18A-12, and MW17A-12 showed significant recovery after the pumping decreased in October. Wells MW10C/D-09 and MW16A-12 showed very little to no recovery, likely because these monitoring wells measure intervals in the bedrock aquifer that are fifteen to twenty metres lower in elevation than the extraction zone. The remaining Lower Bedrock Aquifer wells appeared to fully recover to the levels observed earlier in the year when pumping rates were lower.

In 2020 MW10 C/D-09 responded to the increase in pumping rate in the summer but do not recover as pumping rates are decreased. MW16A-12, on the other hand, does not appear to respond to significant changes in pumping rates and therefore may not be responding to TW3-80 at all. MW10-09 is located cross gradient from TW3-80 and MW16-12 downgradient. Both MW10C/D-09 and MW16A-12 have monitoring intervals at approximately 260 m AMSL. The pumping interval is at approximately 285 m AMSL. The wells that respond in sync with pumping are generally closer to the site and measuring from zones at approximately the same elevation as the pumping well.

The general inverse correlation between pumping rates and groundwater levels in most wells monitoring the Lower Bedrock Aquifer indicates that declining and recovering groundwater potentials are the result of increased taking by NWC rather than due to an external change such as decreased precipitation or from other permitted water takers. This confirms the ability of the Lower Bedrock Aquifer to recover when pumping rates are decreased. The rapid recovery is mainly because the aquifer is depressurized, but not

dewatered. The other general observation is that wells more distant from TW3-80 have less drawdown than wells closer to TW3-80.

3.1 Comment On Connection Between Various Hydrogeological Units

The 2020 monitoring report and the 2019 Technical Study indicate that water levels in the Upper Bedrock Aquifer and the overburden respond to pumping at TW3-80. The Technical study Report (4) states that:

> *"water levels in the on-site monitoring wells in the Upper Bedrock Aquifer are influenced by pumping at TW3-80 but to a lesser degree than water levels in the Lower Bedrock Aquifer due to a lower permeability bedrock layer that exists between the two aquifers…..water levels in the overburden are also affected, but to a lesser degree, by pumping at TW3-80. The response to pumping in the overburden is muted compared to the responses in the Upper and Lower Bedrock Aquifer but there is a correlation with long-term variation in pumping. It should also be noted that measurable drawdown in the water levels in the overburden during the 2010 pumping test was limited to within the NWC property."pgs 38, 39*

Several of the hydrographs for the Upper Bedrock Aquifer monitors mirror the increases and decreases in the pumping rate at TW3-80 just as many of the Lower Bedrock Aquifer monitors do. Upper Bedrock Aquifer monitoring wells also show greater seasonal water level variation and are thus more susceptible to lower groundwater levels arising from years of lower precipitation.

The monitoring report also describes how several of the overburden monitors are affected by pumping at TW3-80.

"In summary, the water levels in the overburden are affected by natural events and to a lesser degree by pumping at TW3-80."

For example, in 2020, overburden wells MW4C and TW1-99 both show a decrease in water levels as the pumping increases and but water levels then do not recover as the pumping rates decrease. This is a different response than observed in the bedrock wells and the delayed recovery is due to a lack of water to support the recovery, i.e. recharge.

The observed water level changes in the Upper Bedrock Aquifer and overburden aquifer in sync with pumping rate changes at TW3-80 demonstrates that the aquitard units that separate the shallower groundwater systems from the pumping zone do not completely insulate the shallow system from the effects of pumping. This may be due to "windows" of higher permeability in the bedrock aquitard locally as simulated in the modelling report, and/or the presence of multiple domestic wells, that are open to the entire

bedrock sequence, resulting in the upper units responding to changes in the lower bedrock units. The influence of the water taking on the shallow system increases as the pumping rate increases. In this way, the seasonal pattern of increased water taking during seasonal low groundwater recharge to Aberfoyle Creek exacerbates the low flow condition in the creek. In many years this may not cause adverse impacts to flow in the creek, but in years with little recharge January to May, the additional stress of seasonal increases in pumping may result in additional stress to the creek environment. It is thus our opinion that reductions in taking by NWC during Low Flow Condition declarations will benefit Aberfoyle Creek.

3.2 Comment on Decline in Surface Water Levels and Stream Flow in Aberfoyle Creek

Mini-piezometer measurements are discussed within the surface water sections of both reports. Mini piezometers are shallow depth and are designed to measure water level changes immediately adjacent to or beneath Aberfoyle Creek. Water levels in the mini piezometers are greatly affected by seasonal variations in streamflow and groundwater recharge. Although the mini-piezometer data does not show significant effects from pumping, the seasonal increase in pumping rates coincide with times of lower streamflow and groundwater recharge and therefore coincide with decreasing shallow groundwater levels. At the same time there are decreased upward gradients or potentially reversals in gradients that change the recharge that supports stream flow. The technical report states that:

"A slight decline in water levels occurred at the mini-piezometers from 2013 to 2015. The coincided with increased pumping from TW3-80 and a period of declining annual precipitation (2013 to 2015) ….. The water levels have stabilized over the past four years during this period pumping rates from TW3-80 have been similar……Overall the water levels are influenced primarily by variations in precipitation, overwhelming any minor changes due to pumping." Pg 41

Some of the mini piezometers located along Aberfoyle Creek on the NWC property, in the vicinity of SW1 (surface water flow monitoring station at upstream end of NWC property) and SW2 (surface water flow monitoring station at downstream end), reflect lower water levels and reduced or reversed gradients in the summer. This reach of Aberfoyle Creek which generally is a zone of groundwater discharge temporarily becomes a zone of groundwater recharge during some summer months. Although water level variations due to precipitation may overwhelm the effects of pumping, the pumping exacerbates low flow conditions in Aberfoyle Creek. The mini piezometers are discreet measuring points and only reflect conditions in their immediate vicinity. That is why streamflow is so important as it integrates the interaction between groundwater and surface water over a lengthy reach of Aberfoyle Creek.

In terms of stream elevations (rather than streamflow), the lowest water levels at SW2 continue to decrease in 2019 and 2020 whereas low water levels at the upgradient station, SW1 are consistent with previous years.

Typically, for most of the year, shallow system groundwater levels and stream flow measurements suggest that the reach of Aberfoyle Creek that flows through the NWC property is a "gaining" stream or that groundwater contributes to the baseflow of the creek in this reach. Since 2002, manual stream flow measurements indicate that for most of the year and for most years, the flow rate increases between SW1 and SW2. We reviewed the data from thirteen of the eighteen years between 2002 to 2020. In one of the years (2007) there were three months where the rate of flow at SW2 was lower than at SW1, in eleven of the remaining years there were two or fewer months where flow volumes at SW2 were lower than at SW1. In 2020 the flow rate between stations SW1 and SW2 decreased in April, was equal in May and then was lower from June through October (Table F1). This is a total of six months of lower flow at SW2 compared to SW1. The streamflow measurement is an important metric in terms of integrating both shallow groundwater system and surface water inputs to Mill Creek. Although we agree that streamflow measurements are not precise (±20% accuracy) and stream flow is influenced by many factors, the month over month of manual measurements of a losing stream between SW1 and SW2 in 2020 is concerning.

The simulated surface water flow graph F3b shows that there are higher flows at SW2 throughout the 2020 summer in comparison to SW1. In some instances, there is significantly greater flow downstream than upstream. Clearly the stage-discharge graph for 2020 does not accurately represent manual stream flow measurements and brings into question the purpose of stage discharge figure F3b. The critical period of streamflow with respect to ecological function is low flow. Therefore, representing the low flow periods accurately between manual measurements is important as the data loggers are intended to be a surrogate for other more manually intensive monitoring methods. That is to say, if the data logger data cannot be used to accurately represent streamflow on days when measured, then it should not be relied upon to represent flow conditions in the stream at other periods of time. We have reviewed additional explanations of the low flow observed at SW2 (See Appendix ___). We do not agree that the simulated hydrograph is a better representation of flow than the manual measurements. Manual measurements conducted by Mill Creek Aggregates corroborate low flow conditions in Mill Creek at the same time as recorded at SW2. The discharge rate measured is lower than that simulated for SW2 presented on Figure F3b. Our position is that if the stream is not gaining for increasing periods of time due to droughty conditions and it is known that the hydraulic properties of the Upper Bedrock Aquitard, Upper Bedrock Aquifer and the overburden allow effects of pumping to propagate upward, then there should be a

condition on the Permit to Take Water that reduced the effects of pumping during these non-gaining periods.

Biological monitoring conducted by Beacon Environmental concludes that there have not been any significant changes to the various terrestrial and aquatic species being monitored.

The fisheries work done by Portt, and Associates determines that the summer temperatures in this reach of Aberfoyle Creek remain high. The high temperatures are consistent with high ambient temperatures during the summer of 2020. This reach of the stream is not suitable for Brook or Brown trout, mainly as a result of warm water discharged from the Mill Pond.

Our comment to the MECP is that it is encouraging to determine that the macro level ecological indicators do not suggest a decline of stream or wetland health. However, with a year such as 2020 where there are several months of decreasing flow measured, should a low flow threshold be established for this Permit.

3.3 Comment on Groundwater Modelling for PTTW application:

The new modeling conducted to support the application for the PTTW renewal at the Aberfoyle facility, improves on previous models by increasing the modelled area, including more high-quality calibration targets, removing expired PTTW's, adding consumptive uses to the model and refining layer thicknesses of the geologic units. In addition to refining layer thicknesses, layer hydraulic conductivities were also refined to allow a better match to monitoring data. For example, in order to match the strong water level response measured at MW7-08, a high conductivity zone is modelled between TW3-80 and MW7-08. This zone appears to be modelled using data from the two wells and the data from MW8, MW10 and MW14 to delineate this area. Three new monitoring wells (MW19-18, MW20-19, MW21-18) were installed in 2018, and 2019 that would also provide information to show that this zone is as defined in the modelling.

Modelling conducted for the PTTW renewal application concludes that increasing the permitted pumping rates from the 2015-2017 average pumping rates (2,113 m^3/day at TW3-80) to maximum permitted rates) will only result in a 3% reduction in groundwater discharge within the identified surface water catchment area. This analysis used a gauge station at Concession 10 (2GAC19), located 7.5 km from the NWC site. There is a stream gauging station at Concession 7 (station 3AQ131) which is only 1.3 km from the site. For more pertinent analysis, this closer station or onsite station SW2 should be used to determine relative impact of the taking. As the distance downstream increases, the relative influence of pumping decreases. The modelling also shows a very local area of

drawdown in the vicinity of TW3-80. Table 10 (Reference 5) shows that the change in the pumping scenario between the average NWC pumping rate and the permitted rate results in a reduction of 1,271 m^3/day. If this is applied to the discharge at station 3AQ131 the resulting decrease is 7%, not the 3% quoted from the distant station. The analysis is also not presented on a seasonal basis. A 3% or 7% change in annualized average flow rate will be a significant difference for low flow conditions. Considering that NWC increases taking during low flow periods, the assessment of average conditions does not address the most sensitive condition.

Modelling also used an estimated 65 l/s and 78 l/s as minimum estimated baseflows at SW1 and SW2 (Table 5). Minimum measured flows in 2020 were 41.8 and 29.5 L/s respectively. The model calibration target was an increase in flow between SW1 and SW2 of 13 L/s, the difference between the two estimated baseflow minimums. In 2020 there was a measured loss of up to 12.3 L/s in this reach amounting to approximately 29% of the flow at SW1. The model should be used to estimate baseflow reduction during the most sensitive time of the year.

3.4 Comment On Groundwater Chemistry

Since TW3-80 draws water from upper aquifers It would be helpful to see a table of the major ion analysis on an annual basis. The model and monitoring both indicate hydraulic connections between the upper groundwater aquifers and lower aquifers. The pumping by NWC causes groundwater to move from the upper to lower zones transporting anthropogenic derived contaminants to the lower aquifers. For example, road salting contaminates groundwater with sodium and chloride ions. A graph of the chloride concentration with time would be an good indicator of actual downward groundwater movement (rather than inferred from hydraulic gradients).

4.0 Discussion

The residents of the Township of Puslinch rely solely on groundwater resources for drinking water and servicing employment lands. There are many Permits to Take Water registered with the MECP for the Aberfoyle area, the largest of which is not NWC. The largest permits by volume are for aggregate processing operations which operate from ponds connected to the shallow groundwater system and have a low consumption rate (i.e. almost all water is returned to the aquifer).

NWC is the largest water taker from the deeper aquifer system in the Aberfoyle area and has a 100% consumption rate, that is, none of the water is returned to the Lower Bedrock Aquifer. The other nearby users of this Lower Bedrock Aquifer are residents in the Hamlet of Aberfoyle, Wellington Common Elements Condo Corp., Con-Cast Pipe, Morguard Brock McLean Ltd., and Royal Canin. There is no direct competition for the

groundwater resource, that is, one user does not experience reduced ability to take water as a result of the taking by another. Farther afield, the City of Guelph is a major municipal water taker from the deep aquifer as is the City of Cambridge and the Hamlet of Freelton.

The water taking from the deep aquifer is sustained by increased downward movement of water from shallow groundwater systems and presumably water bodies, increased groundwater flow from upgradient areas and decreased groundwater flow to downgradient areas. To-date, the detailed monitoring of groundwater, surface water and ecology by NWC and Mill Creek Aggregates do not suggest that the health of the natural ecological system (fish, amphibians, vegetation etc..) of Mill Creek/Aberfoyle Creek is on the decline despite the water taking from the overburden and bedrock sources by many users. That said, local changes to groundwater levels from water taking have been documented and efforts to minimize the effect of lower groundwater levels on Aberfoyle Creek and its riparian wetland should continue to be required within conditions of any Permit To Take Water

As pumping rates from TW3-80 increase, if permitted, there will be greater potential for water level changes to the shallow surface water system supporting Aberfoyle Creek and its riparian wetlands. In 2020 streamflow in the summer was very low and Aberfoyle Creek was measured to be a losing stream for several months. Future droughty periods including 2021 require that a streamflow threshold be established for Aberfoyle Creek in the area of influence of pumping well TW3-80.

From a groundwater level perspective, the effects of the water taking are reversible. The cessation of pumping from TW3-80 results in a rapid initial recovery of water levels in a total recovery estimated to be in a period of weeks to months. Continued environmental monitoring as presently occurs, should be able to recognize environmental impacts arising from the taking and should they occur, can be remedied by decreased pumping or cessation of pumping. This level of control should be applied as a Permit condition and not at the discretion of the Director.

The greatest potential local impact occurs during summer months when evaporation and evapotranspiration are greatest, recharge is least and pumping from TW3-80 is greatest. The water quantity and temperature regulation benefit that the creek flora and fauna derive from groundwater discharge in close proximity to TW3-80, will decrease with increased pumping. The biological studies suggest so far this has been of little or no environmental consequence and our question is at what flow rate or temperature does an environmental consequence occur? This should be discussed, and a flow rate/water level/temperature threshold should be determined, and all efforts made to prevent this from occurring.

5.0 Summary of Recommendations to the Ministry of the Environment, Conservation and Parks

1. We recommend that Permit specific conditions that limit water taking during drought and low flow conditions be considered for this permit renewal.

2. For the Low Water Response declarations to be effective, a reduction in water taking should follow the 2017 interim guideline for water bottling permits and require a 10% reduction in taking based on the previous three months taking for all permits.

3. Investigation of the impacts of open domestic wells on the flow regime and specifically how the downward gradients, in these wells, induced by the pumping at TW3-80 can affect the water level in the upper aquifers and water quality in the lower aquifers should be conducted.

4. It would be valuable to compare data collected at the three new wells MW19-18, MW20-19, MW21-18 to local domestic well hydrographs. This data should be included in subsequent monitoring reports.

5. Improved accuracy and repeatability of streamflow monitoring is necessary, particularly during low flow conditions. If data loggers are to be used as a surrogate for flow monitoring, then improved stage discharge relationships are required.

6. We recommend that hydrographs of the discrete monitoring zones in the new wells MW19-18, MW20-19, MW21-18 be presented and ask NWC to indicate if the three new wells corroborate the extent of the high conductivity zone as presented in the model.

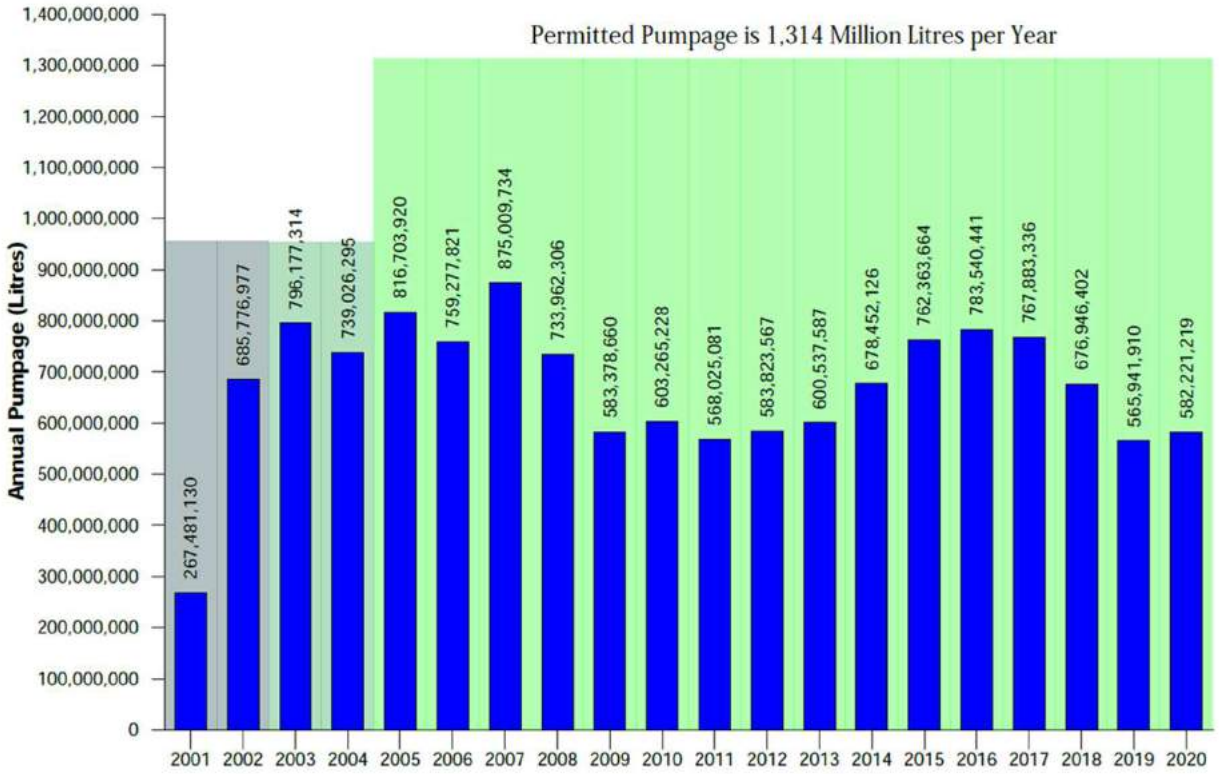
7. Given the measured loss of streamflow for several months, we recommend that the groundwater model include a monthly or seasonal analysis of impact to streamflow within the area of influence of the pumping well or at station 3AQ131. The model should be used to predict seasonal changes in groundwater discharge to Aberfoyle Creek as well as total streamflow. The predicted changes by the model, the field measurements and ecological considerations should then be used to establish a minimum streamflow threshold.

Sincerely,
Harden Environmental Services Ltd.

Stan Denhoed, P.Eng., M.Sc.
Senior Hydrogeologist

Appendix A
Correspondence

TW3-80 Annual Water Taking



Water taking in 2020 was 582 million litres.

Average annual water taking since 2001 is 671 million litres.

Annual water taking in 2020 was below the average historical water taking.

No new impacts anticipated at lower water taking.

Surface Water Flow Stations

Flow is measured at two stations to assess the magnitude of natural flow in Aberfoyle Creek.

SW1 located at upstream end of property and SW2 located at downstream end of property.

There is also a GRCA station located downstream at Concession Road 7 where flow is monitored.

Background

- SW1 and SW2 were set up near the upstream and downstream property boundaries (respectively) to allow an assessment of how flow changes across the site.

- The contributing drainage area between SW1 and SW2 is small in comparison to the total drainage area upstream of the site.

- This means that expected increase in flow based on increase in drainage area will also be small. In general, flow at SW1 and SW2 are similar.

Harden Environmental Comments

- Comment 1 – the manual flow measurements at SW2 are sometimes lower than the flow measurements at SW2 estimated using the stage-discharge rating curve.

- Comment 2 - lower manual flow measurements occurring at SW2 compared to SW1 indicate a reduction in stream flow between the stations.

SW1 Stream Station

The channel cross section at SW1 is relatively stable from year to year and has a silty bed composition.

SW2 Stream Station

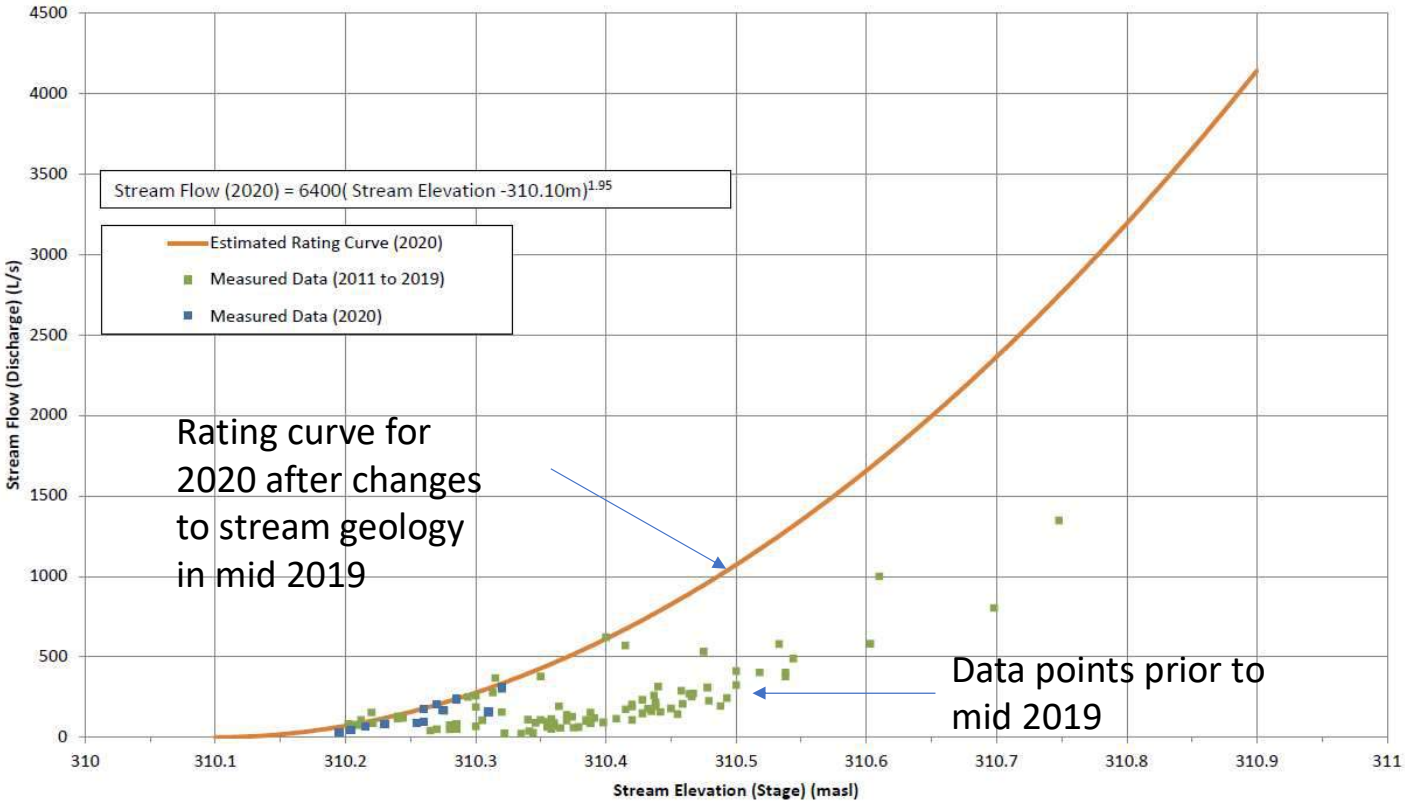
The channel cross section at SW2 is wide, has a cobbly substrate and the bed is mobile, often changing from year to year.

- The presence of large cobbles in the bed introduces flow irregularities that cause additional error to flow measurements, especially at low flow conditions.
- For this reason, development of the 2020 stage discharge (rating) curve for SW2 placed more emphasis on the high flow measurements.

Stage Discharge Curve Development

- Stage discharge curves are developed for SW1 and SW2 (SW2 shown on next slide).
- These curves show the relationship between surface water elevation (stage) and stream flow (discharge).
- Curves are based on manual measurements and used to estimate stream flow from continuous water elevation data measured with a pressure transducer.
- Due to changing channel geometry, the stage discharge curves occasionally need to be updated.
- The old curves are still used for water levels collected prior to the change.
- Additional data allows the curves to be “re-fitted” if needed.
- Power functions are used to develop best fit curves for the measured data.

Stage Discharge Curve for SW2

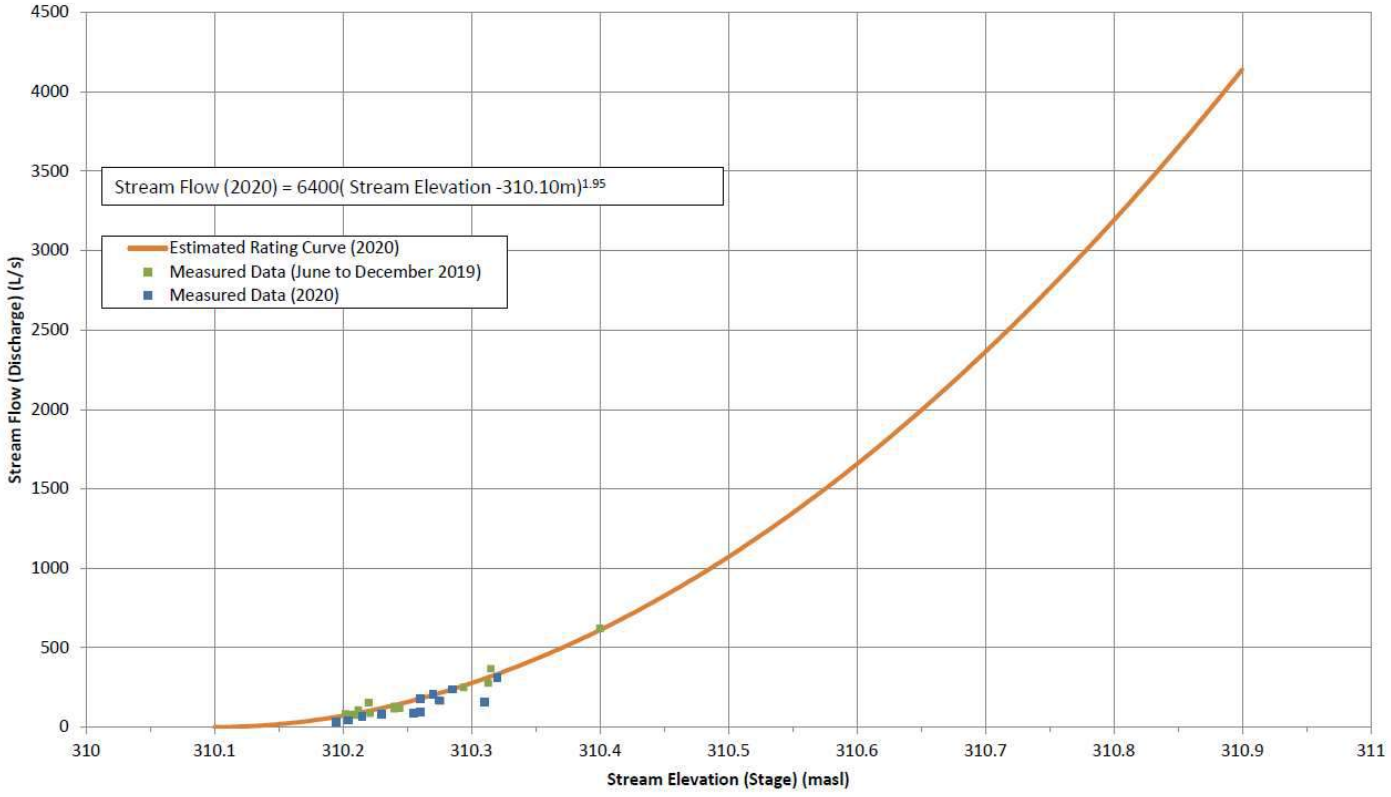


Curves are adjusted

1) yearly for new measurements or
2) as needed when stream geology changes.

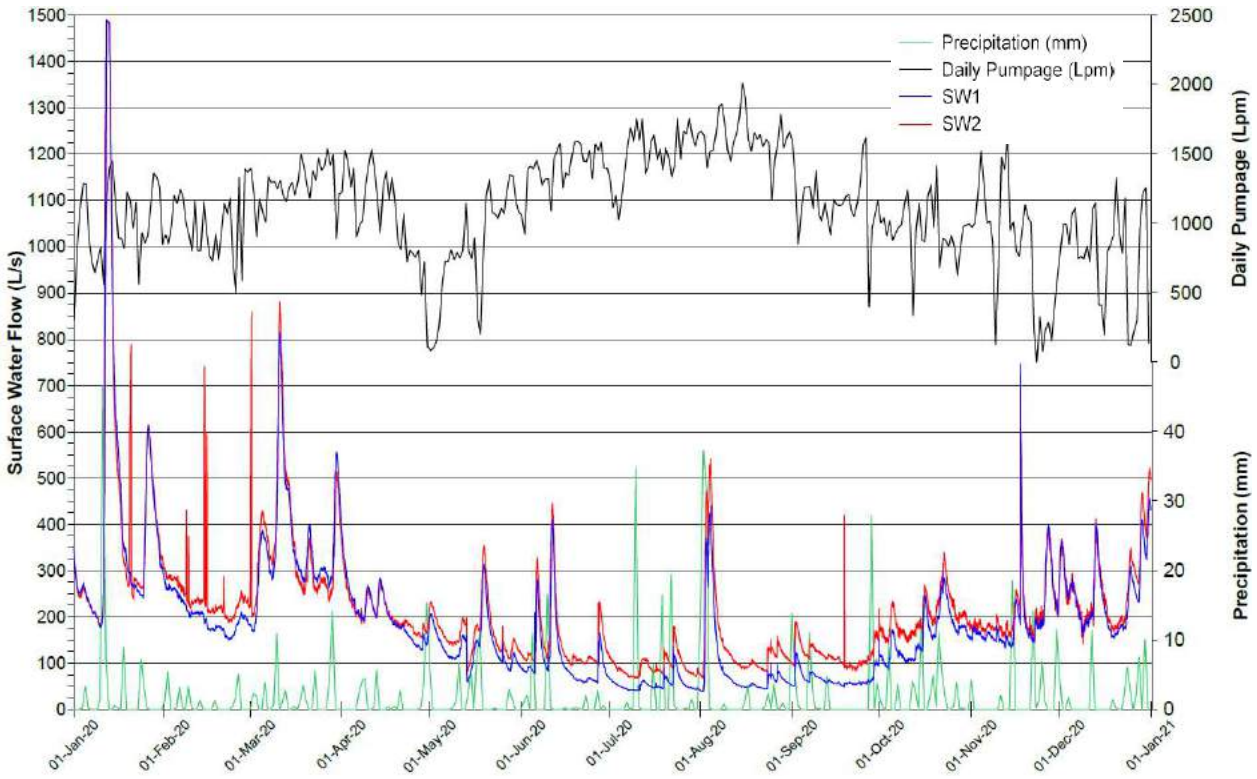
A new curve was developed in 2019 after changes to stream geometry.

Stage Discharge Curve for SW2 after Stream Rehabilitation



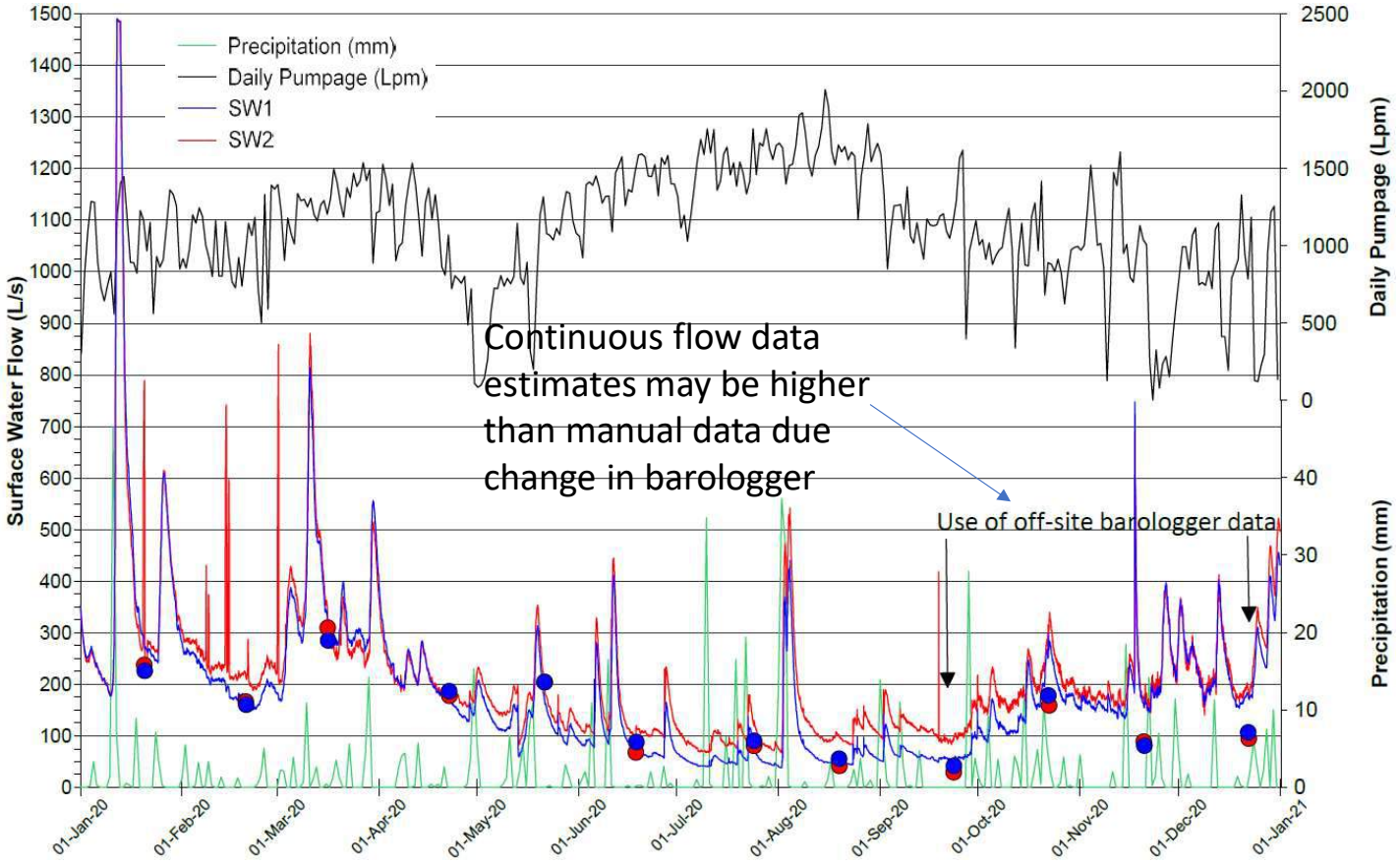
In order to help eliminate some of the manual measurement error a stage discharge curve is developed which relies more heavily on the higher flow data. As such the lower manual flow data can be underestimated compared to the continuous data produced from the rating curve.

Surface Water Flow in 2020 Using Rating Curve



Surface water flow is generally similar or increases moving down stream (i.e. from SW1 to SW2).

Surface Water Flow Comparison



In late September the on-site barologger failed and an off-site barologger was used to correct the data. A small change in barometric pressure can cause a more significant change in stream flow.

Response to Harden Comment 1

Comment 1 – the manual flow measurements at SW2 are sometimes lower than the flow measurements at SW2 estimated using the stage-discharge rating curve.

- This is due to the following:
  - The channel cross-section at SW2 can vary from year to year (and can be impacted from stream rehabilitation).
  - The irregularity of the coarse bed materials introduces error to both the measurement of depths across the channel and velocity in proximity to the bed.
  - Flow through the coarse substrate, known as gauge underflow, is likely occurring at SW2. The magnitude of gauge underflow and the error it introduces cannot be measured using standard stream flow measurement techniques, but the error is larger for shallow depths of flow and less significant for greater depths of flow.
  - A change in barometric pressure data at the end of the year may have caused an overestimation of water level and flow at both SW1 and SW2. The water level error is very small but the change in flow is more significant.

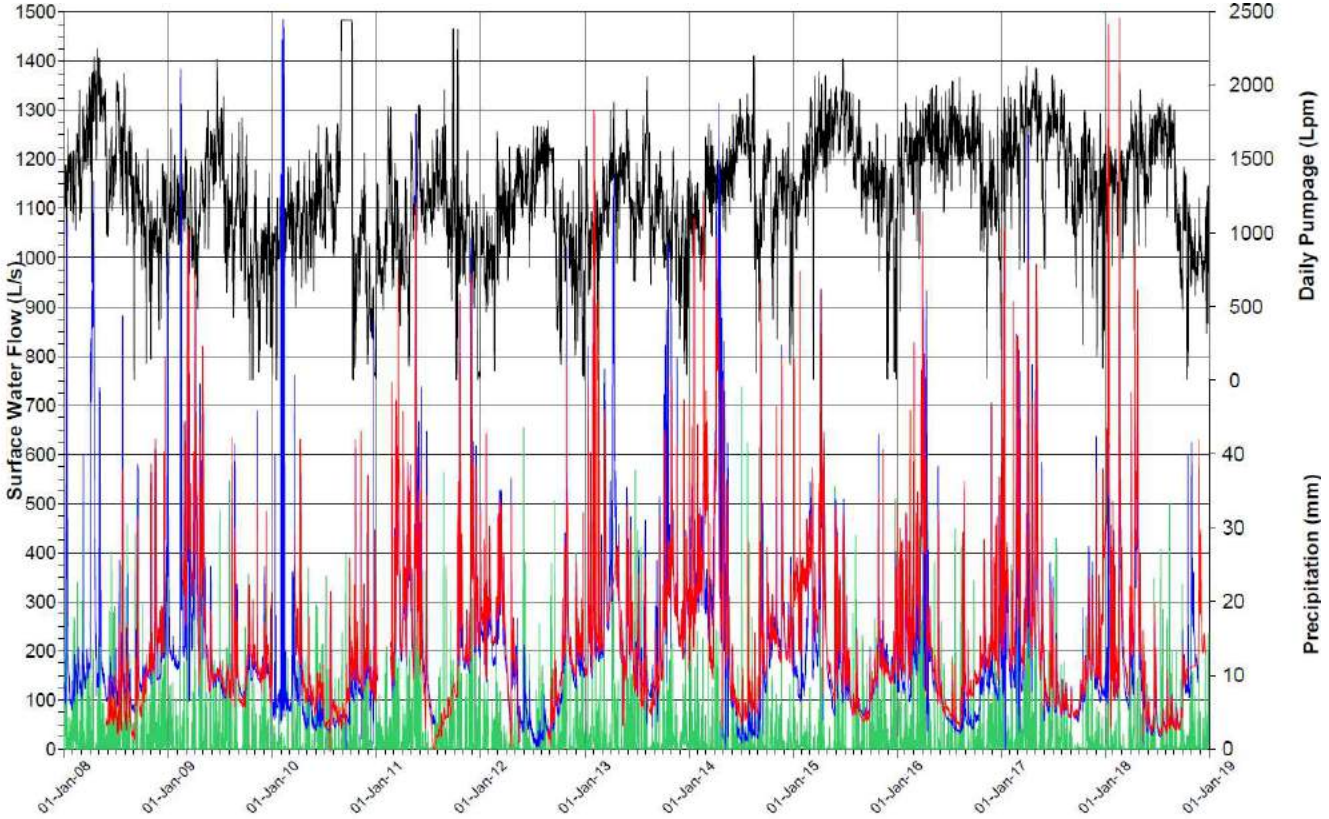
Response to Harden Comment 1 con't

- In order to provide a continuous record of flow, the rating curve is used to estimate flow.
- Rating curve is adjusted each year to account for changing stream conditions based on two scenarios:
  - A simple re-fitting of the curve to include additional data when the cross section has not changed measurably; or
  - Development of a new rating curve to reflect changed cross section geometry (requires new data and improves with time).
- More weight is placed on the higher flow measurements to account for difficulty in measuring shallow flows and gauge underflow losses.
- Likely results in a better estimate of total flow.
- Stream flow measurements and rating curves were developed using industry standard methods.

Review of Historical Long-Term Data

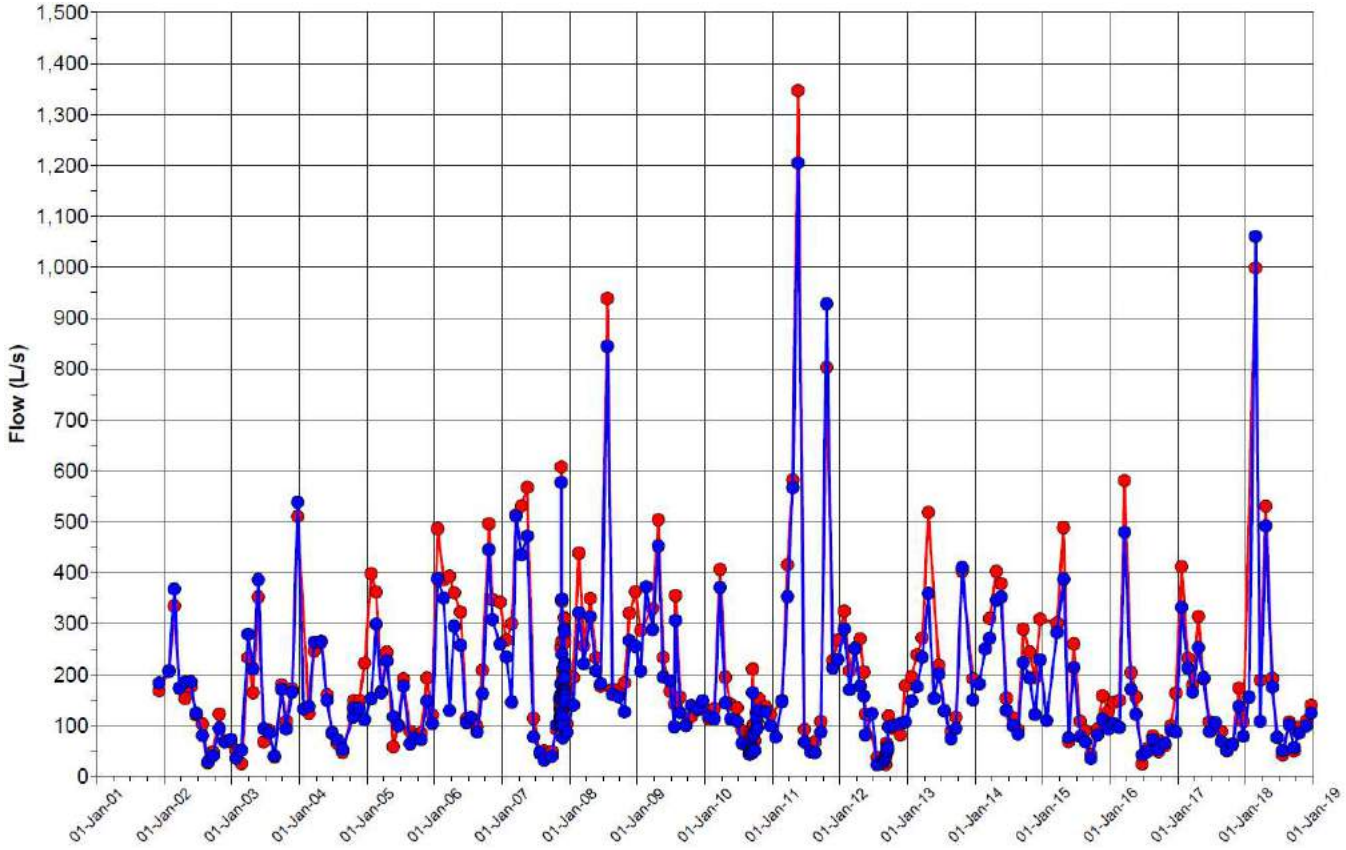
- The following slides provide a review of the long-term historical data collected at the site to address Harden Comment 2 and look at the big picture of the water taking.

Historical Surface Water Flow (continuous)



Flow is generally similar or higher at SW2 compared to SW1.

Historical Surface Water Flow (manual)



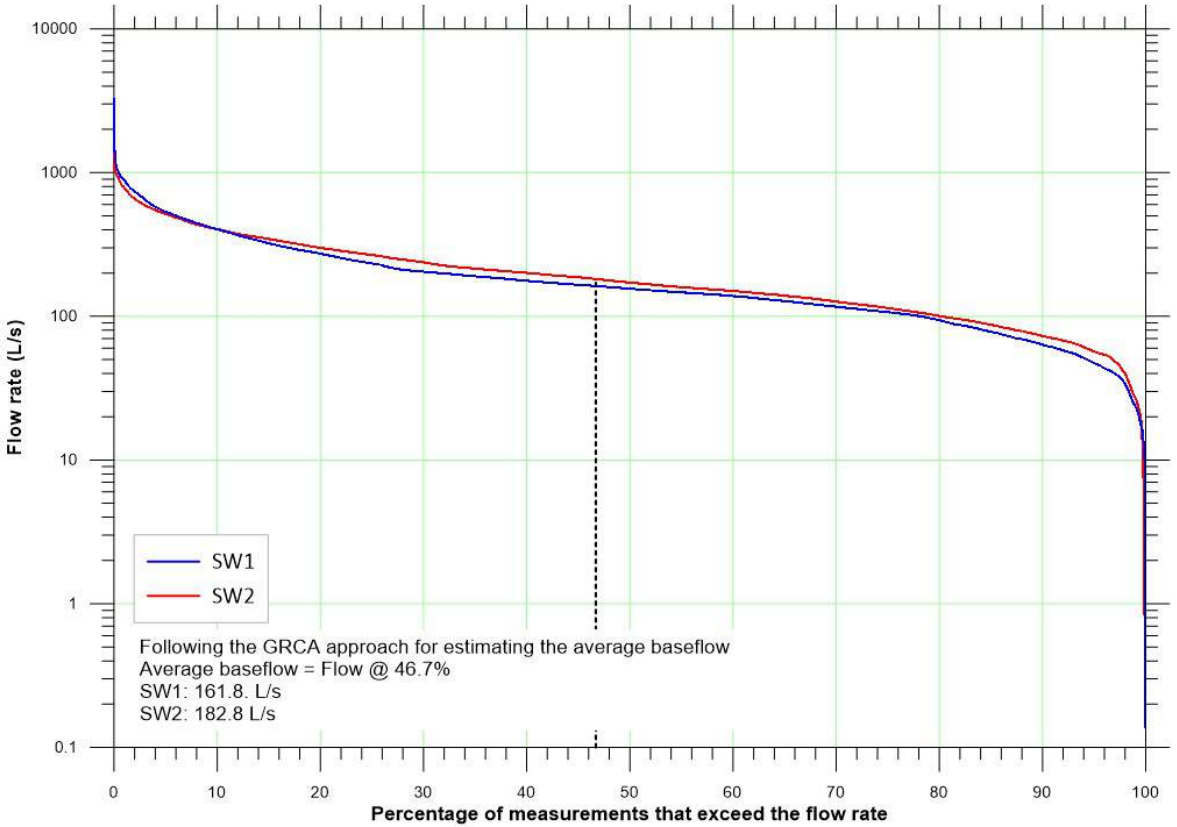
Flow is generally similar or higher at SW2 compared to SW1.

Flows that are lower at SW2 compared to SW1 are within the margin of error of measurement indicating they could be similar.

Summary from Technical Study

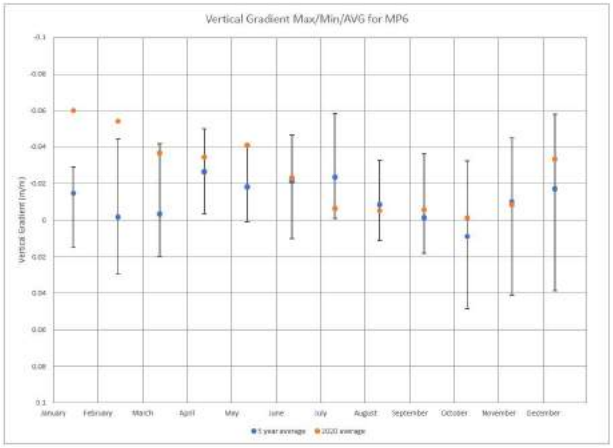
- The trends in surface water flow over the years have been similar.
- Stream flows have been higher in the spring following precipitation and melt events and then have declined through the summer with less variability in flow.
- The calculated flows from the rating curves indicate that flow in the creek is usually higher or similar at SW2 compared to SW1 with some brief periods when flow at SW1 is higher than SW2 (when these occur they are generally within flow measurement error).
- There is no apparent correlation between increases in pumping at TW3-80 and decreases in stream flow.
- Stream flows are influenced by precipitation/melt events and fluctuate seasonally.

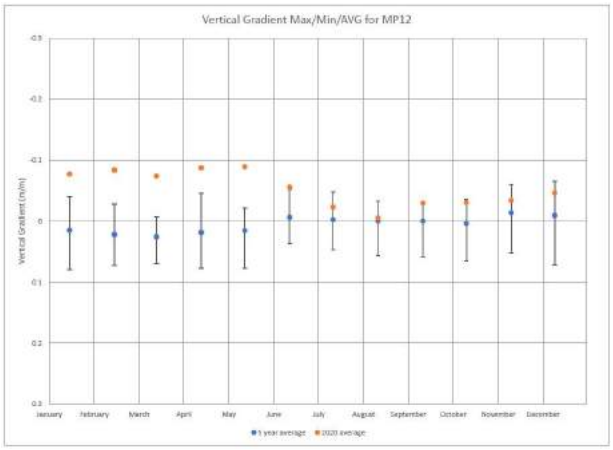
Average Base Flow

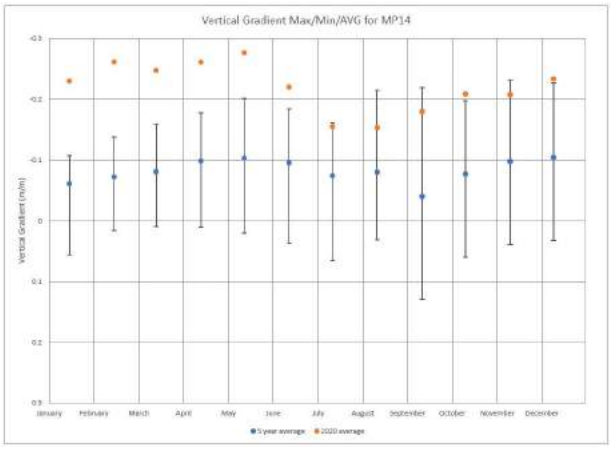


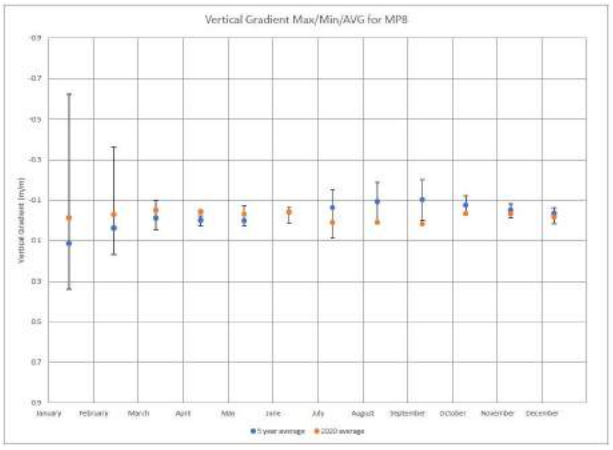
Average base flow is slightly higher at SW2 compared to SW1.

Vertical Gradients in Mini-Piezometers



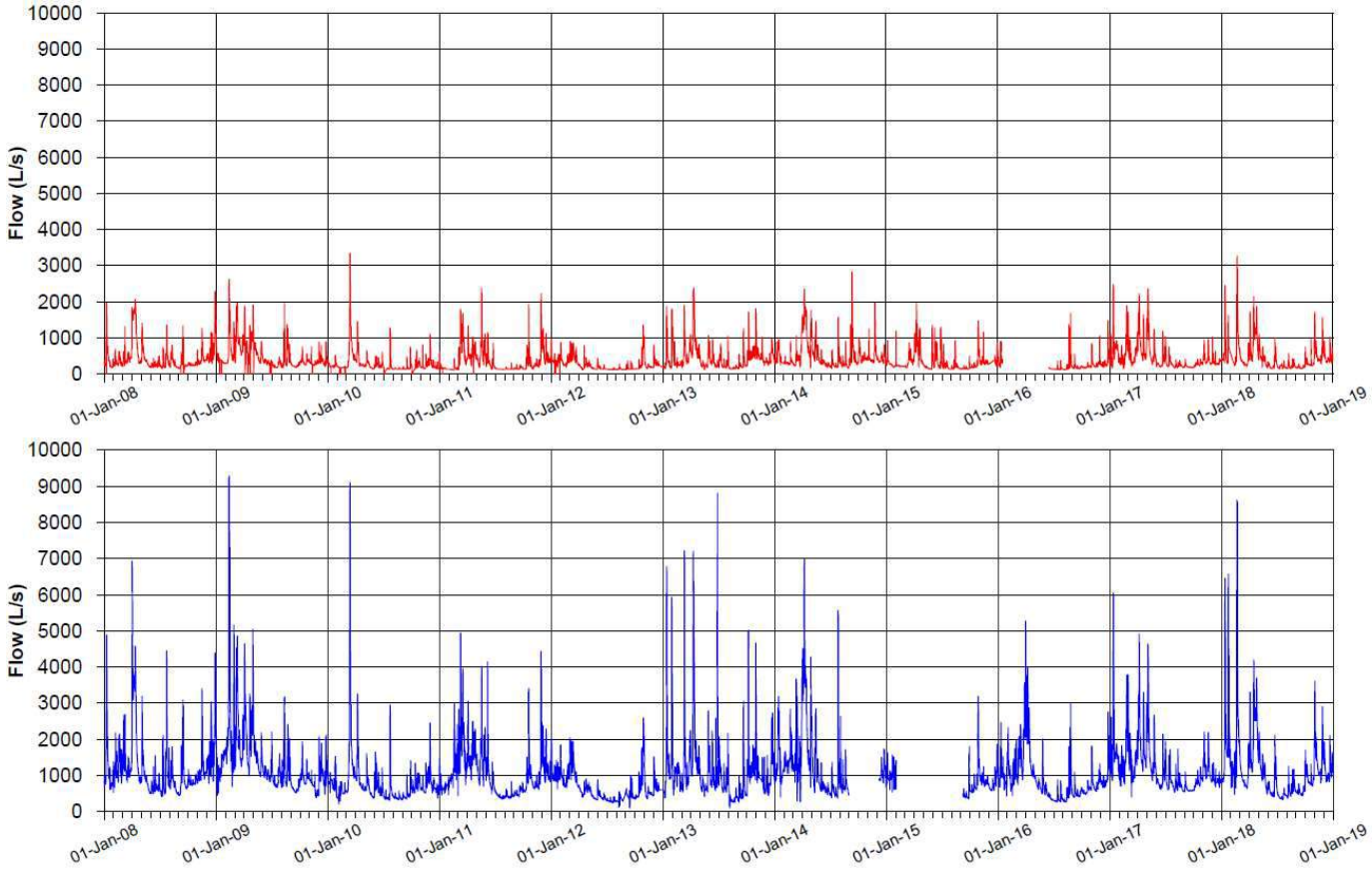






Average vertical gradients in 2020 at the four mini-piezometers between SW1 and SW2 generally indicate groundwater discharge into the creek or near neutral conditions.

Historical Surface Water Flow in Mill Creek



No impacts observed in downstream stations operated by the GRCA.

Response to Harden Comment 2

Comment 2 - lower manual flow measurements occurring at SW2 compared to SW1 indicate a reduction in stream flow between the stations.

- Long term monitoring data and previously conducted pumping tests indicate there is no measurable influence on stream flow from pumping at TW3-80.

- Vertical gradients generally indicate groundwater discharge to the creek or near neutral conditions, historically and during 2020.

- The operation of TW3-80 and water taking (from a deep confined aquifer) did not change in 2020 (actually a year of lower water takings) and as a result no new impacts to Aberfoyle Creek would be expected.

Possible Recommendation

- Blue Triton Brands and its consultants will investigate additional options to increase the accuracy of flow measurements at SW2 including the option to install a fixed cross section (e.g. low head weir or cut off wall in the channel); however, any such modifications would represent a change from natural conditions, be subject to additional permitting and approvals, and must be demonstrated to represent a net benefit to the creek.
- A second barologger should be installed at the site to provide a backup to the existing logger.

May 28, 2021 Project No. 20449101 (1000)

Andreanne Simard, Ph.D.
Blue Triton Brands
101 Brock Road South
Puslinch, Ontario
N0B 2J0

ABERFOYLE CREEK FLOW MONITORING

Dear Andreanne:

Golder, a member of WSP (Golder) has conducted creek flow monitoring on Aberfoyle Creek adjacent to Blue Triton Brands' (formerly Nestle Waters Canada) Aberfoyle plant since 2014. The purpose of the monitoring is to assess the magnitude of natural flow in the creek as it passes Blue Triton Brands' property. To that end, flow monitoring stations were established near the upstream and downstream property boundaries (SW1 and SW2, respectively). A staff gauge with a logging water level transducer is installed at each of these locations to measure and record water levels in the creek.

Discrete flow measurements are periodically (monthly when not frozen) collected at SW1 and SW2 using the velocity-area method. To apply the velocity-area method, the channel cross section is measured by measuring the water depth and velocity at regular intervals across the channel. Depth is measured using a metre stick or wading rod, while velocity is measured using a Hach Electromagnetic Velocimeter (or equivalent). For shallow depths of flow, the velocity is measured at 60% of the depth at each interval, while for deeper depths of flow (over 50cm deep), the velocity is measured at 20% and 80% of the depth to allow an estimate of the vertically averaged velocity at each interval. The flow in each interval is estimated using the mean section method, whereby the average depth in each interval across the stream is multiplied by the width of the interval (across the stream) and the average of the velocities measured at each edge of the interval. The total stream flow at the time of measurement is then calculated by summing the flow in each interval across the stream.

The discrete flow measurement results are correlated with the water levels at the time of measurement to establish a relationship between water level and flow. The resulting relationship, a stage-discharge or rating curve, is then used to estimate a continuous flow record from the water levels recorded by the logging water level

transducer. The developed rating curve is specific to the channel cross section and depends on it being relatively stable from year to year. The methods described above represent an industry standard approach for measuring stream flow at a natural channel cross section in a mildly sloped channel and are consistent with Water Survey of Canada methods for stream flow monitoring.

Flow measurements at SW2 during 2020 were complicated by a change in the hydraulic controls at the cross section, which is evident when comparing the 2020 discrete flow measurements and water levels to measurements made during previous years. As a result, the previous rating curve was abandoned and the 2020 flow monitoring results were used to begin development of a new rating curve for the station. The cause of the change in hydraulic controls is not known but speculated to be a result of channel rehabilitation work, completed in 2019, and natural movement of the channel bed materials. The accuracy of the new rating curve is expected to improve with time as additional discrete flow measurements are completed and used to better define the relationship between flow and water level at the station.

In addition to the changed hydraulic controls, field staff observed that flow depth was shallow during times of the year and flow moved over, between and through the coarse (cobble sized) bed materials. The irregularity of the coarse bed materials introduces error to both the measurement of depths across the channel and velocity in proximity to the bed. In addition, flow through the coarse substrate, known as gauge underflow, is likely occurring at SW2. The magnitude of gauge underflow and the error it introduces cannot be measured using standard stream flow measurement techniques, but the error is larger for shallow depths of flow (when the flow above the bed is small) and less significant for deeper flows (when the flow above the bed is large).

To address concerns around the accuracy of flow measurements at SW2 and use of the results to screen for potential effects of groundwater taking on Aberfoyle Creek, we recommend that Blue Triton Brands consider the following alternatives:

- Incorporate regular (i.e., twice a year) level surveying of the channel cross section into the field program. This practice will allow for prompt identification of changes in hydraulic controls and the need to update the rating curve for the station;
- Consult with GRCA to secure access to the flow data it collects downstream of the site at Concession Road 7 and incorporate that data into annual analysis and reporting as an independent measure of stream flow;
- Consult with GRCA to explore the feasibility of incorporating a fixed (e.g. concrete or sheet pile) cross section to minimize gauge underflow and the need for regular updates to the rating curve; and
- Given the small increase in drainage area between SW1 and SW2, the expected increase in flow between the stations is small and difficult to differentiate from the typical error associated with stream flow measurements. As such, consideration could be given to establishing low head weir structures at SW1 and SW2, while recognizing that the structures themselves represent a barrier to fish passage, change the natural hydraulics of the stream and would disrupt natural habitat during construction.

We trust that this information is sufficient for your current needs. Please don't hesitate to contact the undersigned if you would like to discuss this further.

Yours truly,

Golder Associates Ltd.

Craig De Vito, P.Eng.
Water Resource Engineer

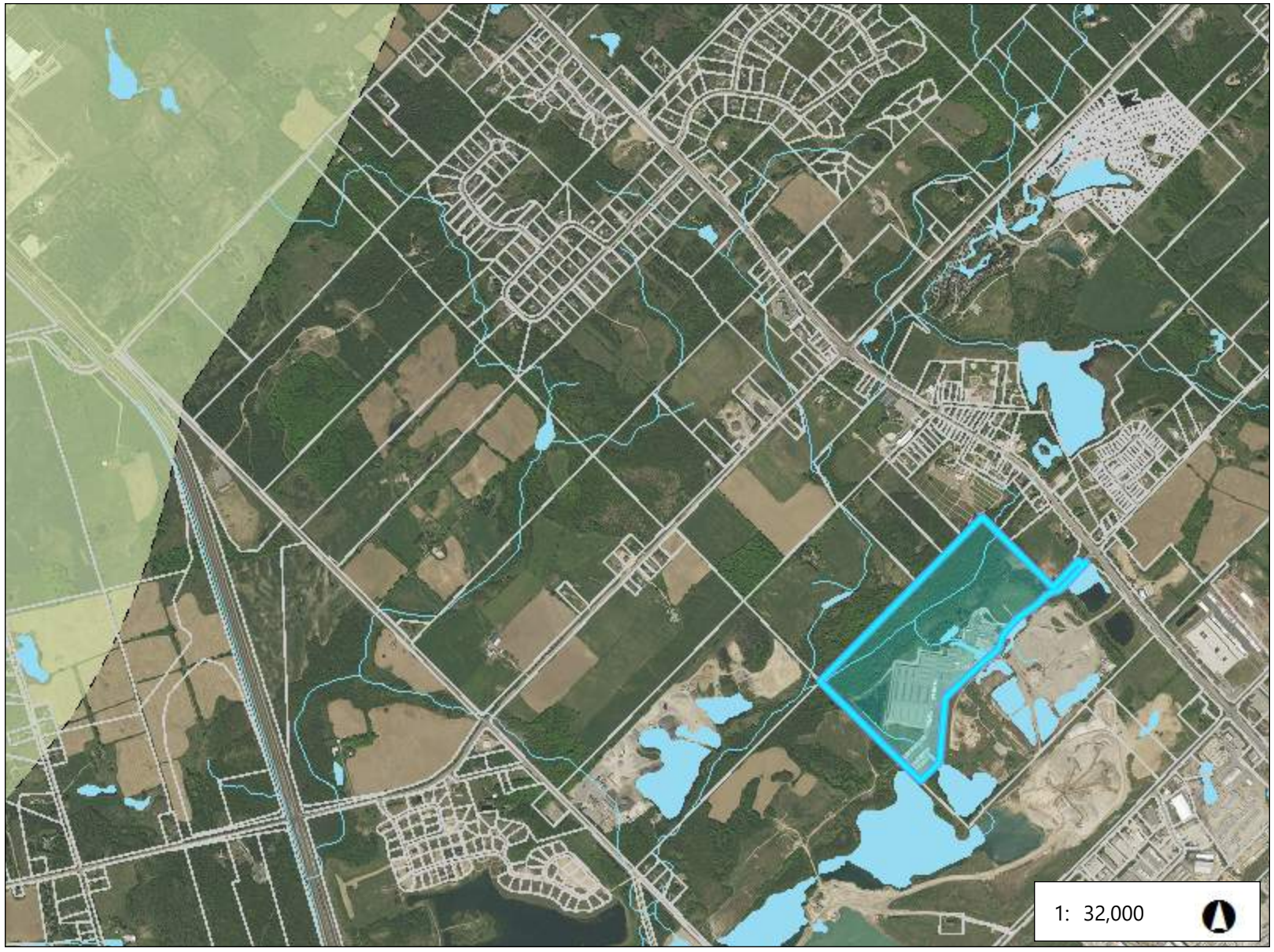
Kevin MacKenzie, M.Sc., P.Eng.
Principal / Water Resources Engineer

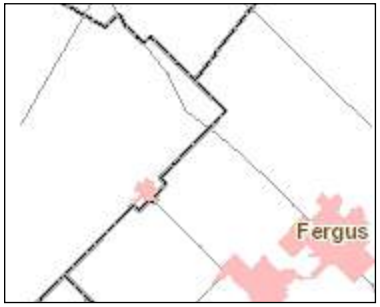
KMM/GRP/CD/ll

CC: Greg Padusenko, Golder, a member of WSP

https://golderassociates.sharepoint.com/sites/139500/project files/6 deliverables/aberfoyle/2021 sw letter/20449101 ltr blue triton re sw2 flow monitoring 28may21.docx

101 Brock Road South, Puslinch





Legend

- Parcels
- Waterbodies
- Watercourses
- Well Locations
- Wellhead Protection Area Boui
  - A
  - B
  - C
  - D
- Issue Contributing Area
  - Chloride
  - Nitrate
  - Sodium
  - TCE
- Vulnerability Score
  - 10
  - 8, D; 8; 8, C
  - 2, 4, 6 (A, B or C)
  - 2,4,6, D; 2,4, D; 2, 4, 6 (D); 4, D; 6,
- RoadsLookup

1.6 0 0.81 1.6 Kilometers

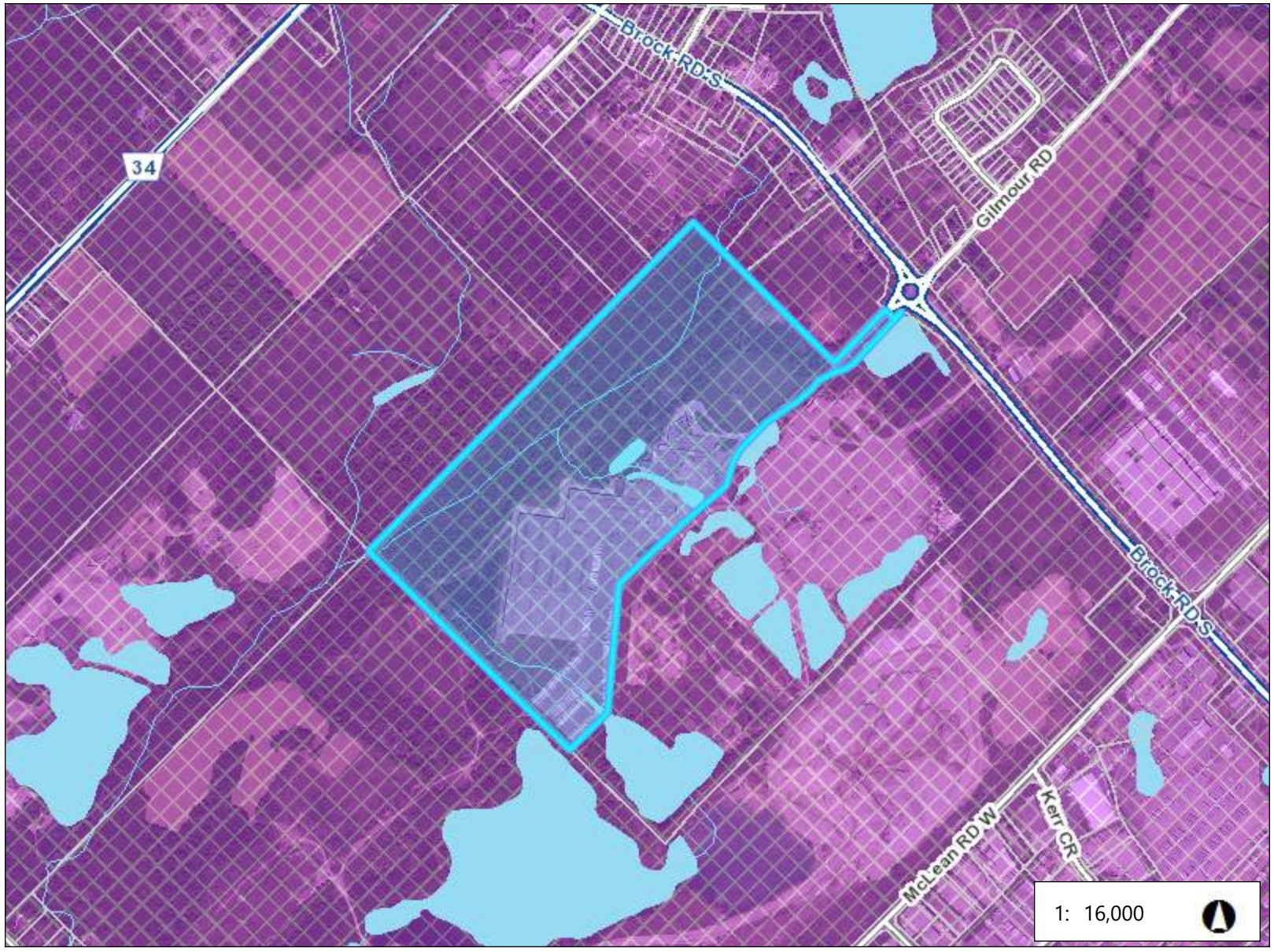
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

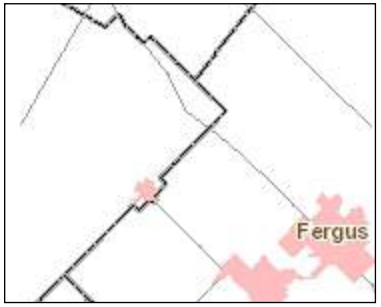
WGS_1984_Web_Mercator_Auxiliary_Sphere

THIS IS NOT SURVEY DATA. Parcels - Teranet 2002, Wellington County 2018

Notes

101 Brock Road South, Puslinch





Legend

- Parcels
- Roads
  - Local Road
  - County Road
  - Highway
- Waterbodies
- Watercourses
- Well Locations
- Q1 and Q2 Boundary
- Q1 and Q2
  - Approved
  - Draft
- SGRA
- RoadsLookup

0.8 0 0.41 0.8 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

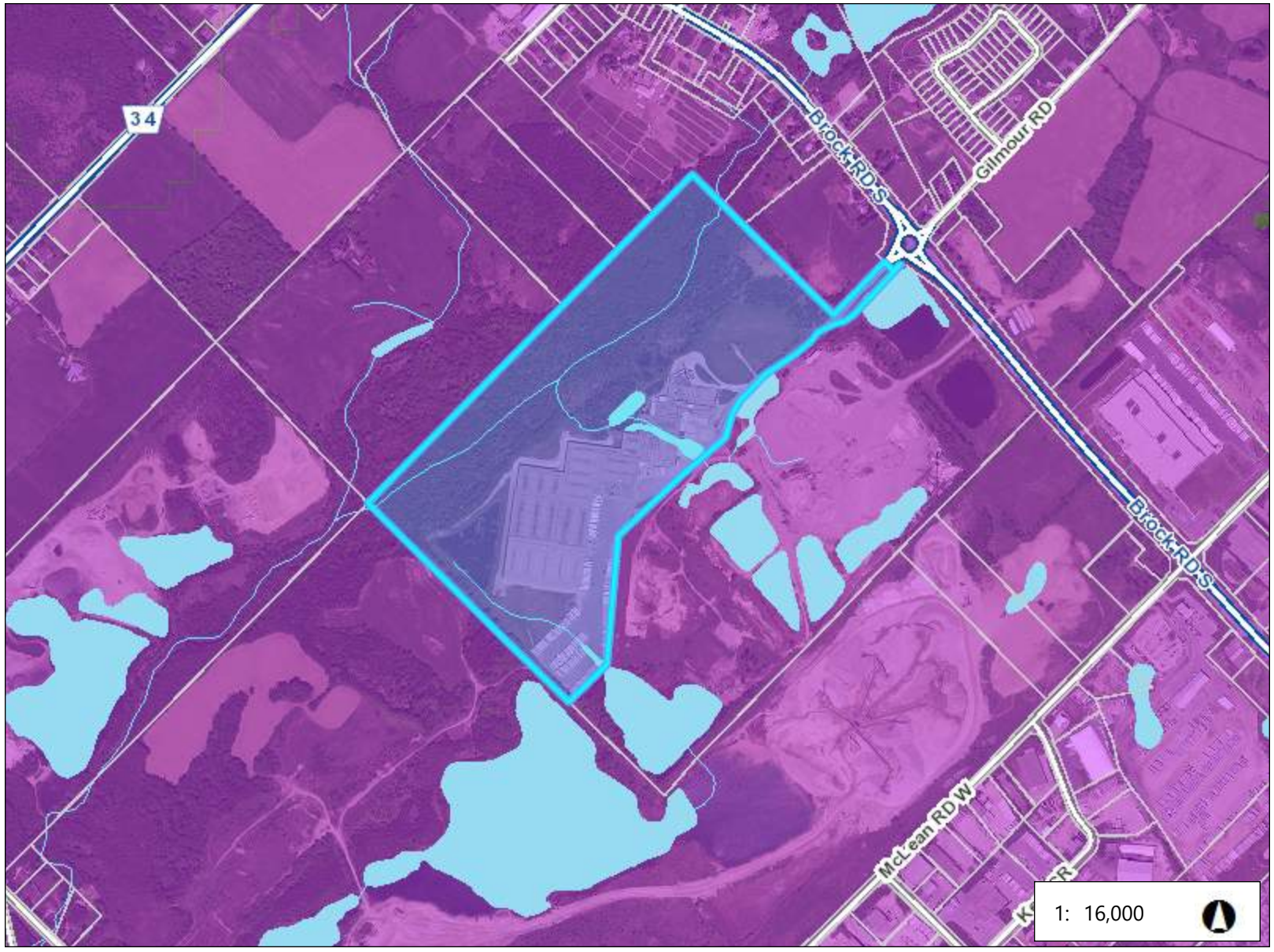
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

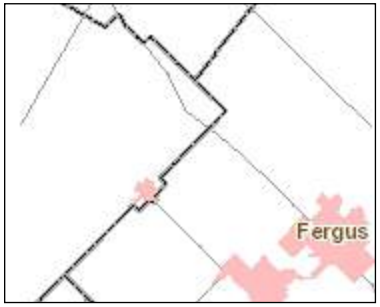
THIS IS NOT SURVEY DATA. Parcels - Teranet 2002, Wellington County 2018

Notes

Explore Wellington

101 Brock Road South, Puslinch





Legend

- Parcels
- Roads
  - Local Road
  - County Road
  - Highway
- Waterbodies
- Watercourses
- Well Locations
- SGRA
- RoadsLookup

0.8 0 0.41 0.8 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

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THIS IS NOT SURVEY DATA. Parcels - Teranet 2002, Wellington County 2018

Notes

AMENDED PERMIT TO TAKE WATER
Ground Water
NUMBER 1381-95ATPY

Pursuant to Section 34 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

Nestle Canada Inc.
101 Brock Road S.
Puslinch, Ontario N1H 6H9

For the water taking from: Two bedrock wells (TW3-80 and TW2-11)

Located at: Lot 23, Concession 7, Geographic Township of Puslinch
Guelph, County of Wellington

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

(a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34, OWRA.

(b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.

(c) "Ministry" means Ontario Ministry of the Environment.

(d) "District Office" means the Guelph District Office.

(e) "Permit" means this Permit to Take Water No. 1381-95ATPY including its Schedules, if any, issued in accordance with Section 34 of the OWRA.

(f) "Permit Holder" means Nestle Canada Inc..

(g) "OWRA " means the *Ontario Water Resources Act,* R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated December 3, 2012 and signed by Don DeMarco, and all Schedules included in this Permit.

1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.

1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.

1.4 This Permit is not transferable to another person.

1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.

1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.

1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

2.1 Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act*, R.S.O. 1990, the *Pesticides Act*, R.S.O. 1990, or the *Safe Drinking Water Act*, S. O. 2002.

2.2 Other Approvals

The issuance of, and compliance with this Permit, does not:

(a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act*, and the *Environmental Protection Act*, and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any

further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **July 31, 2016**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	Well TW3-80	Well Drilled	Bottled Water	Commercial	2,500	24	3,600,000	365	17 569053 4812797
2	Well TW2-11	Well Drilled	Other - Miscellaneous	Miscellaneous	475	24	684,000	365	17 568638 4812238
						Total Taking:	3,600,000		

3.3 For greater certainty, Source Name Well TW2-11 in Table A shall not be used for bottled water and shall be used for miscellaneous purposes such as providing water to the on site pond for fire fighting purposes.

3.4 For greater certainty, the total amount of water taken for the combination of sources in Table A shall not exceed 3,600,000 litres per day.

4. Monitoring

4.1 Under section 9 of O. Reg. 387/04, and as authorized by subsection 34(6) of the *Ontario Water Resources Act* , the Permit Holder shall, on each day water is taken under the authorization of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter or calculated in accordance with the method described in the application for this Permit, or as otherwise accepted by the Director. A separate record shall be maintained for each source. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the records required by this condition to the ministry's Water Taking Reporting System.

4.2 The Permit Holder shall establish the following groundwater monitoring program for the duration of the Permit:

Bedrock Wells

(i) Continuous monitoring of groundwater levels in the following wells:

- TW3-80 (67-07290)
- MW2A/B/C-07
- MW4A/B-07
- Fireflow (67-14195)
- MW-D (67-11936)
- MW1A-04
- PCC-D (67-11650)
- MW10B/C/D-09
- MW6A/B-08

- MW7A/B-08
- MW8A/B-08
- TW2-11
- MW14A/B/C-11
- MW15A/B-12
- MW16A/B-12
- MW17A/B-12
- MW18A/B-12

(ii) Monthly monitoring of groundwater levels at the following private wells (if the owner permits):

- Private well MOE WWR #67-08740
- Private well at 2 Brock Road
- Private well MOE WWR #67-07589
- Private well MOE WWR #67-08317 also known as 8 Maple Lane Well
- Private well at 58 Brock Road
- Private well "B"
- Private well "M1"
- Private well "Y" MOE WWR #67-09669
- Private well "J"
- Meadows of Aberfoyle well #PW5 (67-1197)
- Private Well "W2" (67-13335)

Overburden Wells

(iii) Continuous monitoring of groundwater levels in the following wells:

- TW1-93 (67-11283)
- TW1-99 (67-12929)
- MW-S/I
- PCC S/I
- MW2D/E-07
- MW4C-07
- MW10A-09

4.3 The Permit Holder shall establish the following surface water monitoring program for the duration of the Permit:

Surface Water Levels

(i) Continuous monitoring of water levels at the following locations:

- SW1
- SW2

(ii) Monthly monitoring of water levels at the following locations:

- SW3
- SW4
- SW5
- SW9
- SW10

Stream Flow

(iii) Monthly monitoring of flow, encompassing a range of flow conditions, and the development of a stage-discharge curve at the following surface water locations:

- SW1
- SW2

Multi-level Piezometers

(iv) Continuous monitoring of multi-level piezometers at the following locations:

- MP16S/D-08
- MP6S-08/D -04
- MP12S/D-04
- MP14S/D-07
- MP8S/D-04
- MP11S-08/D-04
- MP17S/D-12
- MP18S/D-12
- MP19S/D-12

Temperature

(v) Continuous monitoring of temperature at the sediment-water interface at the following locations:

- ST6-08
- ST1-05/AT-01
- ST2-05
- ST3-05
- ST4-05
- ST5-05

4.4 The Permit Holder shall undertake wetland monitoring and redd surveys as recommended in "2010 Biological Monitoring Program Final Report" by C. Portt and Associates dated January 28, 2011. Results from the wetland and redd surveys shall be submitted to the Director as a part of the annual monitoring report required under Condition 4.8.

4.5 The Permit Holder shall determine the total amount of water taken for each calendar month. If the monthly amount exceeds 83,700,000 L, the Permit Holder shall submit multi-level piezometer data in a letter report to the Director within 30 days of the end of the calendar month for the following monitoring locations:

- MP6S-08/D-04
- MP12S/D-04
- MP11S-08/D-04
- MW2-D/E

4.6 Continuous monitoring shall be datalogged at 60 minute intervals and downloaded monthly, however, the daily minimum water levels can be used to evaluate the water level variation with respect to pumping to improve the data handling and presentation. Monthly groundwater monitoring shall be conducted in the same week each calendar month.

4.7 The Permit Holder shall identify to the Director in writing, within 15 days of any monthly

monitoring event, any monitoring locations identified in Conditions 4.2 and 4.3 which become inaccessible and/or abandoned along with a recommendation for replacement monitoring locations. Upon approval of the Director the monitoring program shall be appropriately modified.

4.8 The Permit Holder shall submit to the Director, an annual monitoring report which present and interprets the monitoring data to be collected under the Terms and Conditions of this Permit. This report shall be prepared, signed and stamped by a licensed professional geoscientist or a licensed professional engineer specializing in hydrogeology who shall take responsibility for its accuracy. Surface water impact assessment shall be conducted by a qualified surface water scientist who shall co-sign the report as responsibility for the accuracy of the surface water portion. The report shall be submitted to the Director by March 31 of each calendar year and include monitoring data for the 12 month period ending December 31 of the previous year.

4.9 The Permit Holder shall submit to the Director as part of the annual monitoring report, details of the bottling operations involved with water taking under this Permit to Take Water to indicate compliance with OWRA Section 34.3. These details shall include:

- Location and name of the facilities to which water is delivered in bulk containers greater than 20 L from this source,
- If the bulk water is containerized at the receiving location,
- The size of container(s) into which the water is transferred at the receiving location, and
- Total volume of the water transported in bulk in each calendar year to each remote facility.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act* , Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.

2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.

3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written notice served upon me, the Environmental Review Tribunal and the Environmental Commissioner, ***Environmental Bill of Rights****, R.S.O. 1993, Chapter 28, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 101 of the Ontario Water Resources Act, as amended provides that the Notice requiring a hearing shall state:*

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Permit to Take Water number;
6. The date of the Permit to Take Water;
7. The name of the Director;
8. The municipality within which the works are located;

This notice must be served upon:

The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 314-4506
Email:
ERTTribunalsecretary@ontario.ca

AND

The Environmental Commissioner
1075 Bay Street
6th Floor, Suite 605
Toronto, Ontario M5S 2W5

AND

The Director, Section 34
Ministry of the Environment
12th Floor
119 King St W
Hamilton ON L8P 4Y7
Fax: (905)521-7820

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

by telephone at (416) 314-4600 ***by fax at (416) 314-4506*** ***by e-mail at www.ert.gov.on.ca***

This instrument is subject to Section 38 of the ***Environmental Bill of Rights*** *that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek to appeal for 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry, you can determine when the leave to appeal period ends.*

This Permit cancels and replaces Permit Number 1763-8FXR29, issued on 2011/04/29.

Dated at Hamilton this 19th day of December, 2013.

Carl Slater

Carl Slater
Director, Section 34
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule “A” forms part of Permit To Take Water 1381-95ATPY, dated December 19, 2013.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	TW1-88	Well Drilled	Bottled Water	Commercial	773	24	1,113,000	365	17 568384 4847833
						Total Taking:	1,113,000		

3.3 Notwithstanding the Maximum Taken per Minute and Maximum Taken per Day specified in the Table A of Condition 3.2, the instantaneous rate and amount of taking may increase up to a maximum of 946 litres per minute (LPM) and 1,362,240 liters per day (LPD) in each month between April 1 and September 30 for the duration of the Permit in order to provide operational flexibility. However, the average daily taking in any month between April 1 and September 30 shall not exceed 1,113,000 (LPD).

3.4 Notwithstanding Conditions 3.2 and 3.3 the maximum daily water taking shall be reduced should the Grand River Low Water Response Team declare a Level 1 or Level 2 drought condition in the watershed in which the taking is located. The reductions shall be in accordance with the Ontario Low Water Response Protocol and ensure that the reduction is based on the maximum taken per day permitted in Table A.

3.5 Nothwithstanding Conditions 3.2, 3.3, and 3.4 should the Ontario Water Directors Committee declare a Level 3 drought condition in the watershed in which the taking is located, the maximum daily water taking shall be reduced in accordance with the Level 3 declaration.

4. Monitoring

4.1 The Permit Holder shall establish the following monitoring program for the duration of the Permit:

Bedrock Wells

(i) Continuous monitoring of ground water levels at the following locations:

- TW1-88
- D2A
- D3 (MOE #6710228)
- MW5A
- MW6A
- D36B (MOE Tag#A001807)

(ii) Monthly monitoring of ground water levels at the following locations:

- D19 (MOE #6709207)
- D24A (MOE #6711344)
- D24B (MOE #6708146)

Supporting Documentation for June 9, 2021 Harden Environmental Review of Blue Triton Permit to Take Water Application

In response to the request by the Township of Puslinch we are pleased to provide additional supporting documentation for our Section 5 recommendations in our June 9, 2021, review of the Blue Triton Permit to Take Water renewal application. We have attached figures and tables following the text.

5.0 Summary of Recommendations to the Ministry of the Environment, Conservation and Parks

1. **We recommend that Permit specific conditions that limit water taking during drought and low flow conditions be considered for this permit renewal.**

Stream flow measurements on the Blue Triton site in 2016 to 2019 show that over the summer months (June through September) there is an average gain of 8.8 l/s between SW1 and SW2. In 2020 there is an average loss of 14 l/s over the same months. All expectations are that under normal conditions Aberfoyle Creek is a gaining stream from groundwater discharge. This includes 1) Golder (2021) that states that groundwater flow in the overburden is toward Mill Creek 2) Golder (2021) has simulated Aberfoyle Creek discharge graphs that show an expectation of increased flow between SW1 and SW2 and 3) Matrix Solutions (2019) groundwater model has Aberfoyle Creek as a gaining stream. During 2020 the actual flow measurements prove otherwise and during the pumping of water fromTW3-80, previous investigations found that a loss of groundwater discharge to Aberfoyle Creek is expected.

The pumping test conducted in 2007 (CRA, 2008) documents the change in water levels in mini piezometers installed in Aberfoyle Creek. MP12S/D, MP3S/D, MP4S/D and MP7 are all documented to clearly respond to the cessation of pumping on Figure 5.29. This means that during pumping condition, the groundwater levels beneath Aberfoyle Creek were depressed and recovered when pumping ceased. The conclusion by CRA is that *"the extent of influence of pumping along the creek bed is conservatively estimated to extend from MP13S/D-04 to 40 m upstream of the northeast property boundary, a distance of 755 metres" (Page 55 Conclusion 6 CRA, 2008)*. This is majority of the creek that flows through the Blue Triton property. It follows therefore, that most impacts to the creek are realized along this reach and not elsewhere. This is both upgradient of SW2 and the streamflow gauge at Sideroad 7.

The area of influence described by CRA (2008) includes the area beneath the creek shown by the recent modeling by Matrix Solutions as a zone of increased permeability between the Lower Bedrock Aquifer and the Upper Bedrock Aquifer. In this area there are also documented changes in the overburden groundwater system because of pumping. Golder (2021) states that natural events influence overburden water levels to a greater degree than pumping. We recognize that during normal conditions the relative impact from pumping is insignificant but during drought conditions the impacts from pumping become more significant relative to streamflow. Golder

(2021) goes on to say that water levels in the overburden recover when pumping rates are reduced. This speaks to the effectiveness of reduced pumping during Low Flow declarations.

No response in streamflow was noted during the 2007 test, however, the flow rate in the creek ranged from 100 to 600 L/s and was clearly influenced by precipitation events. Conversely, in 2020 the streamflow reduced to 29.5 L/s.

We have also attached our review of the 2010 Monitoring Report (Harden, 2011). The finding by Conestoga Rovers and Associates was that at a rate of 2460 L/m there would be no groundwater discharge to Aberfoyle Creek from the Blue Triton site, compared with a moderate gain under no pumping condition. The Harden (2011) letter includes an analysis that the stream loss would be in the order of 16 L/s at the pumping rate of 2460 L/s compared with a gain of 4.5 L/s under natural conditions. Harden also states that this is likely an underestimation of the impact.

2. **For the Low Water Response declarations to be effective, a reduction in water taking should follow the 2017 interim guideline for water bottling permits and require a 10% reduction in taking based on the previous three months taking for all permits.**

This pumping rate from which to base the reduction in taking was initially recommended in the Interim Procedural and Technical Guidance (MECP, 2017). These guidelines were directed at new PTTW solely for the bottled water industry and we understand that Nestle Waters Canada was not required to abide by these because they had an existing permit. In our review of this guidance and moratorium on behalf of the Township of Puslinch, Harden is clear that Water Bottling should not be treated any differently than other water taking sectors. However, it is obvious that in order to be beneficial, a reduction from present use is necessary. The 3-month average may be arbitrary, however, it is not an unreasonable starting point from which the 10% reduction can be measured.

The Low Water Response system was designed to minimize and mitigate harm to surface water features and to minimize drawdown in aquifers during low precipitation and low and surface water flow conditions. The Low Flow Response request as presented by the MNRF and GRCA is to reduce use by 10%. In 2020 Blue Triton increased their pumping after the low flow declaration. If water taking increases occur by all Permit holders, then the Low Flow Response is obviously ineffective. We refer you to the discussion for Recommendation 1 as to how a reduction in taking is specifically beneficial to Aberfoyle Creek along the Blue Triton property.

3. **Investigation of the impacts of open domestic wells on the flow regime and specifically how the downward gradients, in these wells, induced by the pumping at TW3-80 can affect the water level in the upper aquifers and water quality in the lower aquifers should be conducted.**

The 2020 Monitoring Report (Golder, 2021) documents the pumping and non-pumping scenario around TW3-80 in the lower bedrock. The drawdown in the Lower Bedrock Aquifer is estimated to range from nine metres at the pumping well to one to two metres beneath the Hamlet of Aberfoyle. The documented taking by Blue Triton shows that they generally take water everyday and thus creates a long-term drawdown that does not naturally occur otherwise. Similar conditions occur within the areas of influence of the City of Guelph municipal wells and the Region of Waterloo municipal wells. Harden, 2011 provides a detailed explanation of the importance of determining the role of the multi aquifer wells in the transport of contaminants such as road salt to the Lower Bedrock Aquifer.

4. **It would be valuable to compare data collected at the three new wells MW19-18, MW20-19, MW21-18 to local domestic well hydrographs. This data should be included in subsequent monitoring reports.**

These wells have been designed to determine water levels and water chemistry from several depths in the geological profile in the Aberfoyle area. The data obtained from these wells will assist in the determination of extent of the drawdown area for TW3-80.

5. **Improved accuracy and repeatability of streamflow monitoring is necessary, particularly during low flow conditions. If data loggers are to be used as a surrogate for flow monitoring, then improved stage discharge relationships are required.**

The difference between the 2020 field measured streamflow values and streamflow values determined from the stage-discharge relationship is significant, particularly during low flow conditions. Not only do the calculated (via Stage Discharge relationship) 2020 flows show that there is an increase in surface water flow under all conditions between SW1 and SW2, the flow rate suggested by the continuous flow graph is several times greater than that measured. In order for stage, measured by transducers, to be a reliable method of determining stream flow, an improved stage-discharge relationship must be used.

In contrast to 2020, the simulated continuous flow graph presented in the 2018 monitoring report prepared by Golder (Figure F3B 2018) presents a much better comparison between measured and calculated flows (data and graph attached following text).

We have added the measured streamflow for station SWM1 at the Mill Creek Aggregates site to the continuous discharge graph prepared by Golder (2021). These measured values of streamflow are from a location 2.5 kilometers downstream of the Blue Triton site and downstream of the confluence with Mill Creek. Even at that distant location, the measured streamflow values are lower than the calculated values presented in Golder (2021). This shows that there is a significant overestimation of streamflow in Figure F3b (Golder, 2021)

6. **We recommend that hydrographs of the discrete monitoring zones in the new wells MW19-18, MW20-19, MW21-18 be presented and ask NWC to indicate if the three new wells corroborate the extent of the high conductivity zone as presented in the model.**

These wells have been designed to determine water levels and water chemistry from several depths in the geological profile in the Aberfoyle area. The data obtained from these wells will assist in the determination of the main source area for TW3-80.

7. **Given the measured loss of streamflow for several months, we recommend that the groundwater model include a monthly or seasonal analysis of impact to streamflow within the area of influence of the pumping well or at station 3AQ131. The model should be used to predict seasonal changes in groundwater discharge to Aberfoyle Creek as well as total streamflow. The predicted changes by the model, the field measurements and ecological considerations should then be used to establish a minimum streamflow threshold.**

As discussed in the response to Recommendation 1, the greatest impacts from the pumping well are identified within the area of influence of the pumping well, specifically identified to be within the extent of the Blue Triton property. The extent of influence identified by CRA (2008) occurs both upstream from SW2 and the flow station at Sideroad 7. Therefore, the greatest potential impact to ecology will occur in this area.

The groundwater model should be able to identify the reach of the creek that has the greatest impact from pumping. This reach should be recognized, and suitable thresholds assigned.

Minimum streamflow thresholds have been used for other permits to instigate investigations into causes of decreases in streamflow and to potentially reduce water takings.

Consultants hired by Blue Triton and former owners of this site recognized that the pumping from the Lower Bedrock Aquifer has an effect on streamflow. The evaluation of loss in flow in Aberfoyle Creek was assessed by GWS Ecological and Forestry Services (Harden, 2011, Appendix) and says the following;

> In summary, there is presently inconclusive evidence of potential impacts to the aquatic habitat of Aberfoyle Creek as a result of past water taking operations or proposed future pumping rates. The available data indicate that proposed pumping at the maximum rate will result in little or no groundwater being discharged to the creek and a corresponding loss of flow in the channel as the stream changes from a volume gaining to a volume losing watercourse. Although the magnitude of these changes in stream flow are not anticipated to be large, it is uncertain whether or not this will adversely affect seasonal trout utilization of this reach or dependent aquatic plants and invertebrates. The creek and its biological inhabitants are considered to be the most sensitive indicators of potential changes to groundwater levels in the overburden aquifer arising from proposed water taking up to 2,500 litres/minute. Based on this assumption, the following recommendations are made with respect to the renewal of Nestle's water taking permit for another 10 years and future monitoring of biological resources.

The MECP included significant monitoring requirements in previous Permits to Take Water. One reason is that the pumping tests conducted in support of the application identify changes to streamflow and that the tests did not cover all possible conditions, including Low Flow Conditions. The monitoring is showing that under certain Low Flow Conditions Aberfoyle Creek ceases to be a gaining stream and becomes a losing stream as predicted by the pumping tests. The impact of this becomes more apparent during the Low Flow Conditions and we are recommending that an ecologically based minimum stream flow threshold be established for this site.

References:

Conestoga Rovers And Associates, Supplemental Hydrogeologic Investigation Final Report, January 21, 2008

Harden 2011, Application for PTTW Renewal, 2010, March 17, 2011

Golder Associates Ltd, March 2021, NWC Waters Canada Aberfoyle Site, 2020 Annual Monitoring Report.

Golder Associates Ltd, March 2019, NWC Waters Canada Aberfoyle Site, 2018 Annual Monitoring Report.

Matrix Solutions Inc., February 2019, Groundwater Modelling Report for Renewal of the Permit to Take Water for the NWC Waters Canada Aberfoyle and Erin Facilities.

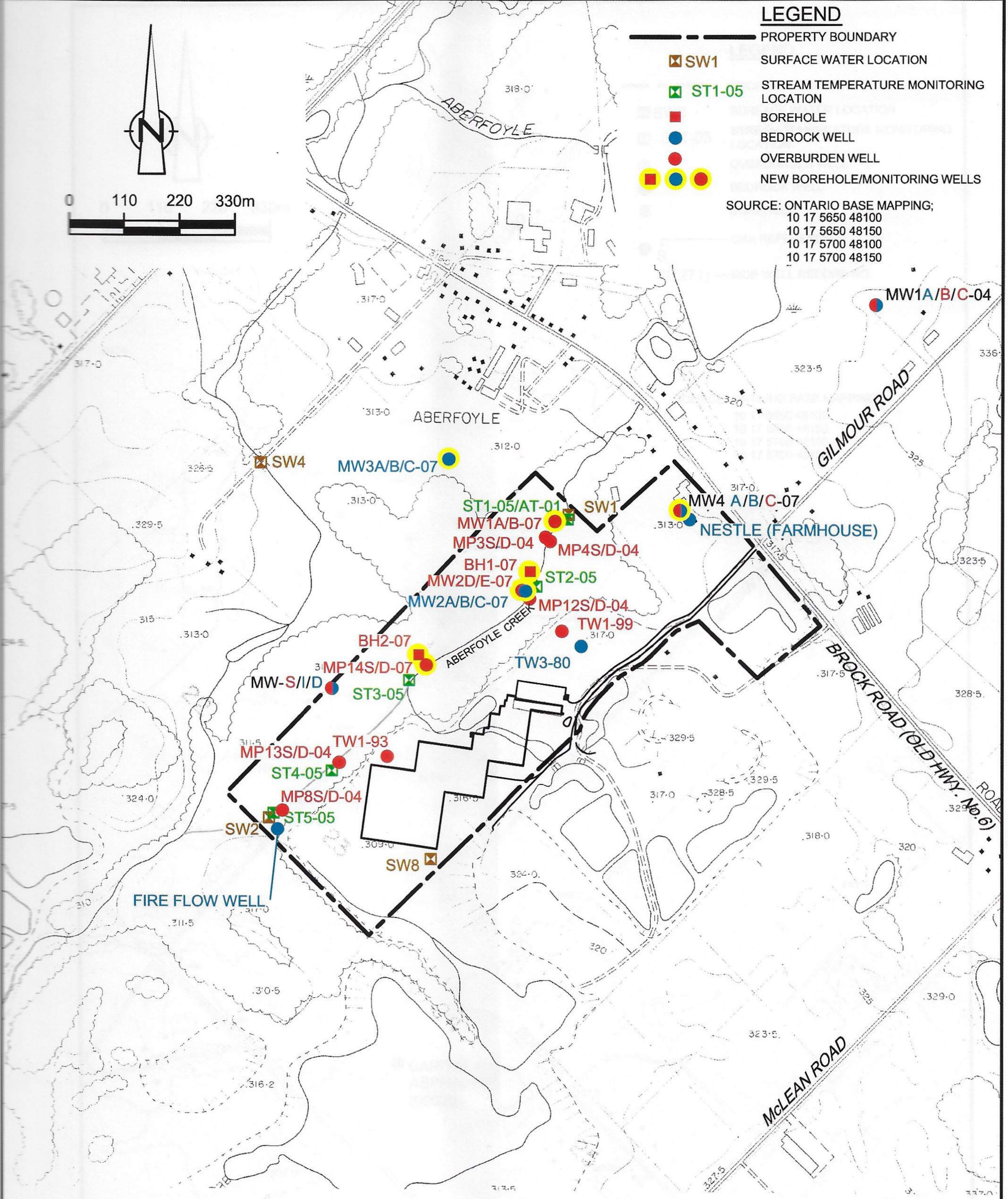


figure 3.1

BOREHOLE/MONITORING WELL LOCATIONS
SUPPLEMENTAL HYDROGEOLOGIC INVESTIGATION
NESTLÉ WATERS CANADA
Guelph, Ontario

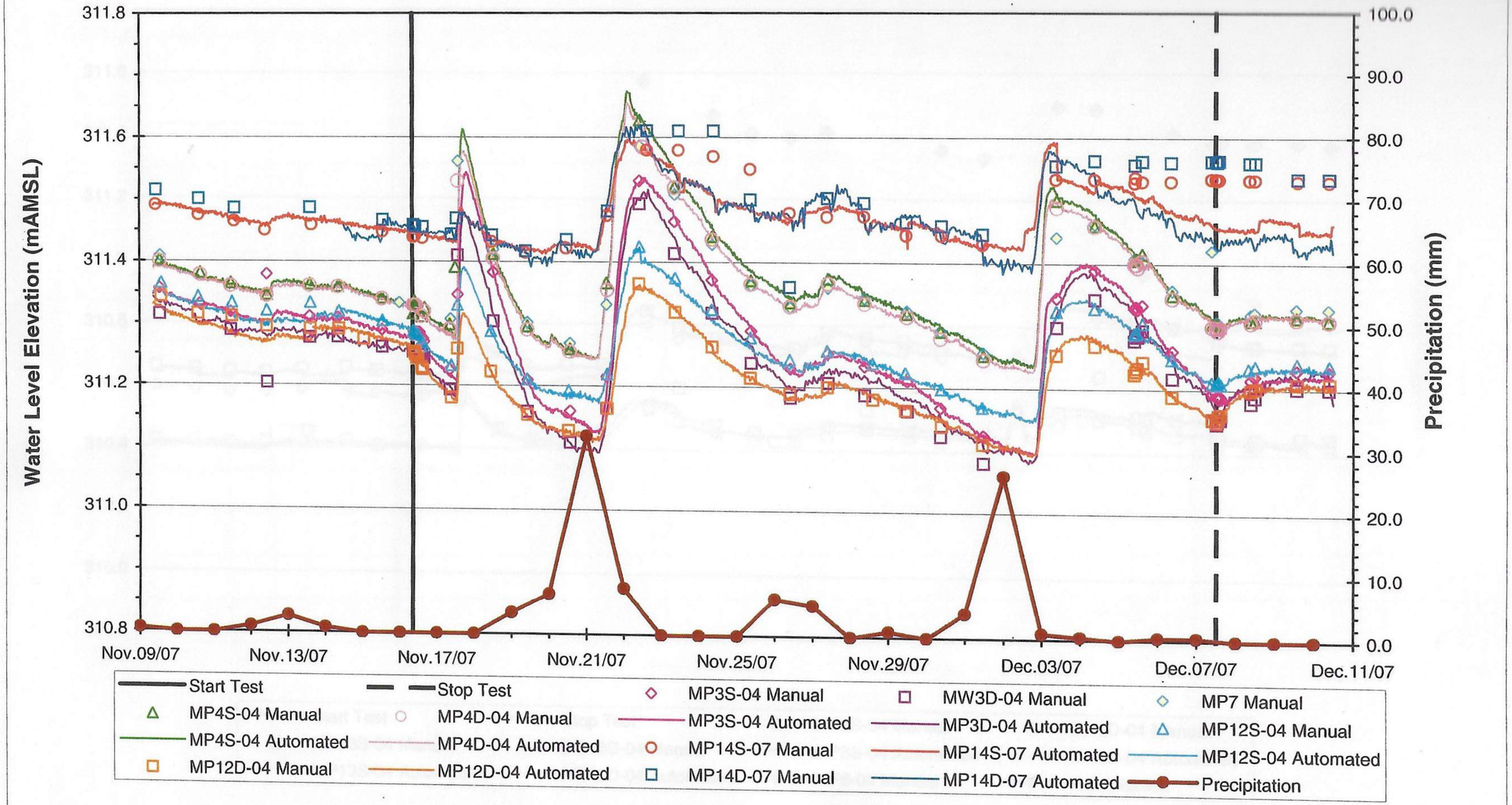


figure 5.29

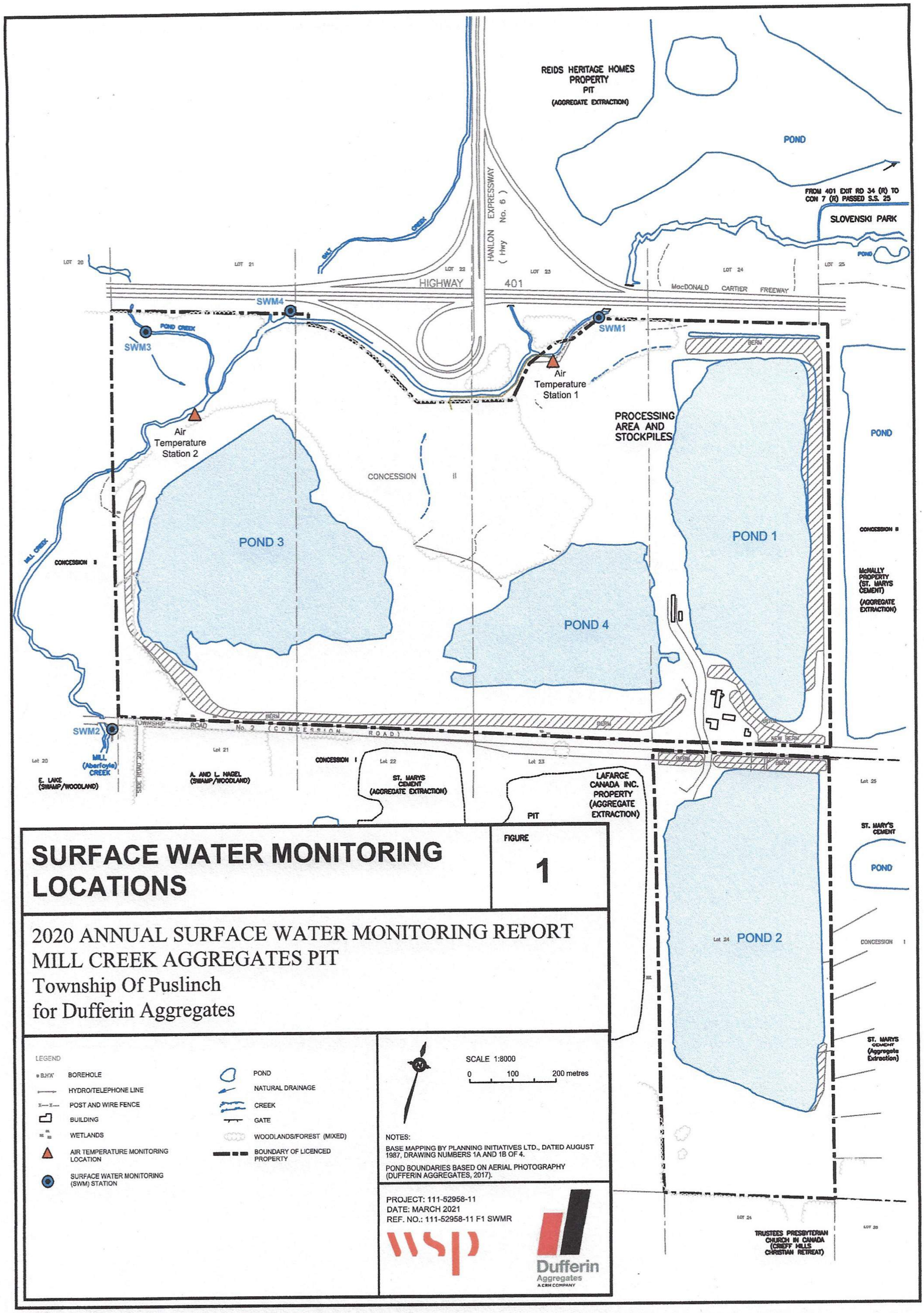
HYDROGRAPHS FOR WELLS INSTALLED IN OVERBURDEN - D

SUPPLEMENTAL HYDROGEOLOGIC INVESTIGATION

NESTLÉ WATERS CANADA

Guelph, Ontario

Note: Water was frozen in the following wells and dates listed: MP14S-04: Nov. 22 to Nov. 24; Nov. 26, Nov. 28, Nov. 30 to Dec. 1, Dec. 4 to Dec. 10; and MP14D-07: Nov. 22 to Nov. 25, Nov. 28, Nov. 30 to Dec. 1, Dec. 4 to Dec. 10, 2007.
Logger was replaced in MP14D-07 on Nov. 14, 2007.



SURFACE WATER MONITORING LOCATIONS

FIGURE 1

2020 ANNUAL SURFACE WATER MONITORING REPORT
MILL CREEK AGGREGATES PIT
Township Of Puslinch
for Dufferin Aggregates

LEGEND

- BOREHOLE
- HYDRO/TELEPHONE LINE
- POST AND WIRE FENCE
- BUILDING
- WETLANDS
- AIR TEMPERATURE MONITORING LOCATION
- SURFACE WATER MONITORING (SWM) STATION
- POND
- NATURAL DRAINAGE
- CREEK
- GATE
- WOODLANDS/FOREST (MIXED)
- BOUNDARY OF LICENCED PROPERTY

SCALE 1:8000
0 100 200 metres

NOTES:

BASE MAPPING BY PLANNING INITIATIVES LTD., DATED AUGUST 1987, DRAWING NUMBERS 1A AND 1B OF 4.

POND BOUNDARIES BASED ON AERIAL PHOTOGRAPHY (DUFFERIN AGGREGATES, 2017).

PROJECT: 111-52958-11
DATE: MARCH 2021
REF. NO.: 111-52958-11 F1 SWMR

wsp

Dufferin Aggregates
A CRH COMPANY

Table B-1: SWM1 and SWM2 Rating Curve Data (2010-2020)

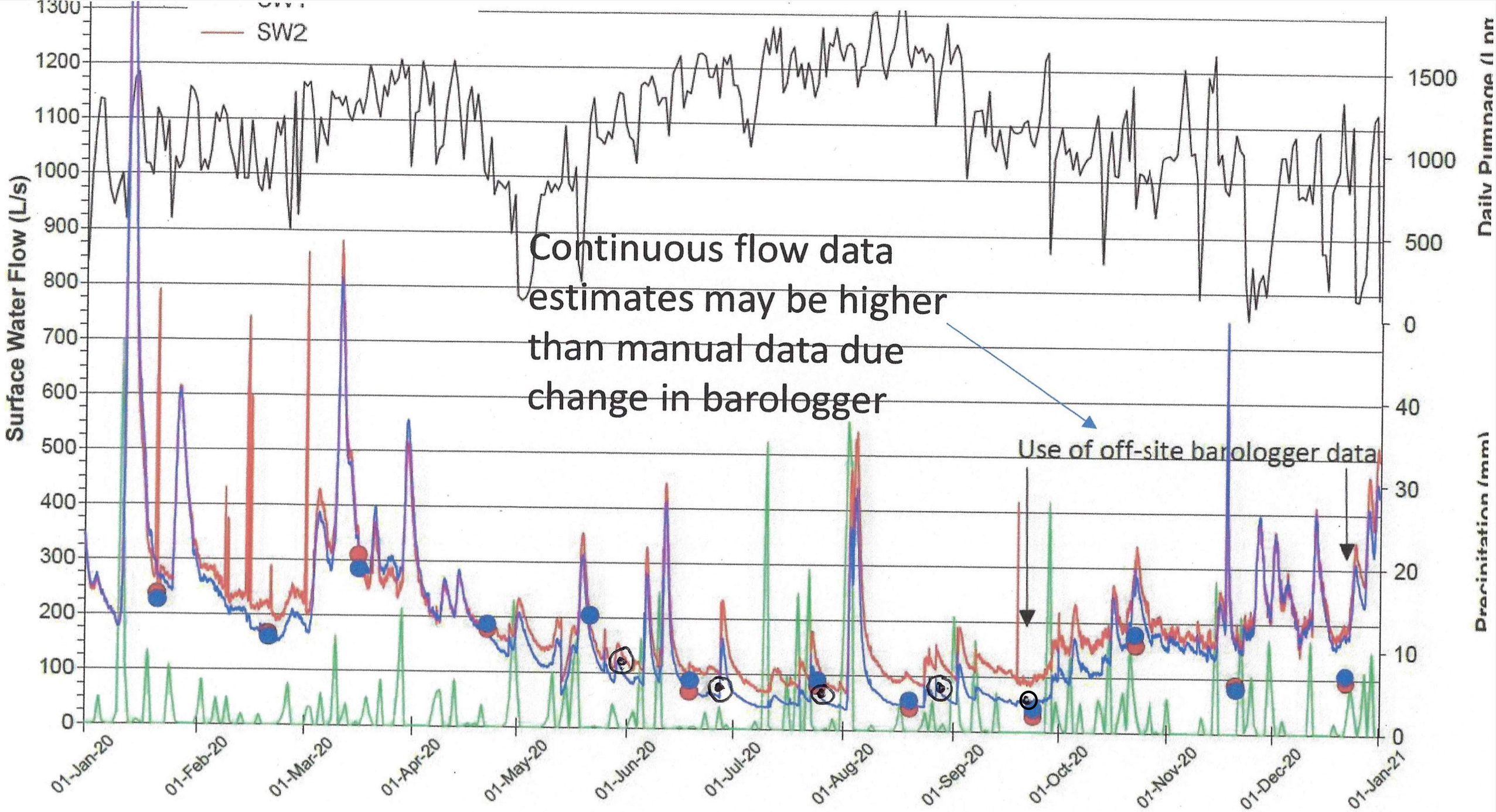
DATE	SWM1		SWM2	
	Water Level (m above logger)	Discharge (m^3/s)	Water Level (m above logger)	Discharge (m^3/s)
2019-Nov-27	0.3932	0.1666	0.5852	0.2220
2019-Dec-18	0.2952	0.1460	0.4663	0.2144
2020-Jan-07	0.3094	0.1479	0.4959	0.2434
2020-Feb-28	0.2522	0.1763	0.4512	0.2370
2020-Mar-12	0.5379	0.5878	0.6165	0.6633
2020-Apr-16	0.2584	0.2285	0.3816	0.2722
2020-May-28	0.2889	0.1124	0.2987	0.1819
2020-Jun-25	0.2623	0.0816	0.2843	0.2364
2020-Jul-22	0.2545	0.0760	0.2867	0.1223
2020-Aug-25	0.2264	0.0891	0.3169	0.1318
2020-Sep-21	0.2445	0.0608	0.2843	0.0843
2020-Oct-30	0.3029	0.1116	0.3305	0.1435
2020-Nov-26	0.3874	0.2289	0.4319	0.3762
2020-Dec-18	0.2548	0.0594	0.3498	0.1399

Notes:

BD - Beaver Dam located downstream; therefore, water level and discharge data not recorded

N/A - Water level/discharge measurement not available due to frozen/inaccessible conditions

Grey shading indicates measurements may be impacted by beaver dam activity downstream of monitoring locations



Data from SWM1 Measured Streamflow, Technical Appendix A, 2020 Surface Water Report, Mill Creek Aggregates, WSP March 25, 2021

Surface Water Flow (L/s)

1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0

Daily Pumpage (Lpm)

2000
1500
1000
500
0

Precipitation (mm)

40
30
20
10
0

01-Jan-18
01-Feb-18
01-Mar-18
01-Apr-18
01-May-18
01-Jun-18
01-Jul-18
01-Aug-18
01-Sep-18
01-Oct-18
01-Nov-18
01-Dec-18
01-Jan-19

Manual measurements
Station SW2

Precipitation (mm)
Daily Pumpage (Lpm)
SW1
SW2

GOLDER

DATE	DECEMBER 2018
DESIGN	JH
REVIEW	GP
APPROVED	GP

PROJECT

NESTLE WATERS CANADA
Town of Aberfoyle, Ontario

TITLE

SURFACE WATER FLOW VS. TIME (2018)
2018 ANNUAL MONITORING REPORT

PROJECT NO.	REV	FIGURE
13-1152-0250 (1000)	A	F3b

TABLE F1
Surface Water Flow
2018 Annual Report

DATE	SW-1 Flow (L/sec)	SW-2 Flow (L/sec)	COMMENT
18-Jan-18	155.4	NA	Frozen channel at SW-2
22-Feb-18	1060.6	998.1	
19-Mar-18	107.5	188.7	
19-Apr-18	491.5	530.6	
24-May-18	174.7	192.3	
19-Jun-18	75.9	75.6	
19-Jul-18	50.1	41.5	
23-Aug-18	100.8	106.4	
18-Sep-18	55.8	49.6	
16-Oct-18	84.7	95.8	
23-Nov-18	98.5	108.4	
20-Dec-18	123.8	139.3	

Harden Environmental

4622 Nassagaweya-Puslinch Townline R.R. 1 Moffat Ontario Canada L0P 1J0
Phone: 519.826.0099 fax: 519.826.9099 www.hardenv.com

Groundwater Studies

Geochemistry

Phase I / II

Regional Flow Studies

Contaminant Investigations

OMB Hearings

Water Quality Sampling

Monitoring

Groundwater Protection Studies

Groundwater Modelling

Groundwater Mapping

File: 0215

March 17, 2011

The Township of Puslinch
R.R 3, Guelph, Ontario
N1H 6H9

Attention: Mrs. Brenda Law, A.M.C.T.
Clerk - Treasurer

Dear Mrs. Law:

Re: Nestlé Waters Canada
Application for PTTW Renewal 2011

We are pleased to comment on the 2010 Annual Monitoring Report prepared by Conestoga Rovers & Associates (CRA) in January 2011. On February 24th, 2011 we attended a stakeholders meeting for which we prepared preliminary comments on the report as shown in the attached email. Minutes of the meeting were kept and responses to individual questions were prepared by Nestlé Waters Canada (NWC) on March 4, 2011 (attached). James Etienne of the Grand River Conservation Authority also responded (email attached) to our concern of overall aquifer management. This letter reflects our professional opinion of the PTTW renewal application understanding that we have received and read the recent responses by NWC and the GRCA. Also, due to the potential for biological degradation of Aberfoyle Creek and its associated wetlands, Greg Scheifele has commented on the potential biological impacts arising from the water taking in his letter of March 17, 2011 (attached).

This letter addresses both the review of the 2010 Annual Monitoring Report and overall aquifer management in the Aberfoyle area.

Review of 2010 Annual Monitoring Report

The 2010 Monitoring Report is a requirement of the existing permit to take water as a summary of the 2010 monitoring results. The 2010 report also contains findings of hydrogeological investigations undertaken to satisfy Conditions 4.7 and 4.8 of the existing Permit to Take Water (PTTW). Conditions 4.7 and 4.8 needed to be satisfied before a new PTTW could be issued. This required the MOE to issue extensions of the 2007 PTTW to wait for suitable environmental conditions to satisfy Condition 4.8 to arise. These environmental conditions arose in 2010 and NWC undertook the test between August 29 and October 9, 2010.

The CRA document also accompanies a request for a permit renewal. Nestlé Waters Canada is presently permitted to extract 2,500 Litres per minute (Lpm) from one source, well TW3-80. The permit renewal request is for the same volume of water although in 2010 the average rate of extraction was 1148 Litres per minute (Lpm) on a continuous basis (CRA, 2011, Appendix C p13). We understand that NWC will "grow" into the maximum allowable taking of 2500 Lpm over several years. NWC has also requested the PTTW be issued with an expiry date of 2021.

The NWC facility is located between the urban center of Aberfoyle and Hwy 401. There are many private and communal wells in Aberfoyle that obtain water from bedrock and overburden sources. Aberfoyle Creek flows through the NWC property and provincially significant wetlands are located adjacent to the Creek. The Township of Puslinch's interest in this matter is one of understanding the ongoing impacts of this taking and the potential impacts of maximum allowable extraction on the local environment and private water supplies. Harden Environmental has reviewed the available documents on behalf of the Township of Puslinch and concludes that;

a) Groundwater discharge to Aberfoyle Creek is presently diminished as a result of the present rate of water taking by Nestlé Waters Canada and increased water taking will further decrease groundwater discharge to Aberfoyle Creek;
b) There is the potential to indirectly effect private well water quality as a result of the water taking by Nestlé Waters Canada and
c) There is the potential for degradation of the water quality of the Goat Island and Gasport aquifers as a result of water taking by Nestlé Waters Canada.

These conclusions are based on the following evaluation.

Nestlé Waters Canada is permitted to extract and remove from the watershed a substantial volume of water. The permitted extraction rate of 41.6 L/s exceeds the low flow rate (± 28 L/s) in Aberfoyle Creek adjacent to the Nestlé Waters Canada facility. It is therefore important to understand the hydraulic relationship between the source of the

water taking and Aberfoyle Creek. The results of the 2010 pumping test show that there is a hydraulic connection between groundwater extraction from production well TW3-80 and Aberfoyle Creek. It is found that under the existing taking, and more so under increased taking, that a cessation of groundwater discharge to Aberfoyle Creek occurs within the Nestlé Waters Canada property. The cessation of groundwater discharge means that cool temperature groundwater no longer contributes to streamflow. In fact, along a small portion of the creek, the groundwater flow direction is reversed and stream water contributes to the groundwater system and presumably to well TW3-80. The magnitude of the decreased groundwater flow to Aberfoyle Creek is explored in detail on Pages 5 and 6 of this letter.

There are three major aquifers beneath the Aberfoyle area as shown in Table 1. These are the sand and gravel aquifer, Guelph aquifer and Goat Island/Gasport aquifers. A regionally recognized aquitard called the Eramosa dolostone separates the Guelph aquifer from the Goat Island/Gasport aquifer. A discontinuous till layer separates the sand and gravel aquifer from the Guelph aquifer. These aquifers are shown in their relative positions on Table 1.

Table 1: Relative positions of major aquifers and aquitards beneath Aberfoyle

Sand and Gravel Aquifer/Silt Till Aquitard
Guelph Aquifer (dolostone)
Eramosa Aquitard (dolostone)
Goat Island Aquifer (dolostone)
Gasport Aquifer (dolostone)

Well TW3-80 takes water from the Goat Island aquifer resulting in a drawdown of water levels (lowering of the water level) in the Goat Island aquifer. The drawdown effect spreads to all other aquifers. The area where lower water levels are measureable is known as the area of influence of the well.

The area of influence of well TW3-80 is not insignificant in either the Goat Island/Gasport aquifers or the Guelph aquifer. The attached Figures 5.5 and 5.8 of the 2010 Annual Report (CRA, 2011) clearly show the extent that the water taking has on water levels in these aquifers. A lowering of the water level in these aquifers may not be problematic for private/communal wells in the area given the ability of both the Guelph and Goat Island/Gasport aquifers to produce water. However, given the measured drawdown of approximately five metres in the Goat Island/Gasport aquifers and three metres in the Guelph aquifer, the lower water levels warrant reviewing the available drawdown in private wells in Aberfoyle during pumping conditions (of private wells) to ensure that there is sufficient availability. The effect of lower water levels on the natural environment will be discussed elsewhere in this letter.

The observation that drawdown in the Goat Island aquifer results in drawdown in the Guelph aquifer suggests that there is a reasonable hydraulic connection between these two aquifers. The Eramosa Formation separates the two aquifers, and although it is apparent that the Eramosa somewhat retards the effect of drawdown (from five metres drawdown to three metres drawdown) there is still a significant drawdown effect over a large area beneath the urban center of Aberfoyle in the Guelph aquifer. Given the relatively rapid response and the magnitude of the response in the Guelph aquifer due to pumping from the Goat Island aquifer, the effectiveness of the Eramosa Formation as an aquitard is questionable. This may be due to natural factors such as a thinning of the aquitard, or vertical fracturing. However, the observed drawdown in the Guelph Formation is also brought about by short circuiting in "Eramosa Penetrating" wells. These Eramosa Penetrating Wells are "open" to both the Guelph aquifer and the Goat Island aquifer. When pumping from the Goat Island aquifer occurs, water is drawn from the Guelph aquifer via the well bore. There are two main concerns in regards to the short circuiting;

a) Contaminants in the shallow aquifer are drawn into the deeper aquifer and
b) The continual downward flow in the well creates an area of influence around each private/communal well thereby increasing the potential for individual well contamination.

The downward movement of groundwater between the Guelph and Goat Island aquifers and mixing of Guelph and Goat Island water will happen in Eramosa Penetrating Wells notwithstanding the pumping by Nestlé Waters Canada. The activation of the pump within the private well and possibly a natural downward gradient will draw water from the Guelph aquifer to the Goat Island aquifer. However, the pumping by NWC significantly exacerbates this condition and the relatively constant use of the NWC well broadens the area of influence of each of these private wells in the Guelph aquifer, thereby drawing in significantly more shallow water and potential contaminants than would naturally occur. This has ramifications for the long term safety of the groundwater quality in the Goat Island and Gasport Formations that may otherwise be protected by an uncompromised Eramosa Formation.

There is already chemical evidence of the influence of the Guelph Formation and overburden derived groundwater on water in TW3-80. In September and December 2007 water samples were obtained from several wells on the NWC property at 101 Brock Road. In December 2009 samples were obtained from groundwater monitoring wells at the nearby NWC property located at 46 Gilmour Road. The samples obtained in 2009 were obtained from specific formations and provide a chemical signature of water from the Guelph, Goat Island and Gasport Formations. The main cations and anions of samples obtained in 2007 and 2009 are summarized in Table 2 and presented as a piper plot on Figure 1.

The chloride concentration in production well TW3-80 of 90 mg/L is significantly different than that found in the water samples from Gilmour Road, an indication that well TW3-80 water does not mainly originate from the Goat Island or Gasport Formations where the average chloride concentration is 16 mg/L. Golder and Associates obtained 113 groundwater samples from wells in 2005 within the City of Guelph and the Township of Puslinch. The median concentration of chloride was 50 mg/L. They concluded that road de-icing and water softeners were the most likely source of chloride. Based on this data and other experiences in Puslinch Township, we conclude that elevated chloride concentrations do not naturally occur in the Guelph, Eramosa, Goat Island or Gasport Formations. Therefore the presence of chloride in elevated concentrations relative to background suggests an impact arising from a shallow source. A further review of Table 2 suggests that concentrations of sodium, sulphate, calcium and hardness found in production well TW3-80 are not similar to Goat Island or Gasport water quality as characterized by the AES data.

Our conclusion from the water quality data is that water taken by Nestlé Waters Canada has a significant component of shallow formation water. There is no other reasonable explanation for the elevated concentration of chloride. It is our opinion that the water quality data challenges the assertion by CRA that the Gasport or Goat Island Formations are the major source of water for well TW3-80 and challenges the CRA assertion that the Eramosa Formation is an effective aquitard. The implication of this is that shallow water sources contribute to production well TW3-80 to a greater degree than suggested.

The source of the water for production well TW3-80 continues to be of interest to the Township of Puslinch with respect to potential impact to residential wells and the Goat Island aquifer in general. If Eramosa Penetrating Wells are conduits for a significant volume of water between the Guelph Formation and the Goat Island Formation, then individual wells may be acting as a local drain, drawing in contaminants from septic systems and roadside runoff to a greater degree than would occur naturally.

We recommend that Eramosa Penetrating Wells be identified and inspected. The water quality of each of these wells must be monitored at least on a bi-annual basis. Where contaminants are found, the wells must be considered for replacement or other remedial measure. This will benefit the water quality of the Goat Island aquifer as well as individual wells. According to Figure 3 attached to the March 4, 2011 submission by John Challinor II (NWC), there are thirty two such wells in the vicinity of Aberfoyle, although not all fall within the area of influence of well TW3-80.

In addition to water quality issues stated above, the source of water for production well TW3-80 is of interest to the Township in regards to the potential impact to Aberfoyle Creek and its associated wetlands. It is our opinion that the 2010 pumping test confirms the hydraulic connection between groundwater discharge to Aberfoyle Creek and water taking from well TW3-80. The response by mini piezometers beneath and adjacent to Aberfoyle Creek clearly show a drawdown effect during the pumping test. The

magnitude of the change in groundwater discharge to Aberfoyle Creek is difficult to determine accurately given the assumptions required for any analysis. When TW3-80 is producing 2460 Lpm, CRA has estimated that the loss of groundwater discharge is 1.57 L/s and the loss of streamflow to the aquifer is 2.74 L/s based on hydraulic gradients obtained from multi-level piezometers. Harden Environmental performed calculations based on hydraulic gradients obtained between shallow mini piezometer water levels and Aberfoyle Creek water levels (Tables 3 and 4). Harden calculations suggest that this location of Aberfoyle Creek is a gaining stream (groundwater discharge exists) of approximately 4.66 L/s under natural conditions. During the testing period, this 4.66 L/s of groundwater discharge does not occur and the creek becomes a losing stream and an additional 16.9 L/s of streamflow is lost into the ground through the creek bed. Although the difference in calculation methods results in a significant difference in estimated groundwater discharge, a more significant difference in results would be realized if the hydraulic conductivity values are greater or lesser than suggested by CRA. For example, CRA's field tests suggest a hydraulic conductivity of 2.20×10^{-4} m/sec at MP12S versus 1.00×10^{-5} m/sec for lab measurements. Using the field measured value will yield a significantly greater impact to Aberfoyle Creek than calculated by CRA or Harden. We conclude that the magnitude of gains and losses by Aberfoyle Creek are likely significantly greater than calculated by CRA. It is very clear, however, that during the testing period at the maximum pumping rate, there was no groundwater discharge to Aberfoyle Creek within the Nestlé Waters Canada property limits and there was a loss of streamflow in Aberfoyle Creek.

Greg Scheifele of GWS Ecological and Forestry Services has commented on this loss of groundwater contribution and loss of streamflow in relation to aquatic habitat and made recommendations pertaining to the PTTW renewal in his letter of March 17, 2011. Of particular interest is Mr. Scheifele's comment that water temperature does not appear to limit trout utilization of this reach of Aberfoyle Creek during the critical spawning and egg incubation periods and trout only become impacted if, as temperatures rose, they did not migrate. Given the absence of pre-pumping thermal measurements and uncertainties in the calculations of groundwater contributions, it is not possible to state whether or not there is sufficient groundwater discharge under non-pumping conditions to provide thermal refuge to trout during warm temperature periods.

Our comments specific to the 2010 Annual Monitoring Report are as follows:

Section 1.2, Paragraph 1	The construction details of TW3-80 presented herein do not correlate to the well record or to the opinion that water is being obtained from the Goat Island Formation. The CRA interpretation is that the Guelph Formation extends to a depth of 24.4 metres (80 feet). If the Guelph Formation does terminate at a depth of 24.4 metres (80 feet) and the well is only 31.1 metres (102 feet) deep, the maximum thickness of the Eramosa Unit

	is 6.7 metres (22 feet). Either the Eramosa is much thinner at TW3-80 or the top of the Guelph Fm. depth is incorrect. This issue was raised in our May 11, 2007 letter response to the 2007 Permit Application. We tend to agree with the AES report that suggests that the Guelph Formation is 2 m thick, thus terminating at 17.2 m (56 feet)
Section 3.12, Bedrock Water Levels	It is noted that some private wells are open across multiple bedrock units. Despite this acknowledgement by CRA, some private wells are used to depict drawdown in the Goat Island/Gasport Formations. These wells should be identified on Figures 4.6 and 5.5 which are intended to indicate the potentiometric surface and the drawdown only from wells in the Goat Island/Gasport Formations. Those wells that are open across multiple aquifers will show less drawdown than those only open to the Goat Island/Gasport Formations. These wells include 6714195, 6712369, 6708740, 6711997, 6713755, 6707383, 6709385 and 6705029.

In summary, in response to the PTTW renewal application by Nestlé Waters Canada, Harden Environmental Services Ltd. recommends the following actions to protect Aberfoyle Creek, to protect private well quality and to protect the deeper aquifer;

1) The pumping water level of all private bedrock wells in Aberfoyle must be measured and the predicted pumping level during stressed conditions estimated. This predicted pumping level must be then adjusted downward by the steady state drawdown predicted for that well. This value must be compared to present pump setting depth. If there is adequate water available, no further steps are necessary. If there is an inadequate amount of available drawdown measures such as lowering the pump or deepening the well must be considered.

2) All Eramosa Penetrating Wells must be identified and water quality samples obtained. Where elevated concentrations of anthropogenic contaminants are found (e.g. chloride, nitrate, and sodium) and degradation of the Goat Island aquifer is occurring, then well replacement or well lining must be considered.

3) We endorse the recommendations of Greg Scheifele of GWS Ecological Forestry Services in his letter of March 17, 2011.

Overall Groundwater Management in Aberfoyle Area

The Ministry of the Environment has permitted a large volume of surface water and groundwater to be taken from aquifers and ponds in the Aberfoyle area. The health of the residents in the area, the economic development of the area and the health of the natural environment rely on the availability of water. The presence of the cold water stream and several wetlands in this area proves that there is groundwater available to the terrestrial environment from underlying aquifers. The permitted water taking alters flow conditions in the underlying aquifer to the point where the natural groundwater discharge to streams and wetlands no longer occurs. In addition to Nestlé Waters Canada; Meadows of Aberfoyle, ComCast, Aberfoyle Concrete and Royal Canin also take water from the underlying aquifer. Dufferin Construction, CBM St. Marys and Capital Paving are also permitted to take water from ponds and wells. In addition to Permitted water taking, there is the diversion of water that occurs during below-water-table extraction, also common in this area. The Township of Puslinch independently reviews monitoring reports for water taking and gravel extraction, however, the Township should be able to rely on the Ministry of the Environment to manage the water taking and water diversion such that the balance between consumption and availability(to residents, businesses and natural environments) is not tipped in favour of consumption.

In consideration of the PTTW renewal by Nestlé Waters Canada, the Township should be told by the MOE how the overall water taking from the aquifers and water diversion within the aquifers is being managed such that the appropriate balance between the natural environment and urban/industrial development is being struck.

Sincerely,

Harden Environmental Services Ltd.

Stan Denhoed, P.Eng., M.Sc.
President

John Challinor II Nestlé Waters Canada
Carl Slater MOE
James Ettiene- GRCA
Art Timmerman MNR
Aldo Salis – County of Wellington
Greg Scheifele – GWS Ecological and Forestry Services

Figure 1: Piper Plot: Nestle Waters Canada

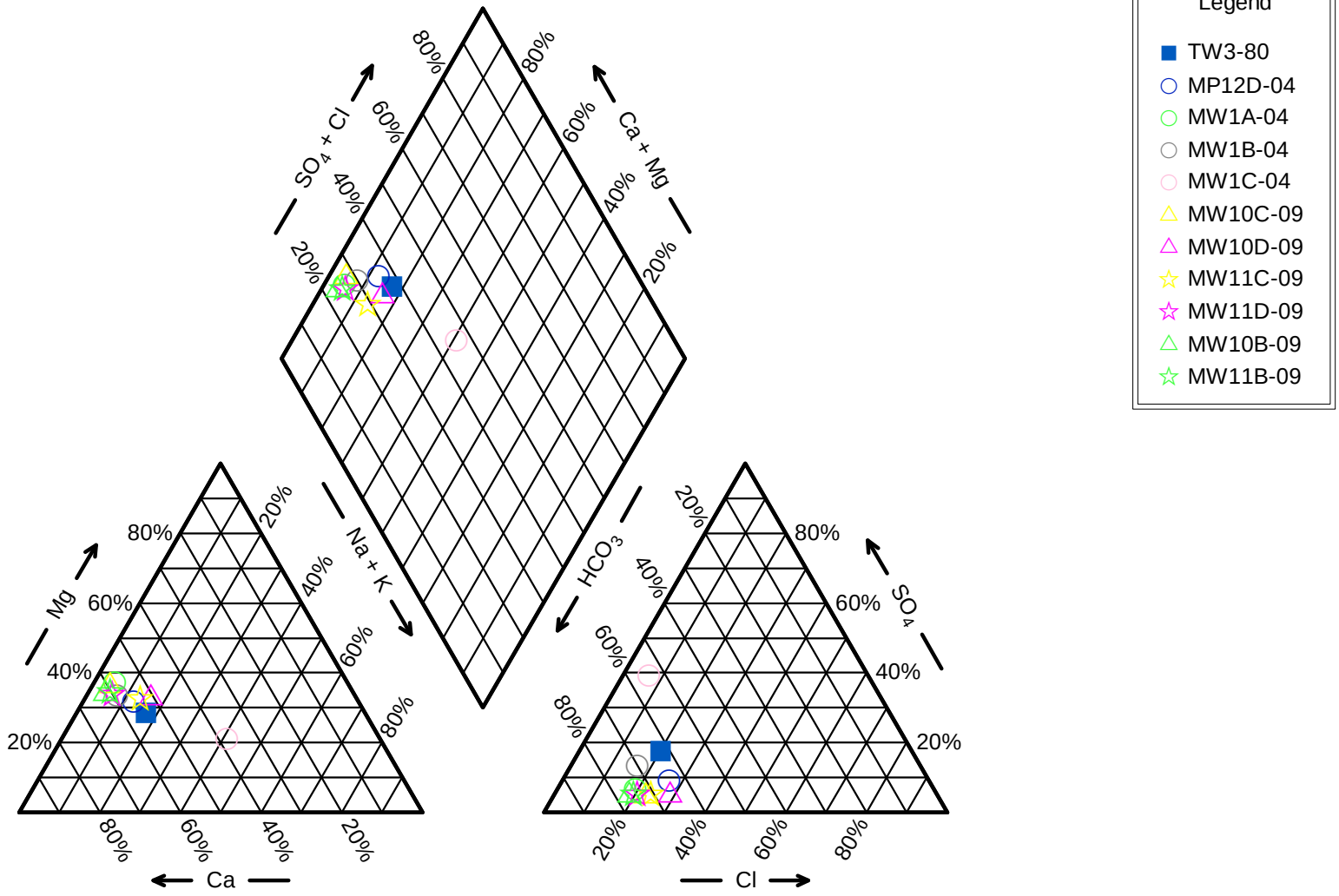


Table 2: Water Quality Data

Formation	Units	Goat Island TW3-80	OB MP12D-04	Guelph MW1A-04	OB MW1B-04	OB MW1C-04	Goat Island MW10C	Gasport MW10D	Goat Island MW11C	Gasport MW11D	Guelph MW10B	Guelph MW11B
Strontium	mg/L	1.53	0.629	0.139	0.229	0.66	1.38	2.91	0.233	0.896	0.097	0.087
Calcium	mg/L	106	80.3	90.6	174	94.4	67	63	64	67	74	68
Magnesium	mg/L	34.1	28.1	35.8	60.1	32.7	25	25	24	23	25	24
Chloride	mg/L	90	37	25	57	390	15	17	16	16	17	16
Sulphate	mg/L	74	76	49	49	44	49	65	50	41	42	40
Alkalinity	mg/L						235	248	248	232	252	235
Sodium	mg/L	37	18.9	8.2	24	115	5	22	18	7	5	6
Hardness	mg/L	400	320	330	370	680	270	260	259	262	303	269
Potassium	mg/L	2	2	1	1	2	1	1	1	1	1	1
Source		CRA	CRA	CRA	CRA	CRA	AES	AES	AES	AES	AES	AES

CRA - Supplemental Hydrogeological Investigation - January 2008

AES - Groudnwater Supply Investigation Report - 46 Gilmour Road, July 23, 2010

OB- Overburden

Table 3: Flux to Creek Using Surface Water and Shallow Mini Piezometer Data under Non Pumping Conditions

	Distance Along Creek (m)	Vertical Hydraulic Conductivity (m/s)	Vertical Gradient at 0 Lpm (m/m)	Panel Length (m)	Panel Width (m)	Panel Area (m2)	Geomean Kv for Panel (m/s)	Average Verticial Gradient Across Panel (m/m)	Flux over Panel (Lps)
MP8S	0	1.30E-08	0.11						
MP13S	154	2.40E-04	0.06	154	5.3	816.2	1.77E-06	0.09	0.12
MP14S	412	7.80E-06	-0.23	258	5.3	1367.4	4.33E-05	-0.08	-4.77
MP12S	660	1.00E-05	-0.04	248	5.3	1314.4	8.83E-06	-0.13	-1.52
MP6S	847	7.90E-05	0.01	187	5.3	991.1	2.81E-05	-0.01	-0.28
MP16S	1090	4.50E-06	0.13	243	5.3	1287.9	1.89E-05	0.07	1.78
								Total	-4.66

Vertical Gradient: (Surface Water Elevation- Groundwater Elevation) / (Ground elevation - mid point of screen elevation)

Note: Negative values indicate upward groundwater flow

Table 4: Flux to Creek Using Surface Water and Shallow Mini Piezometer Data under Pumping Conditions 2460 Lpm

	Distance Along Creek (m)	Vertical Hydraulic Conductivity (m/s)	Vertical Gradient at 2460 Lpm (m/m)	Panel Length (m)	Panel Width (m)	Panel Area (m2)	Geomean Kv for Panel (m/s)	Average Verticial Gradient Across Panel (m/m)	Flux over Panel (Lps)
MP8S	0	1.30E-08	0.40						
MP13S	154	2.40E-04	0.22	154	5.3	816.2	1.77E-06	0.31	0.45
MP14S	412	7.80E-06	-0.06	258	5.3	1367.4	4.33E-05	0.08	4.48
MP12S	660	1.00E-05	0.33	248	5.3	1314.4	8.83E-06	0.13	1.57
MP6S	847	7.90E-05	0.06	187	5.3	991.1	2.81E-05	0.20	5.49
MP16S	1090	4.50E-06	0.34	243	5.3	1287.9	1.89E-05	0.20	4.88
								Total	16.86

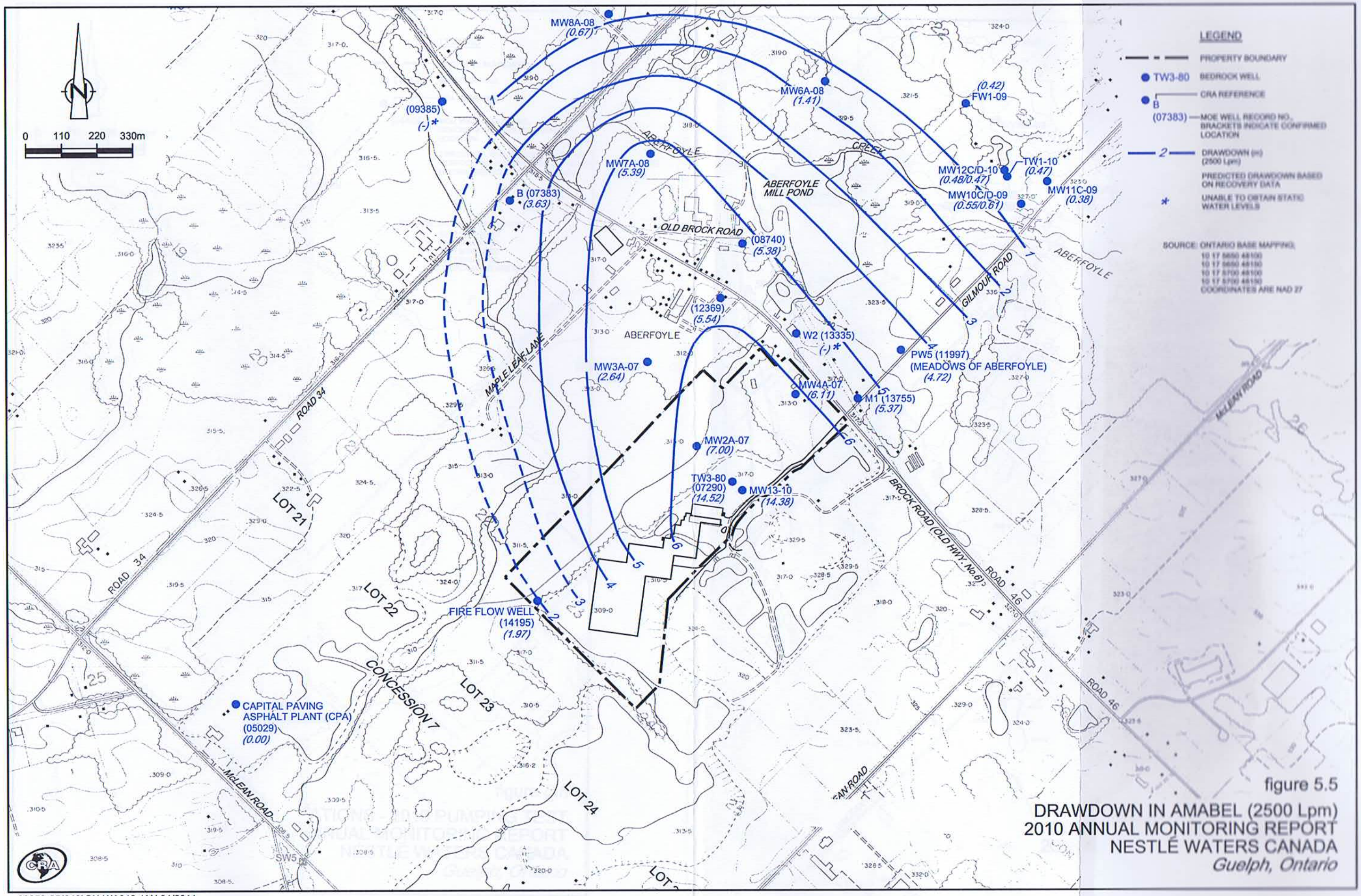


figure 5.5

DRAWDOWN IN AMABEL (2500 Lpm)
2010 ANNUAL MONITORING REPORT
NESTLÉ WATERS CANADA
Guelph, Ontario

00653-25(049)GN-WA012 JAN 31/2011

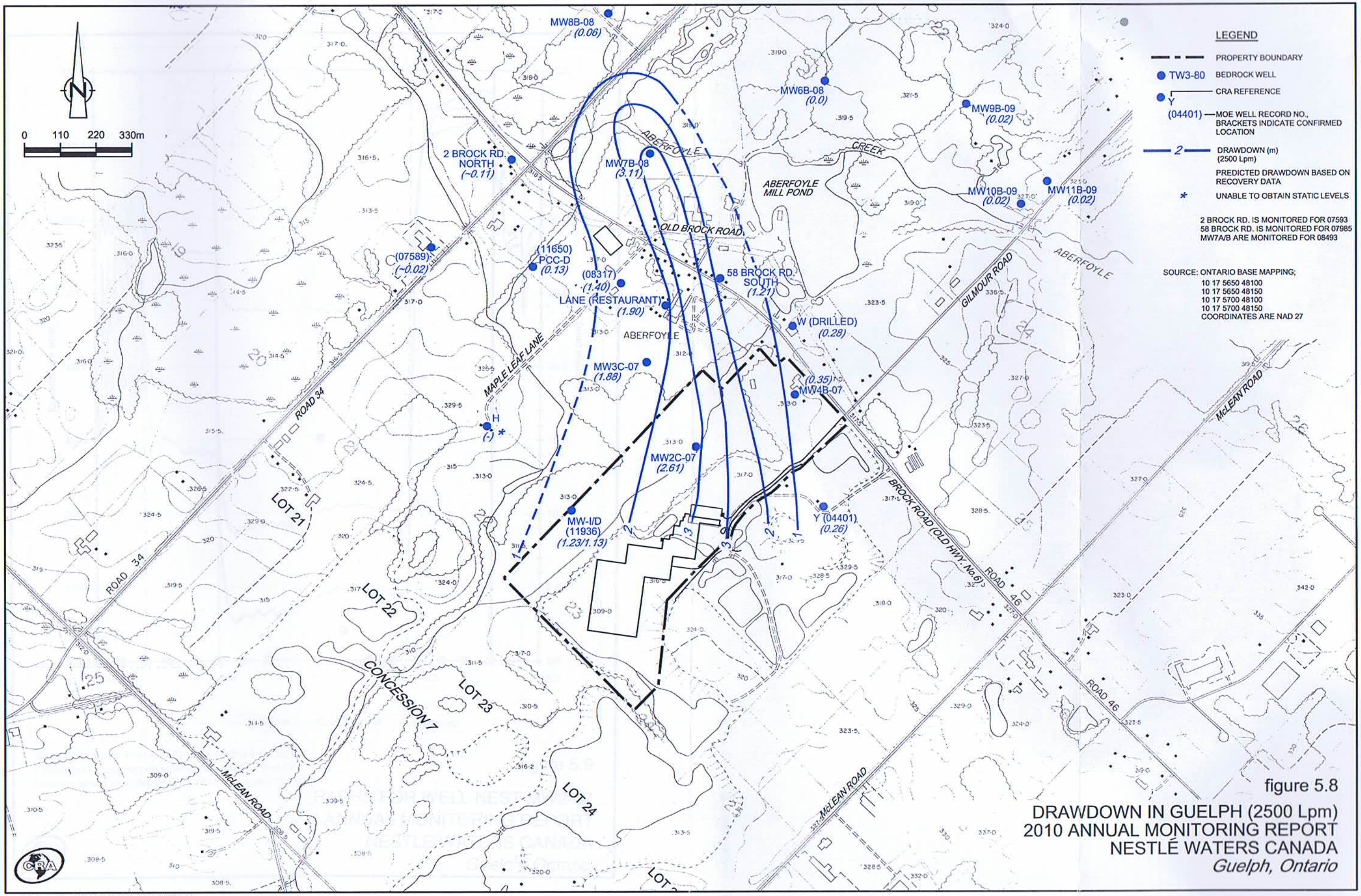


figure 5.8
DRAWDOWN IN GUELPH (2500 Lpm)
2010 ANNUAL MONITORING REPORT
NESTLÉ WATERS CANADA
Guelph, Ontario

00653-25(049)GN-WA011 JAN 31/2011

Stan Denhoed

From: "Stan Denhoed" <sdenhoed@hardenv.com>
Date: February-22-11 1:22 PM
To: "Challinor,John,GUELPH,Corporate Affairs" <John.Challinor@waters.nestle.com>; "Fox,Gregory,Mecosta,Manufacturing" <Gregory.Fox@waters.nestle.com>; "Anderson-Vincent,Arlene,STANWOOD,NWNA SC MW Springs" <Arlene.Anderson-Vincent@waters.nestle.com>; "Pucovsky, Greg" <gpucovsky@craworld.com>; <mdegruchy@dougan.ca>; <cportt@sentex.net>; <wbest@craworld.com>; "Bardswick, Bill (ENE)" <Bill.Bardswick@ontario.ca>; <dave.belanger@guelph.ca>; <peter.busatto@guelph.ca>; "Day, Sarah (ENE)" <Sarah.Day@ontario.ca>; <jetienne@grandriver.ca>; <kevin.french@ontario.ca>; "Koblik, Belinda (ENE)" <Belinda.Koblik@ontario.ca>; <al.murray@ontario.ca>; "Slater, Carl (ENE)" <Carl.Slater@ontario.ca>; <art.timmerman@ontario.ca>; <kursic@beaconenviro.com>; <awong@grandriver.ca>; "Aldis Zandbergs" <Aldis.Zandbergs@aesintlconsultants.com>
Cc: "Janet Laird" <Janet.Laird@guelph.ca>; "Brenda Law" <BrendaL@twp.puslinch.on.ca>; "Greg Scheifele" <gwsefs@sympatico.ca>
Subject: Re: Nestle Waters Canada TW-380 permit to take water renewal application technical stakeholder meeting

I would like to discuss the following preliminary observations at the meeting.

1) Private wells that penetrate the Guelph Formation, Eramosa Formation and Goat Island Formation. There are numerous wells on record that penetrate the Guelph, Eramosa and Goat Island Formations (and possibly deeper into the Gasport Formation). The water taking by Nestle Waters Canada depressurizes the Goat Island formation resulting in the downward movement of groundwater from upper formations. These open wells serve as conduits through the less permeable Eramosa aquitard. I would like to discuss a) where these wells are; b) what is the potential negative effects of water from upper formations moving through the wells on the water quality in the Goat Island formation and c) what are the potential negative effects on the individual well water quality by creating a drawdown cone around these wells in the upper formations.

2) The potential loss of groundwater discharging to Mill Creek was calculated by using gradients obtained from multi-level mini-piezometers. In most cases, the shallow and deep mini piezometers used for this calculation were affected by the pumping and therefore the gradient measured should be used to estimate the difference between pumping and non pumping scenarios between shallow and deep profiles beneath the creek (say between 0.5 and 1.5 metres below the creek). A better indication of potential impact to the creek would be the observed gradient between the surface water level in Mill Creek and the water level in the shallow mini piezometer under pumping and non pumping scenarios. According to my calculations the potential decrease in groundwater discharge to Mill Creek would be closer to 12 L/s than the estimated 1.57 L/s. Would this magnitude of loss change the biologist's opinion of impact/no impact to Mill Creek under low flow conditions?

3) The chloride concentration in TW3-80 is reported to be 90 mg/L (CRA, January 31, 2008). The chloride concentrations in the Goat Island and Gasport formations reported by AES (July 23, 2010) are less than 20 mg/L. This suggests that the well water in TW3-80 is being influenced by chloride impacted water, likely from an anthropogenic source. This raises the question of the source area for well TW3-80. Is the water being taken of a regional deeper origin or is it from a shallow local origin?

4) Water management in the Aberfoyle area/Mill Creek subwatershed. According to the Watershed Assessment work conducted by the GRCA, the Mill Creek subwatershed has low stress. This assessment is done on a subwatershed scale and does not address the cumulative effect of below-water-table aggregate extraction and water taken by PTTW holders in the Aberfoyle area. I would like to discuss the management of groundwater resources in the area local to Aberfoyle given the numerous aggregate operations and consumptive water takings by Nestle Waters, ConCast, Royal Canin and others. What is the MOE doing to manage the available groundwater resource to prevent long term degradation of quality, quantity available from the aquifer and quantity of discharge to surface water.

Stan Denhoed, P.Eng., M.Sc.
Senior Hydrogeologist
Harden Environmental Services Ltd.
1-877-336-4633

From: Challinor,John,GUELPH,Corporate Affairs
Sent: Tuesday, February 22, 2011 11:09 AM
To: Fox,Gregory,Mecosta,Manufacturing ; Anderson-Vincent,Arlene,STANWOOD,NWNA SC MW Springs ; Pucovsky, Greg ; mdegruchy@dougan.ca ; cportt@sentex.net ; wbest@craworld.com ; Bardswick, Bill (ENE) ; dave.belanger@guelph.ca ; peter.busatto@guelph.ca ; Day, Sarah (ENE) ; sdenhoed@hardenv.com ; jetienne@grandriver.ca ; kevin.french@ontario.ca ; Koblik, Belinda (ENE) ; al.murray@ontario.ca ; Slater, Carl (ENE) ; art.timmerman@ontario.ca ; kursic@beaconenviro.com ; awong@grandriver.ca ; Aldis Zandbergs
Cc: Janet Laird
Subject: Nestle Waters Canada TW-380 permit to take water renewal application technical stakeholder meeting

When: Thursday, February 24, 2011 10:00 AM-12:00 PM (GMT-05:00) Eastern Time (US & Canada).

Where: Nestle Waters Canada Farmhouse, 101 Brock Road South, Township of Puslinch, Ontario

~~*~*~*~*~*~*~*~*~*

If you need to call-in, the call-in number is 1 866 634-9676, Participant Code 650927...

Thanks!

JC

Stan Denhoed

From: "James Etienne" <jetienne@grandriver.ca>
Date: February-28-11 3:36 PM
To: "Stan Denhoed" <sdenhoed@hardenv.com>
Cc: "Challinor,John,GUELPH,Corporate Affairs" <John.Challinor@waters.nestle.com>; "Fox,Gregory,Mecosta,Manufacturing" <Gregory.Fox@waters.nestle.com>; "Anderson-Vincent,Arlene,STANWOOD,NWNA SC MW Springs" <Arlene.Anderson-Vincent@waters.nestle.com>; "Pucovsky, Greg" <gpucovsky@craworld.com>; <mdegruchy@dougan.ca>; <cportt@sentex.net>; <wbest@craworld.com>; "Bardswick, Bill (ENE)" <Bill.Bardswick@ontario.ca>; <dave.belanger@guelph.ca>; <peter.busatto@guelph.ca>; "Day, Sarah (ENE)" <Sarah.Day@ontario.ca>; <kevin.french@ontario.ca>; "Koblik, Belinda (ENE)" <Belinda.Koblik@ontario.ca>; <al.murray@ontario.ca>; "Slater, Carl (ENE)" <Carl.Slater@ontario.ca>; <art.timmerman@ontario.ca>; <kursic@beaconenviro.com>; "Amanda Wong" <awong@grandriver.ca>; "Aldis Zandbergs" <Aldis.Zandbergs@aesintlconsultants.com>; "Janet Laird" <Janet.Laird@guelph.ca>; "Brenda Law" <BrendaL@twp.puslinch.on.ca>; "Greg Scheifele" <gwsefs@sympatico.ca>
Subject: RE: Nestle Waters Canada TW-380 permit to take water renewal application technical stakeholder meeting

Good Afternoon Stan:

As discussed at the Nestle meeting on Thursday, here is some background regarding water budgets as they apply to this permitted taking.

The subject bedrock supply well (TW3-80) is located in Aberfoyle, within the Mill Creek subwatershed and draws groundwater from the Amabel (Gasport) formation. The well has been permitted since 1980 at maximum pumping rates varying from 1820 to 5455 litres/minute. The current maximum permitted rate of 2500 litres/minute has been in effect since June 30, 2005. The actual takings from the well in the period 2002-2010 have averaged 61% of the permitted maximum. The annual consumption for the Nestle Canada Inc. permit, based on information from the Grand River Tier 2 Integrated Water Budget Report (June 2009), is approximately 34% of the total consumptive taking for the Mill Creek subwatershed. The Tier 2 Water Budget identifies aggregate washing as both a greater permitted use and a higher consumptive taking than water bottling in the Mill Creek subwatershed. Water use records (PTTW actual reported and estimated amounts from surface and groundwater sources) from 2005 were used in the preparation of the 2009 Water Budget Report. Nestle's 2005 reported water use is a fair representation of the average taking over the period 2002-2010. Water bottling is assessed a consumptive factor of 1.0 for water budget calculations, although there is no way to determine how much of the water is totally removed from the watershed as opposed to being consumed locally.

The Mill Creek subwatershed, at 82 km2, is by far the smallest study area in the Grand River watershed, which averages 365 km2/subwatershed. The Tier 2 Water Quantity Stress Assessment Report (December 2009) classifies the Mill Creek subwatershed as having a "low" potential for surface water stress. The Mill Creek groundwater assessment area is classified as having a "moderate" potential for stress, however under the requirements of the Technical Rules, a Tier 3 Water Budget and Water Quantity Risk Assessment is not required because there are no municipal groundwater supplies located within the Mill Creek Assessment Area (although the data collection and level of assessment currently being completed for the PTTW review rivials the level of detail required to complete a Tier 3 study for a small munical system). Tier 3 work is currently being completed for the surface and groundwater supplies in the City of Guelph. While the Mill Creek subwatershed does fall within the study area of the Guelph Tier 3 work, the permitted takings from Nestle Canada Inc. and the surrounding aggregate washing operations are down gradient of the City of Guelph's water supplies.

It should be noted that the MNR and MOE are currently piloting database management tools

using the products of water budgets (Tiers 1, 2 & 3) across to province to generate comprehensive mapping of water takings and potential stresses at the subwatershed and municipal drinking water source scale. These tools have the ability to track cumulative reported takings to maintain a relatively up-to-date understanding of the ongoing potential for stress at a subwatershed level.

Sincerely,

James B. Etienne, P.Eng.
Senior Water Resources Engineer
Grand River Conservation Authority
400 Clyde Road, Cambridge, ON N1R 5W6
Tel: 519-621-2763 ext. 2298
email: jetienne@grandriver.ca

From: Stan Denhoed [mailto:sdenhoed@hardenv.com]
Sent: Tuesday, February 22, 2011 12:23 PM
To: Challinor,John,GUELPH,Corporate Affairs; Fox,Gregory,Mecosta,Manufacturing; Anderson-Vincent,Arlene,STANWOOD,NWNA SC MW Springs; Pucovsky, Greg; mdegruchy@dougan.ca; cportt@sentex.net; wbest@craworld.com; Bardswick, Bill (ENE); dave.belanger@guelph.ca; peter.busatto@guelph.ca; Day, Sarah (ENE); James Etienne; kevin.french@ontario.ca; Koblik, Belinda (ENE); al.murray@ontario.ca; Slater, Carl (ENE); art.timmerman@ontario.ca; kursic@beaconenviro.com; Amanda Wong; Aldis Zandbergs
Cc: Janet Laird; Brenda Law; Greg Scheifele
Subject: Re: Nestle Waters Canada TW-380 permit to take water renewal application technical stakeholder meeting

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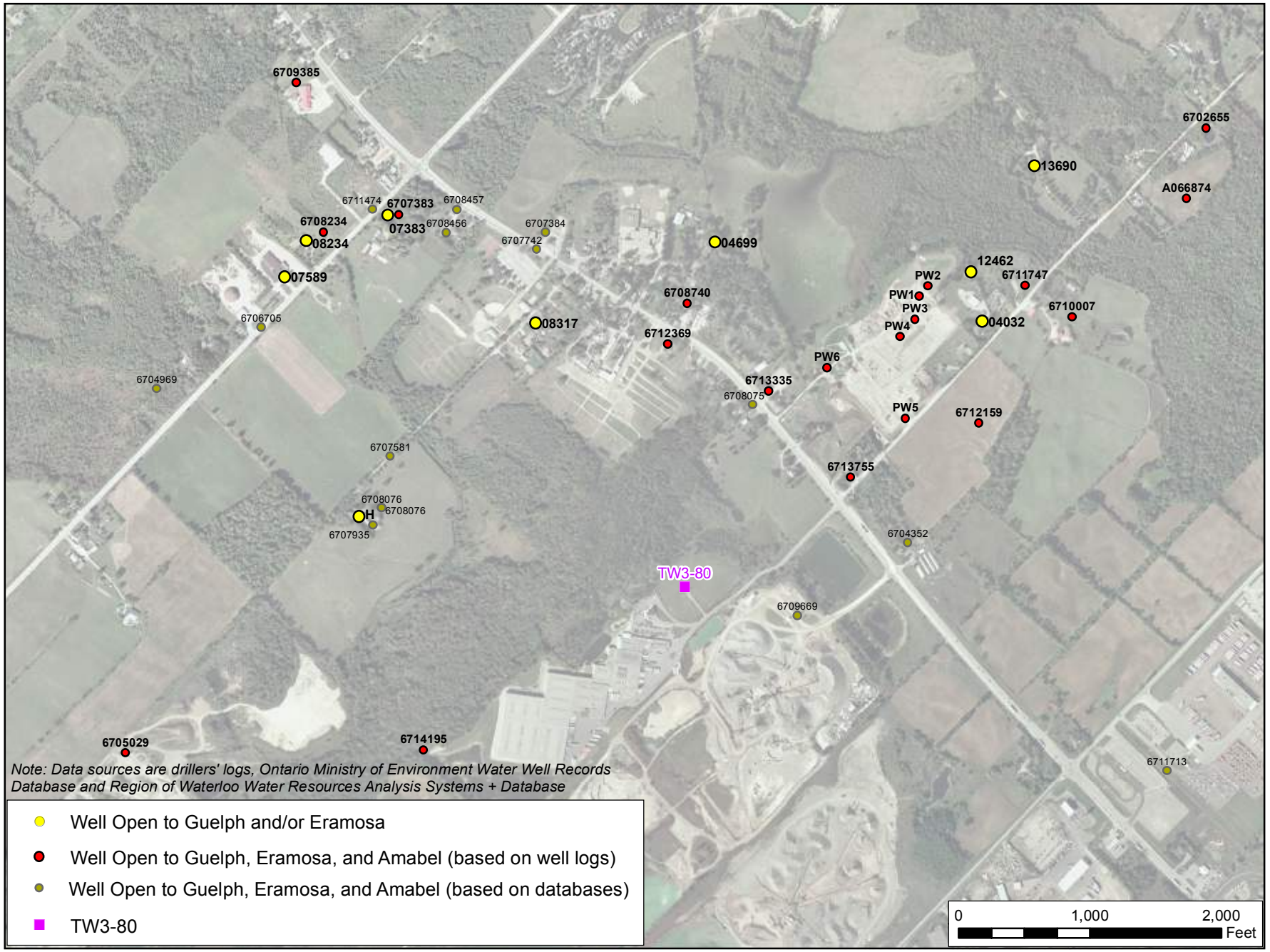

Figure 3 Bedrock Wells in the Vicinity of TW3-80

Attachment 1

From: James Etienne [jetienne@grandriver.ca]
Sent: Monday, February 28, 2011 2:37 PM
To: Stan Denhoed
Cc: Challinor,John,GUELPH,Corporate Affairs; Fox,Gregory,Mecosta,Manufacturing; Anderson-Vincent,Arlene,STANWOOD,NWNA SC MW Springs; Pucovsky, Greg; mdegruchy@dougan.ca; cportt@sentex.net; wbest@craworld.com; Bardswick, Bill (ENE); dave.belanger@guelph.ca; peter.busatto@guelph.ca; Day, Sarah (ENE); kevin.french@ontario.ca; Koblik, Belinda (ENE); al.murray@ontario.ca; Slater, Carl (ENE); art.timmerman@ontario.ca; kursic@beaconenviro.com; Amanda Wong; Aldis Zandbergs; Janet Laird; Brenda Law; Greg Scheifele
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Good Afternoon Stan:

As discussed at the Nestle meeting on Thursday, here is some background regarding water budgets as they apply to this permitted taking.

The subject bedrock supply well (TW3-80) is located in Aberfoyle, within the Mill Creek subwatershed and draws groundwater from the Amabel (Gasport) formation. The well has been permitted since 1980 at maximum pumping rates varying from 1820 to 5455 litres/minute. The current maximum permitted rate of 2500 litres/minute has been in effect since June 30, 2005. The actual takings from the well in the period 2002-2010 have averaged 61% of the permitted maximum. The annual consumption for the Nestle Canada Inc. permit, based on information from the Grand River Tier 2 Integrated Water Budget Report (June 2009), is approximately 34% of the total consumptive taking for the Mill Creek subwatershed. The Tier 2 Water Budget identifies aggregate washing as both a greater permitted use and a higher consumptive taking than water bottling in the Mill Creek subwatershed. Water use records (PTTW actual reported and estimated amounts from surface and groundwater sources) from 2005 were used in the preparation of the 2009 Water Budget Report. Nestle's 2005 reported water use is a fair representation of the average taking over the period 2002-2010. Water bottling is assessed a consumptive factor of 1.0 for water budget calculations, although there is no way to determine how much of the water is totally removed from the watershed as opposed to being consumed locally.

The Mill Creek subwatershed, at 82 km2, is by far the smallest study area in the Grand River watershed, which averages 365 km2/subwatershed. The Tier 2 Water Quantity Stress Assessment Report (December 2009) classifies the Mill Creek subwatershed as having a "low" potential for surface water stress. The Mill Creek groundwater assessment area is classified as having a “moderate” potential for stress, however under the requirements of the Technical Rules, a Tier 3 Water Budget and Water Quantity Risk Assessment is not required because there are no municipal groundwater supplies located within the Mill Creek Assessment Area (although the data collection and level of assessment currently being completed for the PTTW review rivials the level of detail required to complete a Tier 3 study for a small munical system). Tier 3 work is currently being completed for the surface and groundwater supplies in the City of Guelph. While the Mill Creek subwatershed does fall within the study area of the Guelph Tier 3 work, the permitted takings from Nestle Canada Inc. and the surrounding aggregate washing operations are down gradient of the City of Guelph’s water supplies.

It should be noted that the MNR and MOE are currently piloting database management tools using the products of water budgets (Tiers 1, 2 & 3) across to province to generate comprehensive mapping of water takings and potential stresses at the subwatershed and municipal drinking water source scale. These tools have the ability to track cumulative reported takings to maintain a relatively up-to-date understanding of the ongoing potential for stress at a subwatershed level.

Sincerely,

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File: 3101
By: Email & Mail

March 17, 2011

Township of Puslinch
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Guelph, Ontario
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Attention: Mrs. Brenda Law, A.M.C.T.
Clerk - Treasurer

Dear: Mrs. Law

Re: Nestle Water Canada
Renewal Application for TW3-80 Permit To Take Water

As requested, I have reviewed the 2009 and 2010 Biological Monitoring Programs Reports prepared for Nestle Waters Canada (NWC) by Dougan & Associates in association with C.Portt and Associates. In addition, I reviewed the Aberfoyle Creek Habitat Characterization Report prepared by C.Portt and Associates and selected portions of the 2010 Annual Monitoring Report prepared by Conestoga-Rovers & Associates (CRA). I also attended the Technical Stakeholders' Meeting on February 24, 2011 and reviewed the Nestle Consulting Team's March 4, 2011 response to the comments and questions raised at this meeting. For further clarification on stream habitat conditions I contacted Cam Portt and I had several discussions with Stan Denhoed regarding the interpretation of surface and groundwater data and their relationship. My review has been focused on the potential impacts of water taking on the Aberfoyle Creek fishery and the flora and fauna in the adjacent Provincially Significant Wetland (PSW). Biological monitoring of fish and wetland resources in the Nestle study area actually commenced in the fall of 2007 and the Ministry of Environment (MOE) subsequently included this work as a condition of Nestle's permit to take water.

The NWC facility is permitted to continuously extract 2,500 Litres per minute from one well identified as TW3-80 but between 2002 and 2010 it has on average only been taking about 61% of the permitted maximum amount. The company will over time, however, increase its rate of water taking to more fully utilize the permitted volume. The effect of long term water taking at a rate of 100% of their permitted maximum amount was simulated by a thirty nine day pumping test conducted at a discharge rate of 2,460 L/min. Observations made during the test confirm that the water taking by NWC, lowers (draws down) the water levels in aquifers near to the NWC production well. This drawdown of groundwater does in turn affect water levels in the wetland and associated groundwater discharge to the creek. Nestle's consultants have claimed that the pumping of TW3-80 only had small effects on the flow and temperature of Aberfoyle Creek. Furthermore, they conclude that an unsuitable thermal regime resulting from off-site conditions, is the primary reason for the lack of trout utilization in this reach of Aberfoyle Creek. The temperature of the creek on the Nestle property is strongly influenced by the presence of upstream ponds, particularly the Aberfoyle Mill Pond which was constructed in the 1800's and more recently the Mini Lakes ponds. Although suitable substrate for trout spawning is available in some areas on the NWC property, neither brown nor brook trout have been observed

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spawning here during fall surveys annually conducted from 2007 to 2010. An unfavourable thermal regime is considered to be the major factor limiting trout utilization in this portion of Aberfoyle Creek.

With respect to the other biological resources found on the Nestle property, considerable effort was made to document existing vegetation communities, plant species and wildlife utilization. Specific surveys were implemented to determine calling amphibians, turtles and breeding birds. These biological data were collected to first of all characterize existing aquatic, wetland and terrestrial resources on the site and secondly document potential long-term changes to their structure and composition.

Based on the available information I offer the following comments on the results of the physical and biological monitoring programs and the proposed renewal of Nestle's water taking permit.

1. The stream temperature data provided in Figure 6.26 of the CRA 2010 Annual Monitoring Report and Figure 2 of the March 4th correspondence indicates that the water is cooled as it moves from Brock Road through the forested swamp to the southwest corner of the Nestle property at ST5.05. Although water temperatures are generally unfavourable for trout in this reach of Aberfoyle Creek during much of June to September (i.e. >22.5^{o}C), it appears that temperatures would be suitable for spawning during October to December (i.e. <20^{o}C) and would remain suitable for egg incubation (i.e. <11^{o}C) until sometime in May of each year. Therefore, water temperature does not appear to limit trout utilization of this reach during the critical spawning and egg incubation periods. However, if the young-of-the-year did not migrate downstream to cooler water during late spring they would succumb to the warm water conditions that annually occur here.

2. Electrofishing in this reach of Aberfoyle Creek during January and September 2008 revealed the presence of brook trout and brown trout but no redds of either species were observed during spawning surveys conducted by C.Portt during November of 2007, 2008, 2009 and 2010. Data in the Habitat Characterization Report suggest that gravel substrate suitable for trout spawning occurs in this reach and evidence of groundwater discharge (e.g. bank seepage and/or presence of watercress) also occurs at these same locations. The March 4th correspondence confirmed that there are areas in the creek where the substrate is gravel and groundwater discharge is occurring. Although water temperatures and other habitat conditions appear favourable for spawning there is no recent evidence of trout actually spawning in this area. I suggest there are three possible explanations for this lack of spawning activity.

    a) Trout and other fish do not always spawn where habitat conditions appear suitable.

    b) If trout previously spawned in this reach and the eggs successfully hatched the young of the year may not have survived subsequent seasonal increases in water temperature. If this situation occurred repeatedly there would eventually be no breeding stock with a homing instinct to return to this area for spawning purposes.

    c) The pumping of groundwater from TW3-80 may reduce the amount of groundwater being discharged to spawning beds to the point where they are no longer attractive to breeding trout.

3. Based on February 28, 2011 correspondence from James Etienne the Nestle bedrock supply well (TW3-80) has been in operation since 1980 and its maximum pumping rate has varied from 1,820 to 5,455 litres/minute. More recently NWC has been operating this well at an average pumping rate of 1,525 litres/minute from 2007 to 2010. Although groundwater discharge to the stream was still occurring at this pumping rate it did so at a diminished rate. The company would, however, like to have the opportunity to increase their rate of pumping to 2,500 litres/minute to fully utilize their permit. According to calculations made by Harden Environmental and CRA, pumping at a rate of 2,500 litres/minute results in there being no

groundwater discharge to Aberfoyle Creek within the NWC property. There is also a corresponding loss of streamflow in this tributary of Mill Creek. Although Harden's calculated loss of groundwater discharge is larger than CRA's (i.e. 4.66 L/s vs 1.57 L/s) this loss of groundwater may not cause any more impact on trout spawning than may already be occurring. However, if pumping is continuously kept at this level it could affect aquatic plants, particularly patches of watercress, and possibly the benthic community which could in turn affect trout utilization from fall to early spring.

4. Detailed mapping of vegetation communities found on the subject property has been completed in accordance with Ecological Land Classification (ELC) procedures and no rare communities were noted. Six permanent vegetation sample plots were established in various forest communities. A total of 173 vascular plants have been identified on the Nestle property including some highly invasive exotic species, particularly common reed, tartarian honeysuckle, common buckthorn and Manitoba maple. No provincially significant plants were identified on the property but some plants which could possibly be considered rare in Wellington County were encountered. It is, however, important to note that none of the references used to determine rarity in Wellington County have any official status because the County has not endorsed any of the proposed lists of rare vascular plants. Based on three years of monitoring there appears to be no evidence to indicate that any vegetation communities are being stressed as a result of groundwater pumping and possible lowering of the water table relative to the ground surface. Furthermore, I suspect that after 30 years of pumping the vegetation would have adapted to any minor changes in groundwater levels in the overburden. If the water table has declined somewhat in the swamp, tree growth and vigour has likely improved over time. Rather than spending more effort on monitoring vegetation over the next couple of years it would more beneficial to implement measures to control and preferably eradicate highly invasive species which will unquestionably spread throughout the property and adjacent lands.

5. In 2010 a total of 68 species of wildlife were recorded on the property or immediately adjacent to it, including 5 species of damselflies and dragonflies, 2 butterflies, 4 frogs, 1 turtle, 54 birds and 2 mammals. None of these wildlife species are provincially significant and all of them are ranked as secure (S5) or apparently secure (S4) in the province. With respect to claims that some locally rare birds may nest in the study area, Wellington County does not have an official list of rare wildlife species and hence any interpretations of County rarity are speculative. In my opinion, sufficient baseline data has been collected on wildlife utilization of the property. Furthermore, unless there are noticeable changes to vegetation communities it seems unlikely that there would be any significant change to wildlife utilization of these habitats.

In summary, there is presently inconclusive evidence of potential impacts to the aquatic habitat of Aberfoyle Creek as a result of past water taking operations or proposed future pumping rates. The available data indicate that proposed pumping at the maximum rate will result in little or no groundwater being discharged to the creek and a corresponding loss of flow in the channel as the stream changes from a volume gaining to a volume losing watercourse. Although the magnitude of these changes in stream flow are not anticipated to be large, it is uncertain whether or not this will adversely affect seasonal trout utilization of this reach or dependent aquatic plants and invertebrates. The creek and its biological inhabitants are considered to be the most sensitive indicators of potential changes to groundwater levels in the overburden aquifer arising from proposed water taking up to 2,500 litres/minute. Based on this assumption, the following recommendations are made with respect to the renewal of Nestle's water taking permit for another 10 years and future monitoring of biological resources.

i. The proposed trout spawning survey (redd) survey should be carried out in 2011 but I suggest it should be carried out in December rather than November as has been done in the past because of the disturbed nature of this watercourse and our warming climate. At the same time, data should be recorded on potential gravel spawning areas previously identified in the

2009 Habitat Characterization Report. Data should be collected on the distribution and textural composition of substrate materials, as well as the size of seepage areas and watercress patches. A photographic record of site conditions should also be taken so that comparisons with past and future conditions can be facilitated. This survey should be repeated at 2 year intervals over the next 10 years to confirm whether or not groundwater discharge to the creek has in fact been eliminated from the subject property along with the spawning of salmonids.

ii. A one time survey of the benthic macro-invertebrate community should be undertaken iin 2011 at representative sampling stations located on the Nestle property, as well as upstream and downstream of it. I suggest that 4 or 5 sampling stations should be sufficient using the protocols of MOE's Biological Monitoring Assessment Program (BioMAP) or something similar. The BioMAP protocol utilizes a biotic "Water Quality Index" (WQI) and a set of summary matrices to determine the impairment status of a watercourse. The purpose of this biomonitoring is to try and determine if there are other factors other than temperature and groundwater discharge that may be limiting trout utilization of this reach (e.g. possible contaminants, lack of preferred food sources etc.).

iii. Control measures should be implemented to eradicate undesirable highly invasive alien plants while this can still be achieved at a reasonable cost.

iv. Proposed ongoing monitoring of vegetation and wildlife does not appear warranted in 2011 and is likely unnecessary for another 3 to 5 years unless there is evidence of a significant decline in tree health or a major shift in the species composition of a vegetation community that could somehow be related to a change in groundwater levels or other operating practices of the company.

v. If NWC is able to obtain an additional source of water over the next 10 years from it's Gilmour Road property or somewhere in the Township, pumping at TW3-80 should either be discontinued from October 1st to December 31st or reduced to such a low rate that groundwater discharge to the creek is temporarily restored to approximately pre-1980 condtions. Redd surveys should then be undertaken during the latter part of this period to see if this change in habitat conditions prompts salmonid spawning. This modification to pumping procedures at TW3-80 should be carried out for at least two years along with required redd surveys in order to confirm whether or not pumping has caused a harmful alteration, disruption or destruction of fish habitat (HADD) within this reach of Aberfoyle Creek.

I trust this information will help the Township understand existing and proposed operations at the NWC facility and related concerns for the protection and maintenance of natural heritage features. Please do not hesitate to contact me if you require further clarification on these matters.

Yours truly,

GWS Ecological & Forestry Services Inc.

Greg W. Scheifele, M. A., R.P.F.
Principal Ecologist/Forester

cc: Aldo Salis, County of Wellington
Carl Slater, MOE
John Challinor, Nestle Waters Canada
Art Timmerman, MNR
James Etienne, GRCA
Stan Denhoed, Harden Environmental