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SUPPLEMENTAL WATER BALANCE ASSESSMENT

L&M Gardens – Phase II, 11742 Tenth Line, Town of Stouffville-Whitchurch, Ontario

Project #: 26-1231
Prepared for: Sorbara Development Group
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Attention: Natalie Shurigina

SUBJECT: SUPPLEMENTAL WATER BALANCE ASSESSMENT, L&M GARDENS – PHASE II, 11742 TENTH LINE, TOWN OF STOUFFVILLE-WHITCHURCH, ONTARIO

EnVision Consultants Ltd. is pleased to present the enclosed Supplemental Water Balance Assessment report for the above-noted property. The report describes the pre- and post-development water balance for the proposed development and provides conclusions for your consideration.

We thank you for utilizing EnVision for this assignment. If there are any questions regarding the enclosed report, please do not hesitate to contact us.

Yours sincerely,



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QUALITY MANAGEMENT

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1. INTRODUCTION

EnVision Consultants Ltd. (EnVision) was retained by Sorbara Development Group (the 'Client') to provide supplemental hydrogeological services to support the ongoing development of lands identified as L&M Gardens – Phase II, 11742 Tenth Line, Town of Stouffville-Whitchurch, Ontario (the 'Site'). It is our understanding that this assessment has been requested to support Zoning Bylaw Amendment (ZBA) and Site Plan Approval (SPA) for the ongoing redevelopment activities.

It is our understanding that the original L&M Gardens subdivision included a block designated for the construction of a school at the northeast corner of Busato Drive and 10th Line. During ongoing planning activities, it has been determined that the lands will not be developed as such and instead will be developed as a future residential block.

The Site is located on the northeast part of 10th Line and Busato Drive intersection, in the Town of Stouffville -Whitchurch. The subject lands are rectangular in shape, occupying approximately 2.46 ha (6.1 acres) that is currently vacant. The location and orientation of the Site is depicted in Figure 1. Site plan and Site grading plans can be found in Appendix A.

1.1. OBJECTIVES AND SCOPE OF WORK

The key objectives for the assessment are to:

1. Provide a policy framework for the proposed development;
2. Develop a pre- to post-development climate-based water budget for the Site;
3. Comment on the need and scope for implementing Low Impact Development (LID) measures at the Site.

1.2. PREVIOUS SITE INVESTIGATIONS

Previous field level investigations have been completed for the development property by others, including environmental, geotechnical, and hydrogeological. The following summary is provided as some of the historical information and data has been incorporated into this report to provide additional Site context.

1.2.1. Hydrogeological Investigation by Terraprobe, 2007

Terraprobe Limited completed a hydrogeological investigation at the study site during the summer of 2007. The program included drilling thirty-five (35) boreholes to depths that ranged from 4.4 to 9.8 metres below ground surface (m BGS) across the site. The borehole drilling and testing results were used to assess the subsurface conditions across the site. Terraprobe concluded that the shallow subsurface consisted of a topsoil layer that was underlain by earth fill and /or native glacial till soil with limited recharge capability. Non-cohesive silty sand was reported in several boreholes and described as interbedded deposits within the till formation.

Groundwater was reportedly measured in all observation wells at depths between 2 and 4 m BGS. Shallow groundwater flow was inferred to be controlled by topography, with flow being directed towards Stouffville Creek along the western side of the site. Terraprobe reported no evidence of significant groundwater discharge to the creek.

1.2.2. Hydrogeological Impact Study, WSP Canada, 2018

WSP Canada Inc. had completed a hydrogeological impact study for the entire subdivision area consisting of 24.3 ha (60 acres), which also included the subject block. The surficial soil in the study area is described as a general sequence featuring sandy silt to silty sand till deposit underlain by a clayey silt till of limited permeability. Based on in-situ testing complete at onsite monitoring wells, the estimated hydraulic conductivity (K) for the shallow overburden ranges between 1.0×10^{-10} and 9.0×10^{-8} m/sec.

The clay till appears at surface in the southwest portions of the site at lower elevations adjacent to Stouffville Creek and the lower reaches of a drainage feature which traverses the site northeast to southwest. The near surficial material is of low permeability and there is a slight upward hydraulic gradient indicating groundwater discharge conditions. The water table in the sandy till was measured at 2 m to 4 m below ground level and in the areas closer to Stouffville Creek with surficial clayey till, water levels were measured at 1m to 2 m below ground level.

There were four (4) monitoring well nests constructed across the site. Water level measurements at these nests indicated discharge (vertically upward) gradients were typical in the shallow overburden across the site. This is consistent with the regional hydrogeological setting, which suggest that this area of Whitchurch Stouffville is in a regional groundwater discharge area.

1.2.3. Test Pit investigation

Between August 17 and August 23, 2018, Soil Engineers Ltd. completed a test pit investigation across the subject lands to characterize subsurface soil and groundwater conditions in support of sewer construction.

Test Pits 7, 8, and 9 were advanced within the proposed school block area to depths ranging from approximately 4.5 m to 8.7 m below ground surface (BGS). Test Pits 8 and 9 remained dry to their respective termination depths of 4.5 m and 6.2 m BGS. In contrast, Test Pit 7 encountered significant groundwater seepage at approximately 5.8 m BGS, with the groundwater level subsequently recovering to approximately 1.0 m BGS.

The Site is generally underlain by earth fill and/or sandy silt till containing occasional sand seams, underlain by silty clay till. This stratigraphic sequence was observed in all test pits except Test Pit 7, where a coarse sand and gravel layer was encountered at approximately 5.8 m BGS (Elevation 252.7 m ASL). The occurrence of this granular unit is consistent with the noted groundwater seepage and suggests the presence of a localized water-bearing zone within the overburden profile.

1.3. POLICY AND REGULATORY OVERVIEW

The Site falls within the Toronto Regional Conservation Authority (TRCA) and is not located within a regulated area (Toronto and Region Conservation Authority, 2022). However, the property is located within the Wellhead Protection Area Q2 (WHPA-Q2) and is subject to Source Protection Plan (SPP) Policy REC-1 parts 2 a) and b) meaning that any future Site Plan Control or subdivision application would require the submission of a site-specific water balance assessment to ensure REC-1 policy compliance.

As per York Region Official Plan, 2022, the proposed development block falls within an area identified as Recharge Management Area (WHPA Q1/Q2).

A review of the TRCA Source Water Protection Policy areas indicates that the Site is not within any wellhead protection areas, highly vulnerable aquifer, and significant groundwater recharge areas (Ministry of the Environment, Conservation and Parks, 2023).

2. WATER BALANCE ASSESSMENT

2.1. SUMMARY OF WSP SCHOOL BLOCK WATER BALANCE

Proposed development of the school block will consist of future residential development which will necessitate the introduction of impervious surfaces (rooftops, concrete/asphalt driveway/roadways, parking areas) that will result in a reduction in the volume of water infiltrating to the subsurface. The 2017 WSP Hydrogeological Impact Study included a pre-to-post development water balance for the entire subdivision lands that incorporated the school block catchment. Details related to the WSP post-development water balance for the school block catchment are highlighted in *Table 2-1* below.

Table 2-1: Summary of the 2019 WSP Post-Development Water Balance for School Block Catchment

PARAMETER	DIMENSION	NOTES
Pervious area (m^2)	8,505	
Impervious area (m^2)	15,795	Assumed 65% of total area
Total area (m^2)	24,300	
TOTAL INPUTS (m^3/year)	21,753	Precipitation only, no run-on, or other components.
Outputs (m^3/year)		Post-development infiltration was adjusted downwards by 10% to account for soil compaction, and evaporation was estimated at 20% of total incoming precipitation on impervious surfaces
- Evapotranspiration	4,678	
- Evaporation	2,828	
- Infiltration	1,453	
- Runoff	12,794	
TOTAL OUTPUTS (m^3/year)	21,753	

2.2. SUMMARY OF STORMWATER MANAGEMENT DESIGN AND LID INCLUSION

Sabourin Kimble and Associates Ltd. (SKA) have prepared a Stormwater Management Design Brief for the detailed design of the L&M Gardens residential subdivision, which includes the subject block area. Two stormwater management facilities (SWMF A and SWMF B) have been proposed to meet all water quality, quantity, and erosion control requirements for the proposed development area. The school block area is considered to be situated within the SWMF A drainage area, and is therefore ultimately controlled through the function of this facility.

SKA further notes that the findings from the 2018 WSP Updated Hydrogeological Impact Study indicate that there is an infiltration deficit for the entire development area, and that best efforts through the use of redirection of roof runoff and exfiltration galleries should be considered. High water table and upward gradients are reported to exist at the site and therefore it would be "virtually impossible to maintain pre-development infiltration rates."

Based on email correspondence with SKA in August of 2026, it was noted that the original school block has not been identified as an area for inclusion of any exfiltration strategies, and the school block was assumed under development condition to comprise a 79% impervious ratio (0.75 runoff coefficient). As

the block will now be considered for future townhouse development, the runoff coefficient will remain at 0.75. resulting in no change in the percent impervious area. Based on this assumption, SKA has not proposed any additional LID infrastructure within the subject block.

2.3. METHODOLOGY

EnVision has provided the following climate-based water balance update for the subject block. Based on the Thornthwaite and Mather (1957) methodology, the water balance provides an accounting of water movement within the hydrologic cycle. Precipitation (P), in the form of rain or snow, is distributed among several pathways: runoff to streams and lakes (R), infiltration and recharge to the groundwater system (I), and evaporation from the land surface or evapotranspiration by vegetation (ET). When long-term average values of precipitation, runoff, infiltration, and evapotranspiration are considered, changes in groundwater storage (ΔS) are assumed to be negligible or approximately zero.

The annual water budget can be expressed as:

$$P = ET + R + I + \Delta S$$

Where:

P = Precipitation (mm/year)

ET = Evapotranspiration (mm/year)

R = Run-off (mm/year)

I = Infiltration (mm/year)

ΔS = Change in groundwater storage (taken as zero) (mm/year)

It is noted that the water balance described herein does not account for catchment areas that extend off-site. The calculations compare the pre- and post-development water balance changes within the Site boundaries.

The pre-development portion of the area is comprised of open land area with some portable storage sheds.

It is understood that the proposed development will consist of 143 townhouse complexes, with one level of basement and associated infrastructure including, but not limited to, driveways, sidewalks, and landscaped areas.

Based on the available design information, the development area at the Site can be generally categorized into three (3) types as paved area, roof area, and landscape areas. The pre- and post-development plans of the proposed development are shown in Figure 2 and Figure 3. A summary of the surface areas of the development is listed in *Table 2-2* below.

Table 2-2: Pre- and Post Development Site Statistics

TYPE OF LAND COVERAGE	PRE-DEVELOPMENTS AREAS (m^2)	POST DEVELOPMENT AREAS (m^2)	NET CHANGE (m^2)
PAVED AREA	0	8,821	+8,821
BUILDING ROOF AREA	0	9,581	+9,581
LANDSCAPE/VEGETATED AREA	24,552	6,150	-18,402
TOTAL	24,552	24,552	0

Supporting information referenced herein (including detailed water balance calculations) is attached in Appendix B.

2.4. WATER SURPLUS

Water surplus is calculated by determining the difference between precipitation and evapotranspiration (changes in soil water storage were assumed to be negligible over the course of a year). The volume of water surplus is further sub-divided into portions that infiltrate the on-site soils and that are directed off-site as runoff.

The climatic data including monthly average temperature and precipitation were obtained from Environment Canada, for Toronto Buttonville (Airport) weather station (Climate Identifier: 6158409) located about 15 km distance from the Site. Accordingly, the average annual evapotranspiration was estimated to be about 526 mm/annum using the USGS Thornthwaite Monthly Water Balance methodology (Appendix B), and the average annual precipitation was estimated at 886 mm/annum. The water surplus of the Site was calculated to be 360 mm/yr.

Evapotranspiration does not occur from structures, paved areas, or gravel surfaces. It was assumed that 10% of precipitation falling on these surfaces is lost directly to evaporation. The remaining depth (i.e., 90% of precipitation) was considered surplus and converted to infiltration and/or runoff.

2.5. INFILTRATION RATES

The volume of surplus water that infiltrates through pervious surfaces on-site was determined by applying an infiltration factor to the surplus depth. The surplus water that does not infiltrate into pervious surfaces will leave the Site as surface water runoff. The infiltration factor varies from 0 to 1 and is estimated based on topography, soils, and vegetation cover as per the *Stormwater Management and Planning Design Manual* (Ministry of the Environment, 2003).

Based on topography, soil conditions, and land cover, the infiltration factor for the Site has been established as 0.8.

The pre- to post-development water balance calculations are in Appendix B. A summary of the results are presented in the following sections (*Table 2-3* through *Table 2-5*).

2.6. PRE-DEVELOPMENT WATER BALANCE

The water balance for the existing conditions of the Site is summarized in *Table 2-3*.The pre-development infiltration rate was calculated to be 6,265 m^3/yr and the runoff rate was 4,046 m^3/yr.

Table 2-3: Pre-Development Water Balance

LAND USE		AREA (m^2)	PRECIPITATION (m^3)	EVAPO-TRANSPIRATION (m^3)	INFILTRATION (m^3)	RUN-OFF (m^3)
IMPERVIOUS AREAS	Paved Area	0	0	0	0	0
	Roof Area	0	0	0	0	0
PERVIOUS AREAS	Landscaped Area	24,552	21,753	11,442	6,265	4,046
TOTAL		24,552	21,753	11,442	6,265	4,046

Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.

2.7. POST-DEVELOPMENT WATER BALANCE

The post-development water balance is summarized in *Table 2-4*. The post-development infiltration rate was calculated to be 1,569 m^3/yr and the runoff volume was 15,318 m^3/yr.

Table 2-4: Post-Development Water Balance

LAND USE		AREA (m^2)	PRECIPITATION (m^3)	EVAPO-TRANSPIRATION (m^3)	INFILTRATION (m^3)	RUN-OFF (m^3)
IMPERVIOUS AREAS	Paved Area	8,821	7,815	782	0	7,034
	Roof Area	9,581	8,489	849	0	7,640
PERVIOUS AREAS	Landscaped Area	6,150	5,449	3,235	1,569	645

LAND USE	AREA (m^2)	PRECIPITATION (m^3)	EVAPO-TRANSPIRATION (m^3)	INFILTRATION (m^3)	RUN-OFF (m^3)
TOTAL	24,552	21,753	4,865	1,569	15,318

Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.

2.8. WATER BALANCE COMPARISON

The water balances of the pre-and post-development scenarios are summarized below in *Table 2-5*.

Table 2-5: Water Balance Comparison

	PRECIPITATION (m^3/YR)	EVAPOTRANSPIRATION (m^3/YR)	INFILTRATION (m^3/YR)	RUN-OFF (m^3/YR)
PRE-DEVELOPMENT	21,753	11,442	6,265	4,046
POST-DEVELOPMENT	21,753	4,865	1,569	15,318
CHANGE IN VOLUME	0	6,577	4,696	11,272
CHANGE IN %	-	-	-75	+279

As highlighted, the post-development infiltration indicates a deficit of 4,696 m^3/year when compared to the pre-development conditions. The post-development runoff is anticipated to increase by 11,272 m^3/year, which represents a net increase in runoff when compared to the pre-development conditions.

The water balance calculation for the proposed school block that was prepared by WSP has been compared and contrasted to the revised development block, as shown in *Table 2-6* below.

Table 2-6: Direct Comparison of Proposed Block to the Original School Block Water Balance

COMPONENT	WSP WATER BALANCE (APRIL 2017)	ENVISION WATER BALANCE (SEPTEMBER 2026)
Parcel Concept	School Block 224	Townhome Block
Area considered	24,300 m^2	24,552 m^2
Total inputs (m^3/yr)	21,753	21,753
Total Evapotranspiration (m^3/yr)	4,281	4,865
Total Infiltration (m^3/yr)	1,453	1,569

COMPONENT	WSP WATER BALANCE (APRIL 2017)	ENVISION WATER BALANCE (SEPTEMBER 2026)
Total Runoff (m^3/yr)	12,794	15,318

While the proposed townhome development remains in an infiltration deficit relative to pre-development conditions, comparison with the original WSP school-block assessment indicates that post-development infiltration is expected to increase from 1,453 m^3/year to 1,569 m^3/year, representing an approximately 8% improvement. As such, the proposed land-use change does not worsen the infiltration performance previously incorporated into the subdivision-wide water balance assessment and is not anticipated to result in an incremental adverse water balance effect relative to the approved development concept.

2.9. DISCUSSIONS ON LID MEASURES

The post-development infiltration volume indicates a deficit of 4,696 m^3/year. Best effort measures, including downspout disconnections to capture and promote lot-level infiltration using captured stormwater has been proposed. Considering the roof area runoff volume estimates, approximately 7,640 m^3 of clean stormwater is available to support lot level infiltration. This assumes that 10% of the incoming precipitation is lost to evaporation. Assuming that 25% of this incoming water could be directed to disconnected lawn areas, up to 1,910 m^3 of clean water would be available to assign to infiltration. Therefore, introduction of rooftop disconnection and promotion of local lot level infiltration would reduce the infiltration deficit from 4,696 m^3/year to 2,786 m^3/year.

Roof downspouts should only be disconnected where the minimum depth to the seasonally high-water table is at least 1 m BGS. Based on the test pitting investigation across the subject block, the implementation of downspout disconnections are considered suitable, as the local phreatic water surface is estimated below 4.5 m from local ground surface.

3. IMPACT ASSESSMENT

3.1. BASEMENTS AND GROUNDWATER

Based on the review of the WSP hydrogeological report, two monitoring wells (BH28 and BH35) were installed within the school block. Groundwater levels measured in July and September 2017 ranged from 254.3 to 255.6 m ASL. Applying a 0.5 m allowance for seasonal high groundwater conditions, the estimated spring groundwater elevations range from 254.8 to 256.1 m ASL. In addition, test pits opened across the school block indicated that the phreatic water table was encountered below 4.5 m from ground.

Based on the work completed in support of the WSP Hydrogeological Report, two monitoring wells BH28 and BH35 were installed within the school block and the water table elevations were reported between July and September 2017 ranging from 254.3 to 255.6 m ASL.

Based on the review of grading plans (Appendix A) provided by the client, the finished floor elevations ranged from about 258 m ASL in the southwest to about 262 m ASL in the northeast. Accordingly, the under-side of footing elevations to accommodate one (1) level basements ranged from 255 to 259 m ASL. *Table 3-1* below summarizes the relevant elevations for each of the future townhouse blocks with an interpretation of the local groundwater elevations based off of the historical data. Note that the reported WSP Groundwater Elevations are taken from the 2018 Hydrogeological Impact Study.

Table 3-1: Summary of Groundwater Separation Beneath Townhouse Blocks

Block	Finished Floor Elevation (FFE) (m)	Basement Slab Elevation (BSE) (m)	Underside of Footing (USF) (m)	WSP Groundwater Elevation (m ASL)	Groundwater Separation from USF (m)
1	258.07	255.35	255.12	252.0	3.12
2	258.32	255.6	255.37	252.5	2.87
3	258.40	255.68	255.45	253.0	2.45
4	258.52	255.85	255.62	253.5	2.12
5	258.74	258.07	255.84	253.5	2.34
6	259.11	256.6	256.37	253.5	2.87
7	260.10	257.59	257.36	253.5	3.86
8	258.74	256.07	255.84	253.0	2.84

Block	Finished Floor Elevation (FFE) (m)	Basement Slab Elevation (BSE) (m)	Underside of Footing (USF) (m)	WSP Groundwater Elevation (m ASL)	Groundwater Separation from USF (m)
9	259.65	256.98	256.75	253.0	3.75
10	259.07	256.4	256.17	254.0	2.17
11	259.76	257.09	256.86	254.0	2.86
12	262.29	259.78	259.55	254.0	5.55
13	260.82	258.16	257.93	254.0	3.93
14	261.48	258.82	258.59	254.5	4.09
15	261.92	259.26	259.03	255.0	4.03

Notes:

All elevations for block grading as reported on "Site Grading Plan – South", prepared by SKA, dated August 2026

Groundwater elevations have been interpolated from Figure 2, Groundwater Contours and Depth to Water Below Foundations, WSP Hydrogeological Impact Study, Part of Lot 32, Conc 9 (M), Stouffville, ON, dated April 13, 2018.

Based on the findings outlined above, the underside of basement footings are all established above the interpreted shallow groundwater table. Separation distance ranges from 2.1 to 5.6 m. Since the WSP data lacks seasonal context, EnVision has considered that the maximum high groundwater elevations should be adjusted up by a minimum of 1.5m to best represent the spring / winter peak condition. By incorporating a 1.5 m fluctuation allowance to the WSP reported groundwater levels, the minimum separation distance ranges from 0.6 to 5.1 m, which is considered acceptable distance to avoid the need for enhanced waterproofing considerations, based off of the assumptions and limitations outlined above.

During construction/excavation work, EnVision would recommend additional test pits to confirm the current soil / groundwater conditions to the base of elevation across each of the future townhouse blocks.

3.2. PRIVATE WELLS

Based on the search of MECP water well records database completed by WSP, there is one (1) farm well and one (1) domestic water supply well within the overall subdivision area. No supply wells were noted within the subject block. Assuming these wells would be decommissioned before the Site development, and there are no other private wells surrounding the Site no impacts on the local groundwater use is anticipated.

The nearby community of Whitchurch Stouffville is reliant on groundwater obtained from several high-capacity water supply wells and the closest municipal supply well to the site is located about 1,600 m to the northeast. Since these wells are completed in deeper aquifers and water levels in these wells are not expected to be influenced by construction or groundwater control at the proposed subdivision.

3.3. CONSTRUCTION DEWATERING EFFORTS

Based on the development plans and historical groundwater information reviewed, construction works for the future townhome blocks are not anticipated to trigger any requirement to obtain a water taking permit. Any groundwater encountered is expected to be of limited volumes and managed using typical gravity drain/sumps. Active groundwater control systems, such as wellpoints, eductors, or deep wells are not expected to be required to maintain safe / dry excavations. Therefore, there are no adverse impacts associated with future groundwater takings.

3.4. IMPACTS ON INFILTRATION

LID measures are not currently proposed for the Site, it is recommended that impervious surface coverage be minimized, lot-level infiltration practices be implemented where feasible, and activities that may adversely affect groundwater recharge to the underlying aquifer be managed and mitigated. Disconnection of downspouts with conveyance to vegetated areas are proposed to aid in reducing the runoff and promoting limited infiltration as a best practice measure. Enhanced LIDs are not feasible at the Site, based on the limited permeability and the hydrogeological conditions present.

3.5. WATER BALANCE IMPACT

With the inevitable changes in impervious areas and potential changes to groundwater quality and quantity, best management practices (BMP) that promote groundwater infiltration and recharge will make a significant contribution to mitigating the effects of development. It is understood that the townhouse block development will include best efforts including disconnection of rooftop downspouts with conveyance to private lot areas to promote infiltration.

Based on the findings of the water balance assessment, without LID mitigation measures beyond disconnected downspouts, the proposed development would result in a decrease in infiltration across the Block lands. Consequently, mitigation measures such as minimizing impervious surfaces and implementing lot-level infiltration practices are recommended to maintain groundwater recharge and support pre-development hydrologic conditions.

4. CLOSING

4.1. CONCLUSIONS

Based on the information obtained through the Hydrogeological Impact Assessments and Water Balance Study, EnVision presents the following conclusions and recommendations:

- The Site is located within a Wellhead Protection Area Quantity 2 (WHPA-Q2) and a Recharge Management Area identified by York Region.
- Historical hydrogeological investigations indicate that the Site is generally underlain by low-permeability glacial till deposits with localized sand and gravel seams. Groundwater conditions are consistent with the regional groundwater discharge setting that characterizes portions of the Whitchurch-Stouffville area.
- Historical groundwater monitoring data indicate groundwater elevations ranging from approximately 254.3 to 255.6 m ASL within the subject block. Test pit investigations completed within the development area generally encountered groundwater at depths greater than 4.5 m below ground surface, with localized seepage associated with a coarse sand and gravel unit observed in one test pit.
- The water balance assessment estimates that under pre-development conditions approximately 6,265 m^3/year of precipitation infiltrates into the subsurface and approximately 4,046 m^3/year leaves the Site as runoff.
- Under post-development conditions, infiltration is estimated to decrease to approximately 1,569 m^3/year, while runoff is expected to increase to approximately 15,318 m^3/year.
- The proposed development is therefore anticipated to result in an infiltration deficit of approximately 4,696 m^3/year and an increase in annual runoff of approximately 11,272 m^3/year relative to pre-development conditions.
- Comparison with the original WSP school-block water balance indicates that post-development infiltration increases from 1,453 m^3/year to 1,569 m^3/year (approximately 8%), demonstrating that the revised townhome block does not worsen the water balance performance previously assessed for the development.
- Although enhanced Low Impact Development (LID) measures are not currently proposed within the subject block, rooftop downspout disconnection with discharge to vegetated lot areas is considered feasible based on the available groundwater information. Assuming approximately 25% of rooftop runoff can be directed to landscaped areas for infiltration, the residual infiltration deficit could be reduced from approximately 4,696 m^3/year to approximately 2,786 m^3/year.
- Additional opportunities to offset the infiltration deficit include minimizing impervious surface coverage where feasible, maximizing landscaped areas, and incorporating lot-level infiltration practices that promote groundwater recharge.
- Review of the proposed grading plans indicates that basement slab and footing elevations are generally well above the interpreted groundwater elevations. Based on the available information and application of a conservative seasonal high groundwater adjustment, the minimum separation between the underside of footings and estimated maximum

groundwater levels is approximately 0.6 m, with greater separations present across most townhouse blocks.

- Based on the currently available groundwater information, significant groundwater-related construction constraints are not anticipated. Groundwater takings requiring active dewatering systems, such as wellpoints, eductor systems, or deep wells, are not expected during construction. Any groundwater encountered is anticipated to be manageable using conventional sump pumping methods.
- No adverse impacts to nearby municipal groundwater supply wells, private groundwater users, or groundwater-dependent natural features are anticipated as a result of the proposed development.
- As a precautionary measure, additional test pits or groundwater observations should be completed immediately prior to construction to confirm groundwater conditions and verify that basement and footing elevations maintain adequate separation from the seasonal high groundwater table.

4.2. QUALIFICATION OF THE ASSESSORS

Sudhakar Kurli, M. Sc., P. Geo., is a Senior Hydrogeologist and is a practicing member of the Professional Geoscientists of Ontario with over 20 years of hydrogeological experience working in the Greater Toronto Area, Southern Ontario and Alberta. He has experience in physical hydrogeology with foundational knowledge of land developments, groundwater resource assessments, landfill monitoring, well construction and design, groundwater flow modeling, water balance and construction dewatering assessments. Sudhakar also has extensive experience in preparing water taking and discharge plans for linear infrastructure projects, stormwater ponds and residential developments.

Robin Byers, P. Geo., B.Sc. is a Senior Hydrogeologist and is a practicing member of the Professional Geoscientists of Ontario with over 13 years of hydrogeological experience working in the Greater Toronto Area and Southern Ontario. He has experience in physical and chemical hydrogeology with foundational knowledge of well construction and design, groundwater modeling, pumping test analysis, and construction dewatering. Rob is also a qualified person as defined by O.Reg 63/16 for purposes of preparing water taking and discharge plans.

4.3. CERTIFICATION AND SIGNATURES

EnVision confirms the findings and conclusions and findings of the Hydrogeological Investigation.



Prepared by

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Reviewed by

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4.4. QUALIFIER

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The content and opinions contained in the report are based on the observations and/or information available to EnVision at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by EnVision and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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5. REFERENCES

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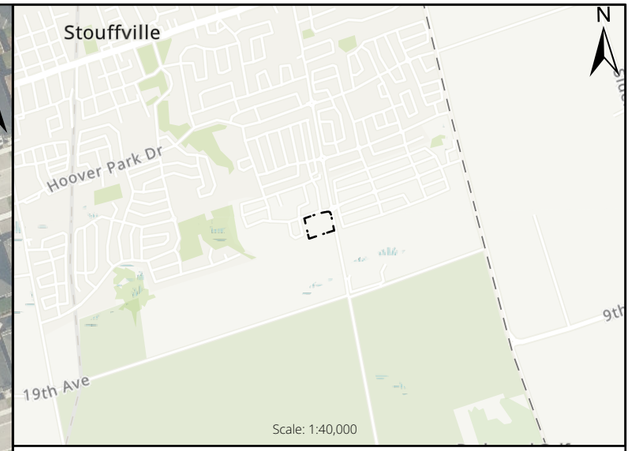
FIGURES

Prepared By: TanyaPeterson





LEGEND

SITE BOUNDARY

TITLE

SITE LOCATION PLAN

PROJECT

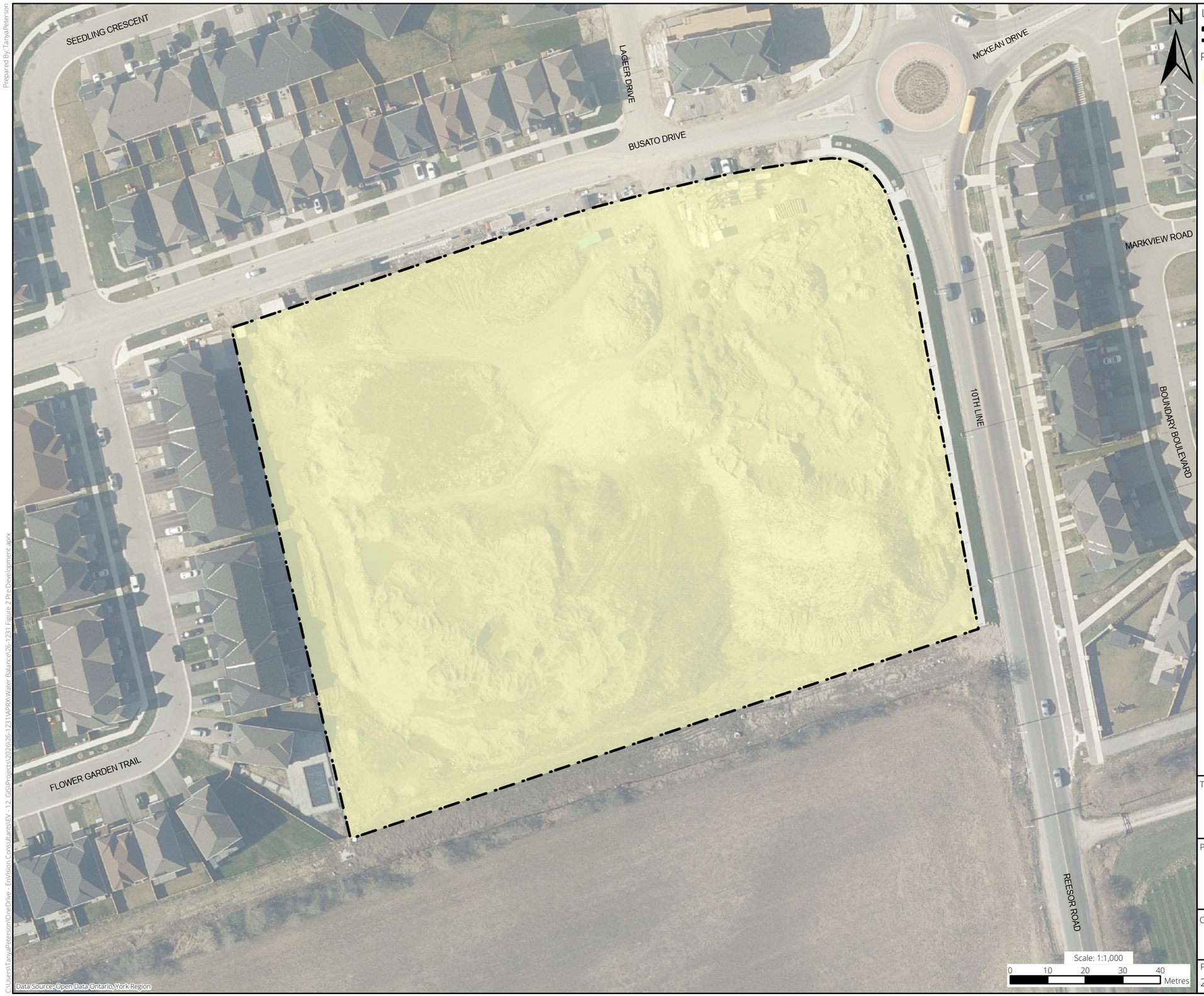
WATER BALANCE
L & M GARDENS BLOCK 224
STOUFFVILLE, ONTARIO

CLIENT

-

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
26-1231	JULY 2026	TP	RB	1

C:\Users\TanyaPeterson\OneDrive - EnVision Consultants\EV - 12_GIS\Projects\2026\26-1231\WPRX\Water Balance\26-1231 Figure 1 Site Plan.aprx



LEGEND

SITE BOUNDARY

PRE DEVELOPMENT LANDUSE:

OPEN AREAS

Pre Development Site Statistics:
Site Area: 24,552 sq.m.
Open Areas: 24,552 sq.m.

TITLE

PRE DEVELOPMENT SITE PLAN

PROJECT

WATER BALANCE
L & M GARDENS BLOCK 224
STOUFFVILLE, ONTARIO

CLIENT

-

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
26-1231	JULY 2026	TP	RB	2

Prepared By: TanyaPeterson

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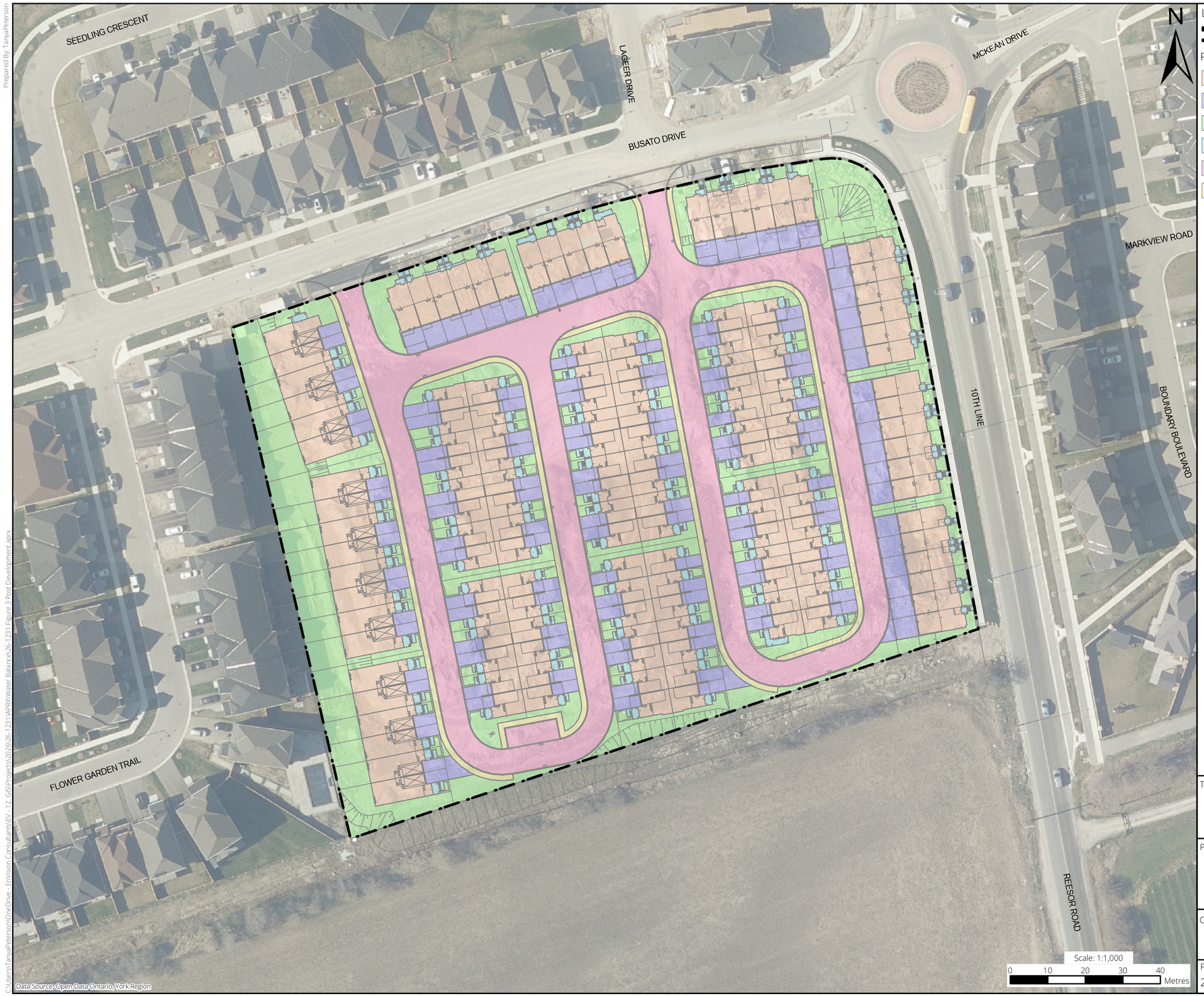


LEGEND

- SITE BOUNDARY

POST DEVELOPMENT LANDUSE:

- BUILDING
- DRIVEWAY
- LANDSCAPED
- PORCH / BALCONY
- ROAD
- SIDEWALK

Post Development Site Statistics:
Site Area: 24,552 sq.m.
Buildings: 8,869 sq.m.
Porch / Deck: 712 sq.m.
Road: 4,801 sq.m.
Amenity Balcony: 1,103 sq.m.
Driveway: 2,917 sq.m.
Landscaped: 6,150 sq.m.

TITLE

POST DEVELOPMENT SITE PLAN

PROJECT

WATER BALANCE
L & M GARDENS BLOCK 224
STOUFFVILLE, ONTARIO

CLIENT

-

PROJECT NO.	DATE	PREPARED BY	APPROVED BY	FIGURE
26-1231	JULY 2026	TP	RB	3

Prepared By: TanyaPeterson

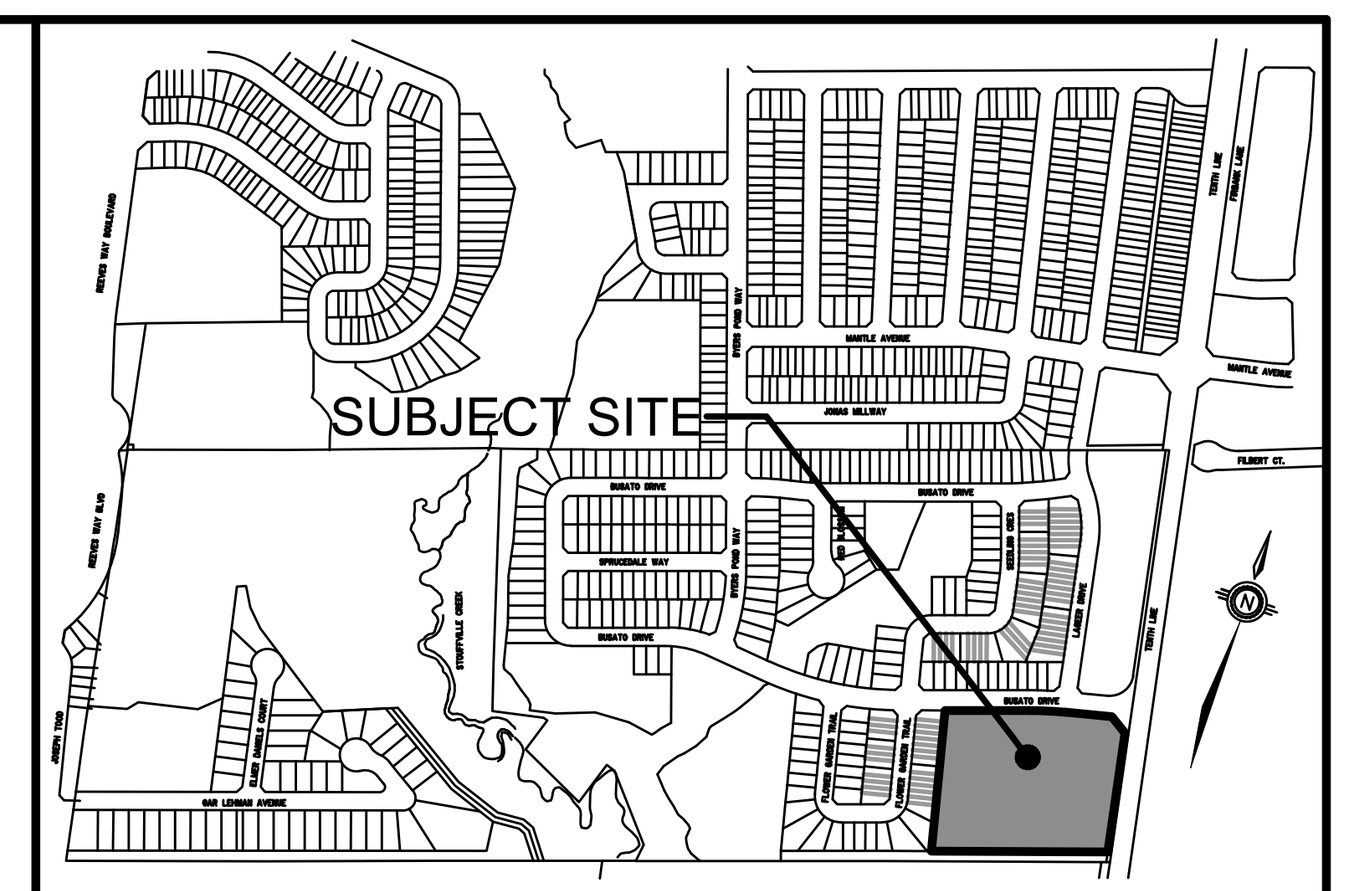
C:\Users\TanyaPeterson\OneDrive - EnVision Consultants\REV - 12_GIS\Projects\2026\26-1231\APRX\Water Balance\26-1231 Figure 3 Post Development.aprx

APPENDIX A:

Site Plan



REFER TO DRAWING No. SG-2



KEYMAP N.T.S.

LEGEND:

- SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED HYDRANT
- PROPOSED GRADE × 92.89
- EXISTING GRADE × 91.20
- DRAINAGE DIRECTION
- SLOPING
- MINIMUM UNDERSIDE OF FOOTING ELEVATION 136.86
- MAXIMUM SURFACE PONDING
- OVERLAND FLOW ARROW
- REFER TO DRAWINGS BY OTHERS FOR DETAILS BEYOND BLOCK 140
- FRONT DOWNSPOUTS TO BE CONNECTED TO THE STORM SERVICE CONNECTION. REAR DOWNSPOUTS TO DISCHARGE TO SURFACE SPLASH PADS.
- ALL DOWNSPOUTS TO BE CONNECTED TO THE STORM SERVICE CONNECTION.
- ALL DOWNSPOUTS TO BE CONNECTED TO THE STORM SERVICE CONNECTION VIA RESIDENTIAL PIPE AROUND THE TOWNHOUSE BLOCK.

BENCHMARK
ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM MTO BENCH MARK No 00819768488 HAVING A PUBLISHED ELEVATION OF 255.290 METRES.

TOWN REVIEWED

TOWN ENGINEER DATE:
TOWN OF WHITCHURCH–STOUFFVILLE

NOTE:
ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE. ALL PIPE SIZES IN MILLIMETRES.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
SORBARA/L&M G.P. INC.

MUNICIPALITY
TOWN OF WHITCHURCH-STOUFFVILLE
REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE
L&M GARDENS - BLOCK 140 SITE PLAN

SHEET TITLE
SITE GRADING PLAN - NORTH

SKA SABOURIN KIMBLE & ASSOCIATES LTD. CONSULTING ENGINEERS

DESIGNED CBO	DRAWN JPR	CHECKED RMS
SCALE 1:300	DATE AUGUST 2026	
PROJECT NUMBER 07:146	DWG. NUMBER SG-1	

PLOT DATE: August 6, 2026 4:48:30 PM
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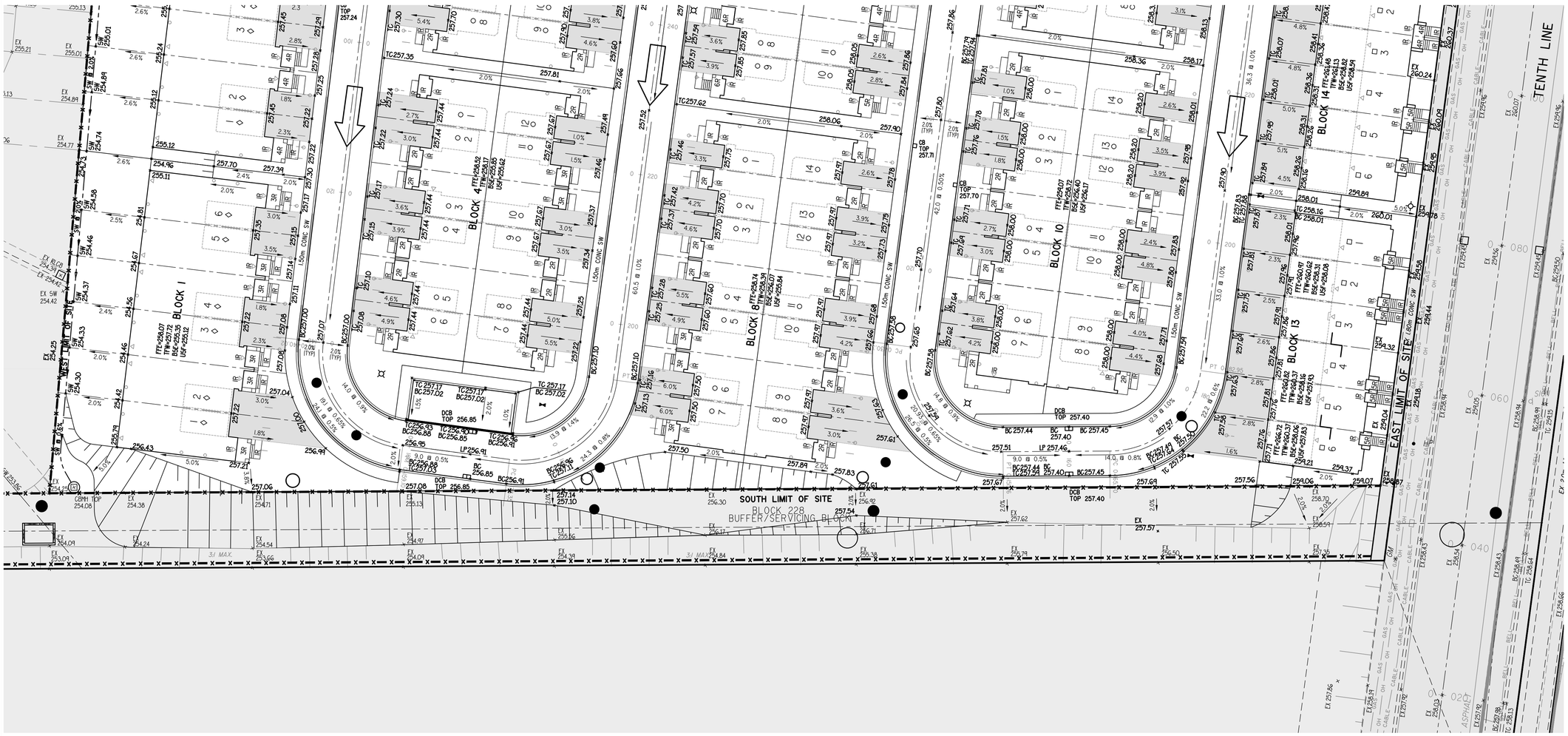
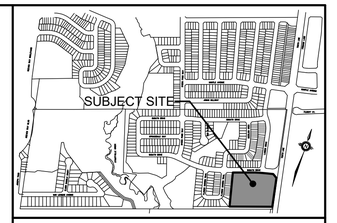
REFER TO DRAWING No. SG-I





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- ALL DOWNSPOUTS TO BE CONNECTED TO THE STORM SERVICE CONNECTION.
- ALL DOWNSPOUTS TO BE CONNECTED TO THE STORM SERVICE CONNECTION VIA RESIDENTIAL PIPE AROUND THE TOWNHOUSE BLOCK.

BENCHMARK
ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM MTO BENCH MARK No 0089768488 HAVING A PUBLISHED ELEVATION OF 255.290 METRES.

TOWN REVIEWED

TOWN ENGINEER
TOWN OF WHITCHURCH-STOUFFVILLE
DATE:

NOTE:
ALL DIMENSIONS AND ELEVATIONS IN METRES UNLESS NOTED OTHERWISE. ALL PIPE SIZES IN MILLIMETRES.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
SORBARA/L&M G.P. INC.

MUNICIPALITY
TOWN OF WHITCHURCH-STOUFFVILLE
REGIONAL MUNICIPALITY OF YORK

PROJECT TITLE
L&M GARDENS - BLOCK 140 SITE PLAN

SHEET TITLE
SITE GRADICING PLAN - SOUTH

SABOURIN KIMBLE & ASSOCIATES LTD. CONSULTING ENGINEERS

DESIGNED	DRAWN	CHECKED
CBO	JPR	RMS

SCALE	DATE
1:300	AUGUST 2026

PROJECT NUMBER	DWG. NUMBER
07:146	SG-2

PLOT DATE: August 6, 2026 4:51:29 PM
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APPENDIX B:

Water Balance Assessment Calculations

DETAILED WATER BALANCE CALCULATIONS		
L&M Gardens Subdivision		
1 Climate Information		
Precipitation	886	mm/a
Actual Evapotranspiration	526	mm/a
Water Surplus	360	mm/a
2 Infiltration Rates		
Table 2 Approach - Infiltration factors		
Topography: Flat Land	0.30	
Soil Type: predominantly sandy silt to silty sand till	0.40	
Cover: Open Land	0.10	
Total	0.80	
Infiltration (0.80 x 360)	288	
Run-off (360-288)	72	
Table 3 Approach - Typical Recharge Rates		
Coarse Sand and Gravel	>250	mm/a
Fine to medium sand	200-250	mm/a
Silty sand to sandy silt	150-200	mm/a
Silt	125-150	mm/a
Clayey Silt	100- 125	mm/a
Clay	<100	mm/a
Site development area is underlain predominantly by sandy silt to silty sand soils		
Based on the above, the recharge rate is typically	150-200	mm/a
3 Pre-Development Property Statistics	ha	m2
Paved Area	0.000	0
Roof Area	0	0
Landscape Area	2.45	24552
Total	2.450	24552
4 Post-Development Property Statistics	ha	m2
Paved Area	0.8820	8821
Total Building Roof Area	0.9580	9581
Landscape Area	0.615	6150
Total	2.455	24552

5. Annual Pre-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	0	0	0	0	0
	Roof Area	0	0	0	0	0
Pervious Areas	Landscape Area	24552	21753	11442	6265	4046
		24552	21753	11442	6265	4046
Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.						

6. Annual Post-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	8821	7815	782	0	7034
	Roof Area	9581	8489	849	0	7640
Pervious Areas	Landscape Area	6150	5449	3235	1569	645
		24552	21753	4865	1569	15318
Assuming no infiltration occurring in paved and roof areas, 10% of precipitation to be evaporated from paved and general roof areas.						

7. Comparision of Pre- and Post -Development

	Precipitation (m^3)	Evapotranspiration (m3)	Infiltration (m^3)	Run-off (m^3)
Pre-Development	21753	11442	6265	4046
Post-Development	21753	4865	1569	15318
Change in Volume		6577	4696	11272
% Change			75	279

8. Requirement for Infiltration of Roof Run-off

Volume of Pre-Development Infiltration (m^3/annum)	6265
Volume of Post-Development Infiltration (m^3/annum)	1569
Deficit from Pre to Post Development Infiltration (m^3/annum)	4696
Percentage of Roof Runoff required to match the pre-development infiltration (%)	31