



July 4, 2014

Via: Mail

Ms. Kim Wingrove
CAO
Township of Guelph Eramosa
P.O. Box 700
8348 Wellington Road 124
Rockwood ON N0B 2K0

Dear Ms. Wingrove:

**Re: Hydrogeologic Assessment
Zoning By-Law Amendment Application ZBA 01/14 (Township File D14 TR)
TriCity Lands Ltd. Spencer Pit
6939 Wellington Road 124
Township of Guelph/Eramosa
Project No.: 300035544.0000**

Section 1.0 Introduction

At your request, R.J. Burnside & Associates Limited (Burnside) has reviewed a February 2014 report prepared by Groundwater Science Corp. entitled "*Hydrogeologic Assessment, Tri-City Lands Ltd. Proposed Spencer Pit Part Lots 14, 15, 16, and Lots 17 and 18, Concession B, Township of Guelph/Eramosa County of Wellington*". The report has been prepared for Harrington McAvan Ltd. as part of a Category 3 licence application under the Aggregate Resources Act (ARA) to extract aggregate from above the water table.

The proposed Spencer Pit is located on the south side of Wellington Road 124, Northeast of the unopened road allowance dividing the City of Cambridge and the Township of Guelph/Eramosa and north-west of the unopened road allowance between the Township of Puslinch and the Township of Gueph/Eramosa. Land use in the area is primarily agricultural with some rural residential properties located along Wellington Road 124 and on Kossuth Road. There are 2 quarries located immediately south of the site, both of which have undergone below water table extraction and now are filled with water.

Section 2.0 Study Components

The objective of the study as indicated by Groundwater Science Corp. (GSC) is to determine the elevation of the established groundwater table within the site and demonstrate that the final depth of extraction is at least 1.5 m above the water table. In order to demonstrate this, GSC has undertaken the following as part of their study:

- A description of the topographic setting.
- A description of reported water well locations based on information from the MOE water well records.
- A description of geologic and hydrogeologic setting.
- A brief description of the proposed extraction.
- An examination of the proposed extraction.
- Conclusions and recommendations.

The GSC study included a review of a variety of reports that were prepared specifically for the site as well as other documents prepared by government sources such as the Grand River Conservation Authority in support of source water protection initiatives in the area. On-site work included the installation of 3 wells and collection of water levels from these 3 wells along with existing on-site drinking water supply well (the Barn well) on the site. In addition, 52 test pits were excavated by others as part of an investigation to look at aggregate quality. This information was also used by GSC in their assessment of the site.

Water levels were measured in the 3 boreholes and the onsite well on 6 occasions between October 1, 2013 and January 9, 2014.

The information from the test pits and boreholes was used to prepare a bedrock surface map and the water level data was used to prepare a map of water table contours.

Section 3.0 Burnside Comments

The comments below are numbered according to the section numbers in the GSC report.

Section 3.4 Quaternary Geology

The Quaternary geology mapping which is provided in Appendix A of the report suggests there is a small area of till found at surface at the southern portion of the site. A number of test pits in the south western portion of the site did not encounter sand and gravel, but found till from the surface to the bottom of the test pit. There are no monitoring wells completed in the overburden materials.

Although observations during test pitting and borehole drilling indicated unsaturated conditions in the overburden, it would be prudent to install a number of monitoring wells in the areas of surficial till in order to confirm that there is not an overburden water table. In addition, additional investigations in areas of surficial till may guide the proponent in their plans for extraction and may also be a suitable area to construct a wash pond given the fine grained materials.

Section 3.7 Private Water Wells

GSC provided a map showing the location of private water wells within 500 m of the site based on information obtained from the Ministry of Environment (MOE) on-line database. The information from the MOE well records indicates that the majority of the wells in the area obtain their supplies from the bedrock and that most of the wells are located up-gradient of the proposed pit.

Although the documentation indicates that the wells are up-gradient of the proposed pit and the above water table extraction should not cause any issues, it is Burnside's recommendation that GSC conduct a door to door survey of wells in order to establish pre-extraction water quality and quantity. The door to door survey may also identify shallow dug wells that do not show up in the MOE water well record database. The door to door survey will provide protection for both the proponent and homeowners in the event that there is an issue with a well in the future. In addition, the information may prove useful in the event that a PTTW is required for washing operations at the site.

Section 3.8 Aggregate Resource Assessment

GSC indicates that at 11 locations fine grained (e.g., Wentworth Tills) materials occurred at surface and extended to depth (or bedrock). It would be prudent to provide better definition of areas where there are no sand and gravel resources as these may be appropriate locations to construct a wash water pond. This would be preferable to constructing a pond directly on the bedrock surface where there will be limited protection provided to the underlying aquifer. Burnside recommends that the extent of the till be better defined by excavating additional test pits or advancing additional boreholes. The information should then be used to provide an updated bedrock topography map for the pit and a map showing the till thickness. This will assist the proponent in selecting the best area for establishing a wash pond and refueling area. Additionally, the till material may be suitable for use in pit rehabilitation and the additional information will assist in refining the volume of material present.

Section 4.2 Water Level Monitoring

GSC installed 3 monitoring wells on the site and also utilized an existing well (the barn well) to obtain water level measurements on six occasions. The measurements indicated that the water table was found at depths below the bedrock surface ranging from 2.82 m at BH1 to 6.3 m at BH3. As a result, it appears that the water table is found within the underlying bedrock. Burnside recommends that water level data collected during the spring of 2014 be used as water levels should be at their peak following the spring snowmelt. GSC indicates that all elevations are relative to an assumed ground elevation of 318.0 masl at BH3. Burnside recommends that a geodetic benchmark be established at the site since the ground surface may change as operations at the site proceed.

As indicated previously, Burnside recommends that additional monitoring wells be installed in areas where there was till encountered from surface to the bedrock in order to see if these areas have a localized water table in the overburden and also whether they would be suitable for leaving in place to facilitate the construction of a wash water pond.

Proposed Extraction

GSC indicates that the extraction plan is referenced on the site plan. However, since the water table is in the bedrock the general plan is to extract gravel to a maximum depth corresponding to the bedrock surface and remaining 1.5 m above the established groundwater table. Rehabilitation will include replacing topsoil once extraction is completed in order to return the site to agricultural use post extraction. Additionally, GSC indicates that the aggregate processing will include washing activities which is anticipated to require a separate application for a permit to take water from the MOE. GSC also indicates that fuel storage and equipment maintenance will occur on site.

Burnside recommends that the area with till material between surface and the underlying bedrock be considered as the location for wash ponds in order to provide some protection to the underlying bedrock aquifer. In addition, since the land use will be returning from industrial to agricultural use (the most sensitive land use), a Record of Site Condition should be provided by the proponent prior to the surrendering of the license. Since extraction to the bedrock surface is proposed, the proponent will need to provide more detail on how much material will be required to provide a suitable thickness of overburden to support agricultural operations. Similarly, the extraction will result in exposed bedrock which will be susceptible to impacts from anthropogenic activities. As a result, Burnside recommends that equipment refueling should be done on a concrete pad which has provisions for spill collection.

Section 7.1 Monitoring Plan

GSC proposes that water level measurements shall be obtained at the existing on-site monitoring well locations BH1, BH2, BH3, and Barn Well on a monthly basis for one year with subsequent water level measurements obtained on a quarterly basis at existing on site well locations BH1, BH2, BH3 and Barn Well during the first 3 years of extraction operations. GSC also indicates that the barn well is within the proposed extraction area and should be abandoned in accordance with the applicable regulations if it is not to be utilized as a monitor or water supply well. At the end of the 3 years of monitoring the data should be summarized in a report provided to the MNR. The monitoring program should be discontinued if no groundwater impacts are observed after 3 years.

Burnside concurs with the proposed monitoring plan, but recommends that some additional overburden wells be installed. Although no impacts to existing domestic wells are expected, Burnside recommends that a pre-extraction well survey be completed to establish baseline water quality/quantity.

Yours truly,

R.J. Burnside & Associates Limited



David Hopkins, P. Geo.
Senior Hydrogeologist
DH:sd

cc: Mr. Bernie Hermsen, MHBC (Via: Email)
Mr. Neal Deruyter, MHBC (Via: Email)
Ms. Meaghen Reid, Township of Guelph/Eramosa (Via: Email)