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Technical Memorandum

Date:	April 28, 2025	**Project No.:**	300043952.0000
Project Name:	Snell's Hollow Developers Group - Foundation Drain Volume Estimates		
Client Name:	Snell's Hollow Developers Group		
Submitted To:	Town of Caledon – Jason Elliott, Senior Planner, Environment – Parks and Natural Heritage		
Submitted By:	Travis Mikel, P.Geo.		
Reviewed By:	Dwight Smikle, P.Geo.		

1.0 Introduction

In review of the Comprehensive Environmental Impact Study and Management Plan (CEISMP) prepared for the Snell's Hollow East Secondary Plan, the Town of Caledon provided the following comment:

Town of Caledon - Parks and Natural Heritage heading:

Comment 23: Clarify if/how the proposed sump pumps relate to the site-based water balance (i.e., if the affect the results and/or will intersect groundwater).

R.J. Burnside & Associates Limited (Burnside) has evaluated the use of conventional foundation drains to control groundwater levels across the proposed Snell's Hollow development (herein referred to as the subject lands) where proximity of seasonal high groundwater to basement elevations may be of concern. This memorandum outlines the hydrogeological conditions across the subject lands and evaluates the potential groundwater flows that may be collected by the foundation drains.

2.0 Hydrogeological Conditions

2.1 Stratigraphy

To illustrate the stratigraphy of the subject lands, interpreted geological cross-sections were prepared as part of the "Hydrogeological Assessment and Water Balance" report (Burnside,

2025) using the borehole logs for boreholes and monitoring wells completed on the subject lands and MECP water well records. The well, borehole and cross-section locations are shown on Figure 5 of the “Hydrogeological Assessment and Water Balance” report (Burnside, 2025).

The cross-sections across the subject lands generally indicate finer-grained soils (fill and glaciolacustrine-derived silty to clayey till), ranging in thickness from about 7 m to 20 m, overlying the Oak Ridges Aquifer Complex (ORAC). The silt, clay and till deposits have a low hydraulic conductivity, typically restrict groundwater movement and are considered to form aquitard layers.

As reported in the Burnside 2025 report, the MECP database documented a total of 81 well records within 500 m of the subject lands of which 30 records were for water supply wells. Of the listed water supply well records, the majority are screened in the overburden materials, with only five wells screened in the bedrock. The overburden wells are screened at various depths ranging from 6.4 m below ground surface (mbgs) to 61 mbgs, but generally target the Thorncliffe Aquifer; however, some shallower wells which are completed in the ORAC are also present. It is noted that the well records do not indicate the current status of the well, i.e., whether or not the well is in use, and many of the wells listed within the developed areas surrounding the subject lands are assumed to be decommissioned. This supports the regional characterization that the ORAC and Thorncliffe Aquifer are the water-bearing stratigraphic deposits that may provide sufficient water supplies to meet domestic needs.

2.2 Groundwater Levels and Seasonal Fluctuations

In southern Ontario, there is a seasonal pattern that typically appears on groundwater level hydrographs from shallow wells (i.e., seasonal water table variations). The groundwater levels tend to be highest in the spring, decline throughout the summer and early fall and then rise again in the late fall/early winter. The monitoring wells installed across the subject lands provide insight into the nature of the seasonal variations within the shallow surficial sediments.

Groundwater in the surficial till show seasonal variations generally ranging from about 2 m to 5 m. Groundwater is interpreted to be a perched water table in deposits of low hydraulic conductivity till encountered above the ORAC. There are select areas across the subject lands where the perched water table is seasonally close to ground surface. Groundwater levels at MW19-01, located in the northwest corner of the subject lands, have ranged from about 1.5 mbgs during the spring freshet to dry conditions (>7.7 mbgs) during the late summer and fall. And groundwater levels at MW19-06, located in a low-lying area in vicinity of Stormwater Management Pond 2, have ranged from at surface to about 2 mbgs.

Hydraulic conductivity testing conducted across the subject lands is summarized in the hydrogeological assessment completed by Burnside (2025). The estimated hydraulic conductivity of the glaciolacustrine-derived silty to clayey till from grainsize analyses and in situ well tests ranges from less than 1.0×10^{-8} m/s to 1.5×10^{-5} m/s. The range in the hydraulic conductivity values reflect the varying amounts (trace to some) of sand and gravel within the till.

In situ well tests completed in the shallower soils (sandy silt clay with trace gravel) had a hydraulic conductivity of approximately 4.0 x 10^{-6} m/s which is considered to be moderate.

3.0 Implementation of Foundation Drains

The shallow depths to the seasonally high groundwater table across portions of the subject lands represent a potential concern for basement construction. A conventional foundation drain system has been proposed by DSEL to collect shallow groundwater in the areas of the subject lands where the depth to groundwater below proposed basement grades may be insufficient and pump the groundwater to surface. DSEL has advised that the foundation drains will be located at an approximate depth of 3 m below proposed grade for the single detached dwellings and townhouses.

It is noted from the geological cross-sections that the low hydraulic conductivity glaciolacustrine silt and clay and glacial till deposits are the prevalent materials within the shallow overburden. It is anticipated that as groundwater levels decline due to seasonal variations that the collected flows would also decline. As such, foundation drain volumes will be higher during spring groundwater high periods and decline into the fall low groundwater period.

3.1 Potential Flow Volumes

It is difficult to estimate the potential groundwater flow volumes that may be expected seasonally from the foundation drain system due to the natural variation of the soil and groundwater conditions across the subject lands, as well as precipitation and climate variations.

An estimate of potential flows can be calculated using the Darcy equation for groundwater flow, assuming values for hydraulic conductivity, hydraulic gradients and potential areas of seepage. To be conservative we have assumed a hydraulic conductivity of 4.0 x 10^{-6} m/s to represent the shallow till soils the foundation drains are to be constructed in.

An estimate of the foundation drain volumes for the northwest corner of the subject lands and a low-lying area in vicinity of Stormwater Management Pond 2 are further explored below. Refer to Figure 1 for areas of discussion.

3.1.1 Northwest

As noted above, the seasonal groundwater levels at MW19-01 range from about 1.5 mbgs during the spring freshet to dry conditions (>7.7 mbgs) during the late summer and fall. The total inflow to the foundation drains for the townhouse blocks and single detached dwellings in vicinity of MW19-01 is estimated to be about 31,800 L/day (~0.368 L/sec).

It is noted the estimated daily volume is interpreted to occur during the spring as groundwater levels decline through the summer and fall. Hypothetically, if groundwater discharged to the foundation drains at a rate of about 31,800 L/day (~0.368 L/sec) for six months of the year, the volume would be about 5,803,500 L (5,803.5 m^3/a).

3.1.2 In Vicinity of SWM Pond 2

The seasonal groundwater levels at MW19-6, located in vicinity of Stormwater Management Pond 2, have ranged from at surface to about 2 mbgs. The total inflow to the foundation drains for the single detached dwellings is estimated to be about 5,700 L/day (~0.066 L/sec).

Seasonal groundwater elevations are observed to fluctuate in vicinity of Stormwater Management Pond 2; however, the seasonal low groundwater level is interpreted to be above the proposed basement elevations suggesting discharge to the foundation drains will occur daily. Hypothetically, if groundwater discharged to the foundation drains at a rate of about 5,700 L/day (~0. 066 L/sec) for the entire year, the volume would be about 2,080,500 L (2,080.5 m^3/a).

4.0 Discussion

As noted above in the introduction, the comment received from the Town indicated the following:

Clarify if/how the proposed sump pumps relate to the site-based water balance (i.e., if they affect the results and/or will intersect groundwater).

In review of the groundwater levels across the subject lands, it is interpreted that there are two areas where proposed basements may intersect groundwater; the northwest corner of the subject lands and in vicinity of the proposed SWM Pond 2. Conservative estimates of the annual groundwater discharge to foundation drains from these two areas total 7,884,000 L (7,884 m^3/a).

The water balance calculations reported in the Burnside Hydrogeological Assessment and Water Balance report (2025) indicate that existing infiltration volumes across the subject lands are estimated to be about 42,100 m^3/a. The stormwater management LID strategy proposed by DSEL includes infiltration of runoff in parks and along the ROW resulting in a post-development infiltration volume of about 123,800 m^3/a.

It is concluded that although the foundation drains may encounter groundwater and direct it to the storm system, the estimated infiltration from the proposed stormwater management LID strategy far exceeds what is estimated to be removed by the foundations drains.

As noted above, seasonal decline in groundwater levels will occur through the year and will result in lower seepage volumes during low groundwater periods. The volumes predicted above are therefore not likely to be maintained throughout the year. Groundwater elevations will be further assessed as part of individual draft plan applications.

R.J. Burnside & Associates Limited

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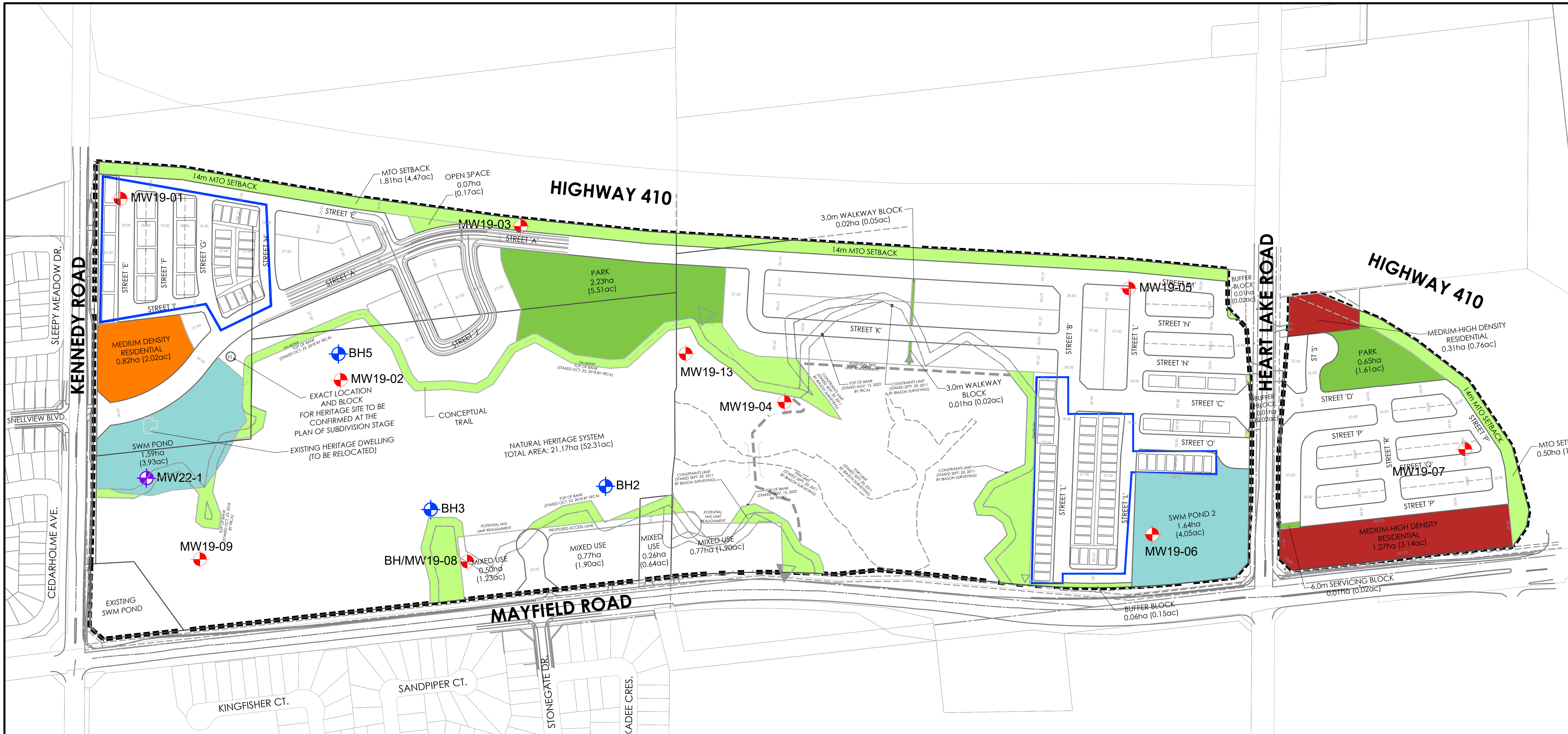
Senior Hydrogeologist
TM/DS:cl

Enclosure(s) Figure 1 – Foundation Drain Estimates



LEGEND

FOUNDATION DRAIN VOLUME ESTIMATE AREAS

MONITORING WELL (GOLDER, 2019)

MONITORING WELL (EDWARD WONG, 2017)

MONITORING WELL (RJB,2023)

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Client / Report

SNELL'S HOLLOW DEVELOPERS GROUP
CALEDON, ONTARIO
HYDROGEOLOGICAL ASSESSMENT AND WATER BALANCE

Figure Title

FOUNDATION DRAIN ESTIMATES

Drawn	Checked	Date	Figure No.
SK	TM	April 2025	1
Scale		Project No.	
1:5,000		300043952	

File: A:\043952 Snell's Hollow\08_Working Files\Foundation Drain Areas.dwg Date Plotted: April 25, 2025 - 10:40 AM