



June 19, 2020
Our File: 120062

JL Cox Planning Consultants Inc.
ATTN: John Cox
17 Spencer Crescent
Guelph ON N1L 1N1

Via E-mail

Re: Preliminary Hydrogeological Feasibility
Assessment for Private Servicing of Lot
Severance: Part 1, 61R-20684, Town of Erin

Dear Mr. Cox,

GM BluePlan Engineering Limited (GMBP) have been retained by JL Cox Planning Consultants Inc. (the "Client") to provide hydrogeological services to support the arrangement of municipal approvals for a potential rural residential lot severance in the Town of Erin. The lands under consideration (i.e. the "Site") are located on the north side of Wellington Country Road 124, approximately 500 m northwest of Ospringe corner. It is further defined as part of Lot 13, Concession 3, Geographic Township of Erin, and Part 1 of Plan 61R-20684. It bears property index number 71148-0425(LT).

The proposed severance of the Site will ultimately result in four lots on the lands under consideration, each sized as follows:

- Severed Lot 1: 0.59 ha
- Severed Lot 2: 0.52 ha
- Severed Lot 3: 0.54 ha
- Retained Lot: 1.27 ha (which hosts the existing residence on-Site).

This preliminary hydrogeological feasibility assessment is intended to establish whether it will be feasible to develop this lot for residential use (i.e. detached house) with private servicing as described above.

GEOLOGICAL SETTING

Physiographic mapping indicates that the Site lies upon a spillway landform (2007b). These landforms originated from the rapid flow of glacial meltwater eroding the landscape and are usually characterized by low-lying lands and gravelly-sandy soil materials.

According to map sets available from the Ontario Ministry of Northern Development and Mines (2006, 2007a), the geological materials underlying the Site are briefly summarized as follows:

- Wentworth Till (silty-sandy texture) overlying
- Gasport Formation (dolostone) bedrock.

Nearby water well records indicate that the depth to bedrock is in the range of 4.3 to 13.5 m below ground surface.

The Wentworth Till that makes up the surficial materials are generally relatively dense and of fine texture (i.e. high proportion of silt) and as a result tend to have low hydraulic conductivity. A well record attributed to the Site (Well ID 6703459) indicates a layer of sand and gravel 2.1-m thick at surface, underlain by “light grey clay” (i.e. till). It is expected that the surficial sand and gravel material becomes more prevalent with proximity to Eramosa River.

The Site is located approximately 500 m southwest of the location where Wellington County Road 124 crosses the Eramosa River. Based on topographic mapping, it appears that there is a topographic divide running that separates the northeastern quarter of the Site from the southwestern three-quarters of the Site (GRCA 2019). The larger part of the Site drains southwestward toward a tributary of the Eramosa River that passes along the southwestern Site boundary, while the smaller northeastern part appears to drain more directly toward the Eramosa River via the roadway ditches or via the associated wetland area that lies just beyond the northeastern property line (GRCA 2020).

Groundwater levels on the Site may vary due to the apparent variability of the surficial materials. Where till materials are found at surface, groundwater levels may rise near the surface in the winter and spring. However, given the fairly steep slope and the presence of coarse surficial materials to the northeast of the Site, it may be that water levels in that part of the Site remain somewhat deeper due to the improved drainage provided by these conditions.

SERVICING CONSIDERATIONS

On-Site Sewage Systems

The primary concern related to on-site sewage systems for residential development is the effect that these systems may have on the concentration of nitrate in local groundwater. The proposed development must ensure that its sewage management does not negatively impact groundwater quality and preclude its use for other purposes or by other (i.e. off-site) users. The most prevalent use for groundwater use is domestic consumption and so typically this means that a given development must not result in nitrate concentrations of 10 mg/L (per Ontario Drinking Water Standards) in the groundwater going off-Site.

Due to the size of the proposed lots, the potential for nitrate impacts due to sewage usage are expected to be low. Nitrogen attenuation calculations for the proposed development have been computed as per the method given in MOE Procedure D-5-4 (1996) and are summarized in Table 1.

Table 1: Nitrogen Attenuation Calculations for Small Lot Created by Severance

Line	Item	Value	Source
1	Average Annual Precipitation (mm/yr)	798	Environment Canada (Shand Dam)
2	Average Annual Evapotranspiration (mm/yr)	550	MNR (1984)
3	Runoff Coefficient	0.25	Estimated, typical for rural residential usage
4	Estimated Recharge Rate (mm/yr)	186	(Line 1 – Line 2) * (1 – Line 3)
5	Site Area (m ²)	29,200	From Conceptual Plan (see Enclosure A)
6	Hydrologic Input (L/yr)	5,431,000	Line 4 * Line 5, units converted
7	Number of Lots	4	From Conceptual Plan (see Enclosure A)
8	Sewage Effluent Input Rate (L/lot/day)	1,000	Specified by Procedure D-5-4
9	Annual Sewage Effluent Input (L/yr)	1,460,000	Line 7 * Line 8, units converted
10	Total Water Input (L/yr)	6,891,000	Line 6 + Line 9, units converted
11	Nitrate Output (g/lot/day)	40	Specified by Procedure D-5-4
12	Annual Nitrogen Loading (g/yr)	58,400	Line 7 * Line 11, units converted
13	Attenuated Nitrate Concentration (mg/L)	8.5	Line 12 / Line 10, units converted

The attenuated nitrate concentration for the Site is estimated to be 8.5 mg/L, which is less than the maximum allowable 10 mg/L. As such, it is anticipated that the Site will be sufficiently serviced using conventional Class 4 sewage systems per the *Ontario Building Code* (i.e. septic tank and tile bed).

Due to the potential for high seasonal groundwater levels, the leaching bed for the on-site sewage system may need to be a raised or “fill-based” bed in order to comply with Ontario Building Code requirements for separation from the groundwater table. A detailed soil survey (ideally conducted in February, March or April) or seasonal groundwater monitoring program may be used to identify seasonal high groundwater levels for the proposed new leaching bed.

Assuming the tile bed is constructed as fill-based absorption trenches serving a 5-bedroom dwelling and is raised 0.5 m above the surrounding ground (assuming level ground), the size of the bed will be approximately 34 m by 37 m. The smallest dimension of any of the Sites is 40 m in width, and so it is anticipated that there will be adequate space available to construct a tile bed for the on-site sewage system.

Private Well and Water Supply

The local Gasport Formation (bedrock) aquifer has been well-studied and is understood to generally be a reliable source of groundwater for domestic consumption. The local overburden is a silty-sandy till and is not recommended for use as a source of water for domestic consumption. Though sand and gravel materials may be found in parts of the Site and though those materials may in some cases be shown to provide adequate water supply to support domestic usage, shallow overburden wells are more susceptible to groundwater impacts. It is therefore recommended that groundwater supply wells be installed in the bedrock aquifer.

According to nearby water well records, the subcrop of the Gasport Formation may lie between 4 and 14 m below ground surface. This formation typically has high transmissivity and so is usually highly capable of meeting typical domestic demands for water supply. The water quality from the Gasport Formation generally meets the Ontario Drinking Water Standards, with the exception of certain aesthetic parameters such as hardness. Due to the relatively thin layer of overburden in this area, it is recommended that the water wells be installed such that the annular seal and watertight casing extend from ground surface to bedrock or to a depth of 6 m, whichever is greatest, to provide increased protection from water quality impacts from surface activities.

It is recommended that the new water wells be installed (in respect of the separation requirements set forth in the *Ontario Building Code*) at least 15 m away from existing or proposed sewage treatment systems, including those on neighbouring properties.

This preliminary assessment has not included review of the condition, type of construction, supply or water quality of any existing well on-Site.

CONCLUSION

A preliminary hydrogeological assessment of a proposed lot severance for a 2.92-ha Site located within Lot 13, Concession 3, Geographic Township of Erin, has been conducted to assess the feasibility for the Site to support four residential lots, each serviced by private water wells and private on-site sewage.

The findings of the assessment indicate that:

- on-site sewage systems would be sufficient to provide sewage servicing for the proposed development;
- on-site sewage systems may be conventional Class 4 systems (i.e. septic tank and tile bed);
- the tile bed may need to be constructed as a raised bed depending on the soils and groundwater elevations;
- sufficient groundwater supply is likely available from the bedrock (Gasport Formation) aquifer below the Site;
- the hydrogeological conditions generally support the proposed and servicing scheme; and
- the proposed severance is feasible from a hydrogeological perspective.

It is further recommended that

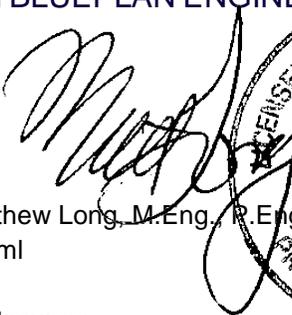
- new water supply wells for the Site be
 - constructed so as to draw from the bedrock aquifer;
 - installed with a watertight casing and annular seal that extends from surface to bedrock or to a depth of 6 m below ground surface, whichever is deepest;
 - placed in a location at least 15 m away from existing or proposed on-site sewage systems, including those on neighbouring properties.
- the new on-site sewage systems be constructed per the *Ontario Building Code* and in respect of all offsets from any existing or proposed well as specified therein.

Additional hydrogeological study may be requested by the municipality in order to meet site plan approval requirements. It is recommended that pre-consultation be conducted to determine the details of these requirements.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED

Per:


Matthew Long, M.Eng., P.Eng.
ML/ml



Enclosures:

A: Conceptual Site Plan

References

Environment Canada. 2020. Canadian Climate Normals 1981-2010 Station Data: Fergus Shand Dam. Accessible at https://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnName&txtStationName=shand+dam&searchMethod=contains&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=4760&dispBack=1

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Ontario Ministry of the Environment, Conservation and Parks. 2020. Map: Well Records. Accessible at <https://www.ontario.ca/environment-and-energy/map-well-records>

Ontario Ministry of the Environment and Energy. 1996. Procedure D-5-4 -Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment.

Ontario Ministry of the Environment and Energy. 1996. Procedure D-5-5 – Technical Guideline for Private Wells Water Supply Assessment.

Ontario Ministry of Natural Resources. 1984. Water Quantity Resources of Ontario.

Ontario Ministry of Northern Development and Mines. 2006. Surficial Geology of Southern Ontario: GIS Map. Accessible at GRCA Web Map <https://maps.grandriver.ca/web-gis/public/?theme=General>

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Ontario Ministry of Northern Development and Mines. 2007b. Physiography of Southern Ontario: GIS Map. Accessible at GRCA Web Map <https://maps.grandriver.ca/web-gis/public/?theme=General>

**ENCLOSURE A:
CONCEPTUAL SITE PLAN**

③ PIN 71148-0349(LT)

PLAN

④ PIN 71148-0304(LT)

LOT 19

PIN 71148-0322(LT)

LOT 14

TRANSFER FROM TOWN OF ERIN BY INST. WC564206

⑤ #35

ESTABLISHED BY REGISTERED PLAN 61M-118

BLOCK 52
PIN 71148-0355(LT)

LOT 1

② ZONING: OS1-107

LOT 20 #31
PIN 71148-0323(LT)

ZONING: ENVIRONMENTAL PROTECTION (EP2)
COUNTY & LOCAL O.P.: CORE GREENLANDS

LANDS TO BE RETAINED
AREA=1.27±ha

STEWART DRIVE
20.0m WIDE

R=170.0
A=29.6

R=40.0
A=17.8

REG'D PART 1,
61R--21291
PIN 71148-0432(LT)

PART 14,
61R--10479
SUBJECT TO EASEMENT AS IN INST. WC157117

LANDS TO BE SEVERED (1)
AREA=0.59±ha

LANDS TO BE SEVERED (2)
AREA=0.52±ha

LANDS TO BE SEVERED (3)
AREA=0.54±ha

LOCAL O.P.: HAMLET AREA

⑬ PIN 71148-0368(LT)
PART 12,
61R--10479

LOT 13,
ZONING: AGRICULTURAL

SUBJECT TO EASEMENT AS IN INST. DS17640
PART 2,
61R--20684

①

13,

ZONING:

CORN

O.P. COUNTY

CREATED BY

71148

132.7

118.3

CONCESSION
AGRICULTURAL FIELD

SECONDARY

OCTOBER 2015
B143/14

EDGE OF FIELD

"YARD" WELLO

DWELLING #894C

(LT)

DRIVEWAY (A)

SEPTIC AGRICULTURAL

BY INST. WC450289

TOP OF BANK

⑦

PIN 71148

WETLAND LIMIT

PART 13, 61R--14079

PART 2, 61R--20684

214.2

WELLINGTON COUNTY ROAD No. 124
(FORMERLY KING'S HIGHWAY No. 24)

30.48m WIDE

LOCAL &

COUNTY

O.P.:

SECONDARY

AGRICULTURAL

LOT 13,

CONCESSION

ZONING: AGRICULTURAL

⑫

#8919

PIN 71165-0053(LT)

⑪

PIN 71165-0052(LT)

⑩

#8933

PIN 71165-0051(LT)

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PIN 71165-0049(LT)

⑧

#8947

PIN 71165-0050(LT)