



Environmental

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**Locations**

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April 20, 2017

Hamilton Water Division – Source Protection Planning  
77 James Street North, Suite 400  
Hamilton, ON L8R 2K3



Attn: Mike Christie, Project Manager

**Re: Formal Consultation – Preliminary Review Comments – 8475 English Church Road Severances GL/B 15:66**

Dear Mr. Christie,

Cambium Inc. (Cambium) is pleased to provide the comments with respect to two (2) proposed lot severances of 8475 English Church Road. The subject property is described as Lot 7 Concession 4 in the geographic Township of Glanbrook and is currently enveloped in the parcel known as the Willow Valley Golf Course. The severances are located on the south side of English Church Road and were referred to as Part 1 and Part 2.

One residential dwelling will be constructed on each severance and each will be serviced privately for wastewater treatment and water supply. Part 1 is 0.405 hectares (ha) in size and it is proposed that a 3-bedroom dwelling is constructed at this location. Part 2 is 0.782 hectares (ha) in size and it is proposed that a 4-bedroom dwelling is constructed at this location.

The severance applications have been supported by a letter drafted by R.J. Burnside & Associates Limited (dated February 16, 2017) that outlines non-detailed designs of the on-Site wastewater treatment systems that will service each of the proposed severances (this letter is hereafter referred to as the Wastewater Treatment System Design). The Wastewater Treatment System Design was based off of information outlined in the report titled *Hydrogeological Assessment, English Church Road, Mount Hope, Ontario* (Terraprobe, 2005) (hereafter referred to as the Hydrogeological Assessment).

#### HYDROGEOLOGICAL ASSESSMENT

As part of the hydrogeological assessment test-pits were advanced on Part 1 and Part 2 (one test-pit per severance for a total of two test-pits). The test-pits were advanced to depths of 2.7 m below ground surface (BGS) and 3.05 m BGS. It was determined that silt topsoil was encountered in both test pits to a depth of 0.45 m below ground surface (BGS). Underlying the topsoil was sandy silt to clayey silt soils. The T-time of the native soils was estimated to be 50 min/cm. Water was observed to be entering test-pit TP1 at a depth of 1.5 m BGS. Terraprobe indicated that the water table may be within 0.9 m of the ground surface during spring melt events, but should otherwise be found at a depth below 1 m.

Cambium agrees that the receiving soils should exhibit a T-time of 50 min/cm (or greater). The location of test-pit TP1 was clearly defined on a Figure 3 of the Hydrogeological Assessment.



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The location of test-pit TP2 was only outlined on Figure 2, which at the scale of this map, does not precisely indicate the location of the test-pit.

Nitrate loading calculations were completed that estimated the minimum lot size required to attenuate 1000 L/day of sewage with a nitrate concentration of 40 mg/L (as per the MOECC D-4-5 guidelines). The minimum lot size required to attenuate the sewage to a concentration less than 10 mg/L at the property boundary was calculated to be 0.9 ha (which is greater than Part 1 and Part 2).

Terraprobe indicates that even though the minimum parcel size for adequate nitrate attenuation was not met, though report that down-gradient groundwater users should not be impacted for the following reasons:

1. Groundwater flow is towards the south and east. Three Mile Creek acts as a hydrogeological boundary for local and intermediate groundwater flow systems further south and east of Part 1 and Part 2.
2. Well #1 is located adjacent to potential sources of nitrate contamination; the concentration of nitrate was reported to be less than the method detection limits at this well. (Additionally the sample from Well #2 indicated a concentration of nitrate less than the method detection limits)
3. No water wells or residential lots exist down-gradient of the Parts 1 and 2 properties during the time of the investigation and no wells or lots will be created down-gradient of Parts 1 and 2 in the future

Cambium repeated the assessment with similar results, and confirm that the nitrate boundary concentrations are exceeded.

- ***Given the proximity to the surface water feature (Part 2), the attenuation potential should also consider phosphorous loading to the tributary.***
- ***It is noted that no borehole logs were supplied for Wells #1 and #2 (nor could any be located by Cambium). Additionally no evidence was provided that support the claim that no wells or residential lots will be created down-gradient of Parts 1 and 2.***

Terraprobe indicated in the Hydrogeological Assessment that deeper groundwater resources in the area are likely protected from surficial sources of nitrate contamination because there are fine grained soils present at surface in the area that restrict the vertical migration of groundwater. This conclusion was based off of the results of a groundwater sample collected from Well #1 that was located adjacent to several potential sources of nitrate contamination.

Cambium agrees that the fine grained soils present at surface will likely offer a degree of hydraulic isolation between the effluent discharged from the wastewater treatment systems, and



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deeper aquifer systems in the area. The guidance provided in Guideline D-5-4 "Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment" provides a stepped approach to lot sizing based on area, isolation of supply aquifers, and finally boundary condition predictions. While not specifically stated, the hydrogeological report does suggest a degree of isolation between the surface and supply aquifers exist.

- ***Cambium recommends the degree of isolation be confirmed on each site if isolation is the key lot sizing consideration. Likewise the proponent must demonstrate that the isolated supply aquifer is the only drinking water supply aquifer within 500m of each site.***

Terraprobe indicates that the lands down-gradient of the proposed severances will not be severed for lot development nor will wells be drilled on these lands. Terraprobe does not offer an explanation for this claim, however where isolation is determined to be the key lot sizing consideration, the future use is less significant.

The water supply discussion suggests most of the wells are completed in the first few meters of Guelph fm. bedrock and are characterised as having high Total Dissolved Solids (TDS) and Sulphate. Well yields are generally within acceptable ranges, however some wells reported to have suspect yields (i.e. less than 3 GPM).

In accordance with the City's Guidelines for Hydrogeological Studies and Technical Standards for Private Services (Sec 3.2.1 b 2), *In the case of a proposed severance, it is recommended that a test well be constructed on the lot to be severed. The well should be located and constructed in a manner such that the well could be used as a water supply source if the severance application is approved. The proponent will also be required to demonstrate that a potable supply of groundwater, of sufficient quantity, is available from a well located on the lot to be retained.*

- The City should recommend the installation and pump testing of a drinking water supply well for each severance. The pump test should include water quality assessment as per the guideline (Tables 1 through 4 of the Ontario Drinking Water Quality Standards (O.Reg. 169/03), with the exception of replacing Table 3 with gross Alpha and Beta screening at minimum).

**WASTEWATER TREATMENT SYSTEM DESIGN**

The daily design flows for the proposed dwellings that are to be built on Part 1 and Part 2 were calculated to be 1,900 L/day and 4,300 L/day, respectively. The calculations of these daily design flows are considered appropriate. Both wastewater treatment systems will be constructed as raised absorption trench leaching beds. The design of each of the wastewater treatment systems was based off of imported fill with a T-time of 10 min/cm and receiving soils that have a T-time of 50 min/cm. The calculations used to determine the length of the absorption trenches, the size of the contact area and also other dimensions of the wastewater treatment system



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appear to meet the specifications outlined in Part 8 of the Ontario Building Code. Additionally a reserve bed area has been outlined in the Wastewater Treatment System Design report for each severance (as per the City of Hamilton Rural Official Plan Requirements).

The design of the wastewater treatments systems are appropriate and have taken into consideration all of the requirements of Part 8 of the OBC and the City of Hamilton. The wastewater treatment systems will be built as fully raised systems however detailed design drawings were not included in the Wastewater Treatment System Design. The test-pits advanced as part of the Hydrogeological Assessment indicated that there was 0.45 m of topsoil at Part 1 and Part 2.

- ***The detailed design should outline how much of the topsoil will be removed and if the wastewater treatment system will be installed within the excavation.***

**ADDITIONAL COMMENT'S**

According to the Niagara Peninsula Conservation Authority (NPCA) mapping Part 1 and Part 2 are not located in an area of a highly vulnerable aquifer (HVA). The HVA located just north of the proposed developments, upon consulting the Groundwater Vulnerability Mapping in the Niagara Peninsula Source Protection Area - Assessment Reports, appear to be assigned by parcel and could be related to a cluster of wells, or a suspect water well based on its installation date. In any case the proposed development area and lands to the north are identifies as low intrinsic groundwater susceptibility (GwSI) in the Approved Assessment Report.

The Niagara Peninsula Conservation Authority mapping indicates that there is a regulated floodplain located just south and east of Part 2. The proposed location of the wastewater treatment system is a sufficient distance from the published floodplain. According to NPCA mapping, there is also a small drainage course located in the eastern portion of Part 2 that runs north/south and parallel to the eastern property boundary. The proposed wastewater treatment system is located directly over the drainage course. According to available mapping a culvert may drain the lands north of English Church Road E through this drainage course.

- ***The City should request grading plans that accommodate the proposed servicing while maintaining the function of the drain to the satisfaction of the NPCA. It appears that some design modifications to the wastewater treatment system will be required to accommodate the existing drainage feature.***

**CONCLUSION and RECOMMENDATIONS**

According to the calculations in the Hydrogeological Assessment, the concentration of nitrate in the groundwater at the boundary of Part 1 and 2 will likely exceed the ODWQS criteria. The fine grained soil at surface may hydraulically isolate surficial contaminants from the local drinking water supply aquifer. The characteristics of the existing and future water well users supply





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aquifer(s) and the lateral extent of the isolating aquitard is a key consideration when justifying lot sizes based on supply aquifer isolation.

Given the integrity of the aquitard is the key consideration for evaluating the sustainability of private sewage service associated to these developments, Cambium recommends:

- The City request on-site confirmation of the isolation potential through geotechnical drilling.
- The City request a figure showing all known water well records within 500m of the proposed development, and indicate the thickness of the reported aquitard as well as the depth and description of the screened (open hole) interval.
- The aforementioned figure should be supported with a door to door survey of all water users within 500m of the sites.

The sewage attenuation potential should be predicated on the most sensitive receiver. Given the argument for hydrogeological isolation of drinking water supply aquifers is based on limited downward vertical migration of sewage effluent, a lateral migration of effluent towards the tributary is logical.

- The City should request a predictive assessment similar to the nitrate boundary calculations, using a sewage effluent total phosphorous concentration of 15mg/L and the tributary as the down-gradient boundary for both parcels.

The wastewater treatment system designs were completed to the specifications outlined in Part 8 of the OBC and the City of Hamilton Rural Official Plan requirements. However the proposed wastewater treatment system for Part 2 is currently located over a drainage course, as such re-grading, movement/modifications of the septic design and associated permitting may be required.

- The NPCA should be consulted for any works modifying the drainage works
- The specific location of test-pit TP2 and additional test pit(s) / borehole(s) should be provided.

Given the suspect water quality and potential quantity concerns, the City should recommend the proponent demonstrate a potable water supply exists prior to establishing residential lots on the proposed severance.

- Cambium recommends the installation and pump testing of a drinking water supply well for each proposed residential lot. The pump test should include water quality assessment as per the guideline (Tables 1 through 4 of the Ontario Drinking Water Quality Standards (O.Reg. 169/03), with the exception of replacing Table 3 with gross Alpha and Beta screening at minimum). Where aesthetic parameters are exceeded the proponent or their consultant should provide treatment details to the satisfaction of the City.



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We trust our review meets your expectations, please feel free to contact the undersigned at your convenience for further clarification as needed.

Best Regards,

**Cambium Inc.**

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Mike Bingham, P. Geo.  
Hydrogeologist

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Cameron MacDougall, P. Geo.  
Environmental Specialist

*Encl.*

*Copies:*

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